Supporting Document 1-3

Hydrogeology Existing Conditions Report

Twin Creeks Environmental Centre Landfill Optimization Project Environmental Assessment

WM Canada

Watford, Ontario

May 2026

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Revision History

Revision	Date
1	November 2023
2	July 2025
3	May 2026

Executive Summary

RWDI AIR Inc. (RWDI) was contracted by HDR Corporation on behalf of WM Canada (WM) to prepare this Hydrogeologic Existing Conditions Report for the Twin Creeks Environmental Centre (TCEC) Landfill Optimization Project Environmental Assessment (EA). This work is being completed per the approved Terms of Reference (ToR) dated January 7, 2022, as amended on March 30, 2022 (ToR). The purpose of this report is to present the existing hydrogeology (groundwater) conditions of the TCEC site and surrounding area.

The TCEC is located at 5768 Nauvoo Rd. approximately 1 km north of the Village of Watford in the Township of Warwick, Ontario. The TCEC is bounded by agricultural area on all sides, with the closest residential area being in Watford in the south.

There are approximately 5 years of approved landfill airspace capacity remaining at the TCEC (i.e., capacity will be reached in approximately 2031). The proposed optimization would provide additional airspace of approximately 14.3 million cubic metres (m^3), which could extend the site life by approximately 12 years (from 2031 to 2043) and may be achieved through alternative landfill configurations or alternative methods within the existing 301-hectare TCEC site area. No changes are proposed to the size of the TCEC site area, approved service area, or annual fill rate.

The hydrogeologic conditions of the TCEC were evaluated to document the Existing Conditions as it pertains to the groundwater quality at the TCEC in consideration of the On-Site and Off-Site Study Areas for the TCEC. Refer to **Attached Figure 1** for an outline of the Study Areas.

The On-Site Study Area consists of the TCEC property. Within the On-Site Study Area is an established network of groundwater monitoring wells that are strategically located to evaluate for subsurface groundwater impacts from landfill leachate. The TCEC landfilling areas are divided as: 1) the Existing Landfill, and 2) the Expansion Landfill. The Existing Landfill consists of a nearly 30 ha area where historical landfilling occurred. The Existing Landfill closed to the receipt of waste approximately 10 years ago. The Existing Landfill is located along the northeastern portion of the TCEC. The Expansion Landfill is the landfilling area approved in 2008 that consists of a much larger landfilling footprint than the Existing Landfill and is the currently active landfill.

To document the Existing Conditions of the On-Site Study Area, an evaluation of historical and up to 2022 field monitoring data was undertaken, which included a review of chemical analytical results, liquid level measurements, and chemical constituent trend analyses. Subsurface geologic conditions were also documented and reviewed with comparisons made to the previous EA effort in 2005 (Jagger Hims Limited, 2005).

Leachate level monitoring provides an understanding of Existing Conditions at the TCEC. Leachate generation rates thus far for the Expansion Landfill are below the

predicted generation rates from the 2008 D&O Report and are projected to remain below historical predictions for the next 5 years.

Leachate quality monitoring provides a tracking mechanism to evaluate chemical trends within the waste cells, as well as an evaluation toward the effectiveness of the monitoring program over time.

Leachate quality monitoring completed for the waste cells of the Existing Landfill is consistent with historical monitoring findings. Leachate quality within the Expansion Landfill shows that most tested parameters are showing increasing trends. Expansion Landfill leachate constituent concentrations are typically greater than within the Existing Landfill, but are below the predicted peak leachate values tabulated within Table 6-9 of the 2008 D&O.

The selected Primary and Secondary Leachate Indicator List (PLIL and SLIL) parameters for evaluating potential leachate effects on groundwater quality as outlined in the 2007 EMP, including the triggering mechanisms established to evaluate groundwater quality, remains relevant based on then-predicted leachate and groundwater quality compared to their respective Existing Conditions. The monitoring program as it relates to the Compliance Leachate and Groundwater Monitoring Programs is effective in evaluating potential landfill leachate effects to groundwater quality based on leachate and groundwater Existing Conditions.

Groundwater quality in each of the assessed hydrostratigraphic units shows acceptable quality that is not negatively impacted by landfill leachate or operations.

The projected Contaminating Lifespan (CLS) for the Expansion Landfill under Existing Conditions is 69 years and is calculated to be 99 years for At Capacity conditions.

The Off-Site Study Area encompassed the completion of a Water Well Survey of Ministry of Environment, Conservation and Parks (MECP)-documented Ontario Water Well Records (WWRs) for nearby properties. The effort was to update the previously established database since its last update as part of the 2005 EA efforts.

Based on the evaluated data, groundwater users within the Off-Site Study Area are not impacted by, nor causing impacts to, groundwater quantity as it relates to the operation of the TCEC.

Acronyms, Units and Glossary

Acronyms

Acronym	Definition
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CLS	Contaminating Lifespan
COD	Chemical Oxygen Demand
D&O	2008 Design & Operations Report for the Expansion Landfill
DOC	Dissolved Organic Carbon
EA	Environmental Assessment
EAA	*Environmental Assessment Act*
ECA	Environmental Compliance Approval
EMP	Environmental Monitoring Plan
LMP	Leachate Management Plan, dated December 20, 2019
LW	Leachate Well
MECP	Ministry of Environment, Conservation and Parks
ODWS	Ontario Drinking Water Standards
OW	Observation Well
PDL	Primary Drainage Layer
PLIL	Primary Leachate Indicator List
PTTW	Permit-To-Take-Water
RDL	Reportable Detection Limit (laboratory data-related)
SCRCA	St. Clair Region Conservation Authority
SDL	Secondary Drainage Layer
SGRA	Significant Groundwater Recharge Area
SLIL	Secondary Leachate Indicator List
TCEC	Twin Creeks Environmental Centre
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
VOC	Volatile Organic Compound
Waste ECA	Amended Environmental Compliance Approval (ECA) No. A032203, dated June 20, 2025
WM	WM Canada
WWR	Ontario Water Well Record

Units

Unit	Definition
ha	Hectare
km	Kilometre
kg	Kilogram
L	Litre
m	Metre
mASL	Metres Above Sea Level
mbgs	Metres below ground surface
m^3	Cubic metres
M	Million
mg	Milligram
n	Number of wells considered
ppm	Parts per million
µg	Microgram
µm	Micrometer

Glossary

Term	Definition
Approval	Permission granted by an authorized individual or organization for a project to proceed. This may be in the form of program approval, certificate of approval or provisional certificate of approval.
Capacity (Disposal Volume)	The total volume of air space available for disposal of waste at a landfill site for a particular design (typically in m^3); includes both waste and daily cover materials, but excludes the final cover.
Composting	The controlled microbial decomposition of organic matter, such as food and yard wastes, in the presence of oxygen, into finished compost (humus), a soil-like material. Humus can be used in vegetable and flower gardens, hedges, etc.
Composting facility	A facility designed to compost organic matter either in the presence of oxygen (aerobic) or absence of oxygen (anaerobic).
Environment	As defined by the *Environmental Assessment Act*, environment means: • air, land or water; • plant and animal life, including human life; • the social, economic and cultural conditions that influence the life of humans or a community; • any building, structure, machine or other device or thing made by humans; • any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities; or • any part or combination of the foregoing and the interrelationships between any two or more of them (ecosystem approach).
Environmental Assessment (EA)	A systematic planning process that is conducted in accordance with applicable laws or regulations aimed at assessing the effects of a proposed project on the environment.
Evaluation criteria	Evaluation criteria are considerations or factors taken into account in assessing the advantages and disadvantages of various alternatives being considered.

Units

Unit	Definition
Existing Landfill	The landfill along the eastern portion of the TCEC that was the 'Warwick Landfill' that opened in 1972.
Expansion Landfill	The landfill west of the Existing Landfill at the TCEC that was approved for construction in 2008, with landfilling commencing in late 2009.
Greenhouse gas (GHG)	Any of the gases whose absorption of solar radiation is responsible for the greenhouse effect, including carbon dioxide, methane, ozone, and the fluorocarbons.
Guideline B-7	Groundwater quality management tool adopted by the MECP for the reasonable use of groundwater resources adjacent to waste disposal sites (Procedure B-7-1). The reasonable use concept outlines the MECP's expectation of sites that discharge contaminants that could impact groundwater resources and provides guidance toward the establishment of contaminant attenuation zones (CAZ).
Indicators	Indicators are specific characteristics of the evaluation criteria that can be measured or determined in some way, as opposed to the actual criteria, which are fairly general.
Landfill gas (LFG)	The gases produced from the wastes disposed in a landfill; the main constituents are typically carbon dioxide and methane, with small amounts of other organic and odour-causing compounds.
Landfill site	An approved engineered site/facility used for the final disposal of waste. Landfills are waste disposal sites where waste is spread in layers, compacted to the smallest practical volume, and typically covered by soil.
Leachate	Liquid that drains from solid waste in a landfill and which contains dissolved, suspended and/or microbial contaminants from the breakdown of this waste.
Mitigation	Measures taken to reduce adverse impacts on the environment.
Project	Is defined in the *Environmental Assessment Act* as: one or more enterprises or activities or a proposal, plan or program in respect of an enterprise or activity.
Proponent	A person who: • carries out or proposes to carry out a project; or • is the owner or person having charge, management or control of a project.
Receptor	The person, plant or wildlife species that may be affected due to exposure to a contaminant.
Terms of Reference (ToR)	A terms of reference is a document that sets out detailed requirements for the preparation of an Environmental Assessment.
Waste	Refuse from places of human or animal habitation; unwanted materials left over from a manufacturing process.

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Contents

Tables

Figures

Attached Figures

Appendices

1 Introduction

This report presents a description of the Existing Conditions for the Hydrogeology for the WM Canada (WM) Twin Creeks Environmental Centre (TCEC) Landfill Optimization Project in support of the environmental assessment (EA). The purpose of the EA is to assess the potential effects of the proposed landfill optimization on the environment. The EA is being carried out in accordance with the requirements of the *Environmental Assessment Act* (*EAA*) and Terms of Reference (ToR), which was approved by the Ministry of Environment, Conservation and Parks (MECP) on December 13, 2022.

WM, the owner and operator of the TCEC in Watford, Ontario, has initiated the EA seeking approval to optimize the landfill design and operation, maximizing the use of the constructed infrastructure and the significant investment made at the TCEC. There are approximately 5 years of approved landfill airspace capacity remaining at the TCEC (i.e., capacity will be reached in approximately 2031). The proposed optimization would provide additional airspace of approximately 14.3 million cubic metres (m^3), which could extend the site life by approximately 12 years (from 2031 to 2043) and may be achieved through alternative landfill configurations or alternative methods within the existing 301-hectare (ha) TCEC site area. No changes are proposed to the size of the TCEC site area, approved service area, or annual fill rate.

There is a need for the continued development of the TCEC as it is a significant component of the provincial waste management network and infrastructure, which is lacking in sufficient and secure long-term disposal capacity. Optimizing the future development of the TCEC allows for on-going sustainable business operations and continued provision of essential financial support for community services and programs.

The approved ToR included a preliminary description of the Existing Conditions within the area surrounding the TCEC, with the commitment that a more detailed description of existing environmental conditions would be prepared as part of the EA. In accordance with the approved ToR, additional investigative studies were carried out as necessary to generate a more detailed description of the existing natural, cultural, socio-economic, and built environments for use in the assessment of the effects of the alternative methods for the TCEC Landfill Optimization Project during the EA.

This Hydrogeology Existing Conditions Report is one component of the EA. The EA Study Report will incorporate the information presented herein as appropriate, and this report will be included with the EA Study Report as a supporting document.

2 TCEC and Study Areas

The TCEC is located at 5768 Nauvoo Road approximately 1 km north of the Village of Watford in the Township of Warwick, within the County of Lambton. The TCEC lies to the north of the community of Watford and is generally bounded by Confederation Line to the south, Nauvoo Road to the west, Zion Line to the north, and agricultural lands to the east. The TCEC is a regional facility that provides safe and convenient disposal services for communities, businesses and industries serving the Province of Ontario. The landfill is approved to receive municipal, industrial, commercial, and institutional solid non-hazardous wastes generated, including non-hazardous contaminated soil.

Within the TCEC are two landfilling areas. The landfill area along the eastern portion of the TCEC was the former 'Warwick Landfill' that began waste infilling around 1972 and is termed the "Existing Landfill". The landfilling area that is west of the Existing Landfill at the TCEC is the "Expansion Landfill". The Expansion Landfill was approved for construction in 2008, with landfilling commencing in late 2009.

The TCEC is engineered with environmental protection systems that meet or exceed regulatory requirements and are subject to highly regulated monitoring and reporting requirements. Systems include engineered liners and covers, leachate collection and removal, landfill gas collection and control, and on-site leachate disposal through phytoremediation. The TCEC provides landfill gas, for heating, to the 40-acre greenhouse facility adjacent to the landfill property. Prior to this, all landfill gas was flared.

Leachate that is generated in the waste is conveyed toward a perimeter leachate collection system. WM received approval to treat leachate through a phytoremediation system consisting of a 9.3 ha Poplar System planted on the existing landfill cap in 2003. Surplus leachate is trucked off-site to approved wastewater treatment plants.

During the EA, Existing Conditions and potential effects will be considered in the context of two Study Areas: on-site and off-site. The general Study Areas for the purposes of the EA and in context to the Regional Setting, are shown on **Attached Figure 1**. For details pertaining to the overall groundwater and leachate environmental monitoring program setting for the TCEC, refer to the **Attached Figure 2**.

- On-Site Study Area: the existing TCEC.
- Off-Site Study Area (vicinity): the lands within the vicinity of the TCEC extending approximately 1 km from the TCEC's property boundaries. It is noted that the regional geologic area (5 km to 10 km from site) will be documented, but the effects of the Landfill Optimization Project would not be expected beyond the Off-Site Study Area.

Both the On-Site and Off-Site Study Areas are geologically situated within till plains, with the remnants of a shoreline scarp located to the west near County Road 79 (Nauvoo Road). The Regional Setting within 5 to 10 km's of the TCEC consists of the

southeastern portion of the Horseshoe Moraines physiographic region. The Horseshoe Moraines consist of a large horseshoe-shaped landform that includes a series of moraines aligned roughly parallel to the Lake Huron shoreline. Bear Creek to the west and Brown Creek/Kersey Drain to the east provide a slightly rolling topography around the TCEC. This rolling topography is further enhanced by the local tributaries and drainage swales. Further south, east, and west are lands located within the St. Clair Clay Plain physiographic region, typically defined as fine-grained clay and silt soils with characteristically poor drainage qualities.

3 Methods

This Hydrogeology Existing Conditions Report was developed based on the evaluation criteria, indicators, and data sources included in the approved ToR, which were developed in consultation with government agencies and other stakeholders. The evaluation criteria, rationale, indicators and data sources used for Hydrogeology as per the approved ToR are provided in **Table 3-1** below.

Table 3-1. Evaluation Criteria, Indicators and Data Sources for Hydrogeology

Evaluation Criteria	Rationale	Indicators	Data Sources
Natural Environment			
Hydrogeology			
Groundwater Quality	Contaminants associated with waste disposal at the TCEC have the potential to enter the groundwater and impact on-site groundwater. Acceptable groundwater quality, which is 80% of the Guideline B-7 criteria for the PLIL parameters, must be shown at the TCEC boundaries.	• Predicted effects on groundwater quality on-site from increased waste quantities disposed within the Expansion Landfill • Predicted contaminating lifespan	• Applicable regulatory documentation (i.e., Amended TCEC ECAs, MECP guidelines, technical standards, etc.). • Landfill Environmental Monitoring Plan (Jagger Hims Limited, 2007) (EMP), and as amended per MECP approval. • Historical Hydrogeological studies. • Liquid level monitoring data for on-site groundwater monitoring wells and leachate monitoring stations. • Groundwater quality monitoring data at on-site monitoring wells as outlined in the EMP. • Quarterly and Annual TCEC compliance monitoring reports. • Leachate generation and management assessments, as outlined in the Leachate Management Plan, (March 2023) (HDR, 2023). • Proposed facility characteristics. • Water well survey within the Off-Site Study Area.

Evaluation Criteria	Rationale	Indicators	Data Sources
Groundwater Quantity	The landfill optimization has the potential to affect the established hydraulic trap design for the Expansion Landfill and understood groundwater flow patterns on-site and off-site	• Predicted effect of landfill optimization on groundwater flow and quantity both on-site and off-site.	• Applicable regulatory documentation (i.e., Amended TCEC ECAs, MECP guidelines, technical standards, etc.) • Liquid level monitoring data for on-site groundwater monitoring wells and leachate monitoring stations. • Historical Hydrogeological studies. • Water well records to be reviewed to understand the effect on groundwater quantity on-site and off-site as result of off-site water well use in the area. • Quarterly and Annual TCEC compliance monitoring reports. • Water taking tracking from the Secondary Drainage Layer. • Proposed facility characteristics. • Water well survey within the Off-Site Study Area.

3.1 Data Collection and Review

This review of hydrogeologic existing conditions includes analytical data and historical hydrogeological sources noted in **Table 3-1** to provide information as it relates to:

- The correlation of and updates to historically defined hydrogeological site conditions to more recent borehole advancement efforts completed at the TCEC;
- Groundwater flow within each hydrostratigraphic unit as a result of waste being disposed at the TCEC;
- Leachate and groundwater quality chemical trends; and
- The contaminating lifespan (CLS) of the Expansion Landfill.

Leachate and groundwater chemical analytical data collected at the TCEC from 2003 to 2022 was compiled into a database for statistical and data trend interpretations. The interpretations considered the following datasets:

- Chemical data historical concentration ranges (i.e., maximums & minimums);
- Chemical data historical geometric concentration and value means; and
- Chemical data trends.

The assessment considered current potential effects of landfilling operations on groundwater quality and quantity on-site. The findings of this Existing Conditions assessment allow for base line understanding for use in evaluating potential effects that the Landfill Optimization Project may have on groundwater quality and quantity.

3.2 Field Studies

Field monitoring and evaluation activities have been ongoing at the TCEC per the Environmental Monitoring Plan (EMP) (Jagger Hims Limited, 2007), as required by the Amended Environmental Compliance Approval (ECA) No. A032203, dated June 20, 2025 (Waste ECA). The monitoring entails an evaluation of the leachate collection systems and quality of the groundwater around the TCEC. These field studies are further described below. On-Site field studies/monitoring beyond the routine compliance monitoring were not required, as the routine monitoring and analysis of historical groundwater and leachate quality data was determined to be sufficient to characterize and describe the Hydrogeologic Existing Conditions. On-site studies/monitoring as required by the Waste ECA, are outlined in **Section 3.2.1**. Off-site field studies, which were completed as part of the EA efforts are outlined in **Section 3.2.3**.

3.2.1 On-Site Hydrogeology Field Studies/Monitoring

The on-site hydrogeology field studies, which are governed by the Waste ECA, consisted of monitoring leachate and groundwater conditions and quality as detailed below.

3.2.1.1 Liquid Levels – Leachate

- Daily liquid level measurements during TCEC operation from within the Primary Drainage Layer (PDL) pumping stations of the Expansion Landfill.
- Semi-annual (May and November) leachate liquid levels measured from within the leachate pumping stations of the Expansion Landfill, as well as from the maintenance hole/pumping stations and select monitoring well locations for the Existing Landfill.

3.2.1.2 Quality – Leachate

- Quarterly and semi-annual leachate samples collected from the Equalization Tank.
- Annual (May) leachate samples collected from within the leachate pumping stations of the Expansion Landfill, as well as from select maintenance hole/pumping stations and monitoring well locations for the Existing Landfill.

3.2.1.3 Liquid Levels – Groundwater

- Monthly liquid level measurements of the Secondary Drainage Layer (SDL) from the Expansion Landfill pumping stations.
- Semi-annual to annual liquid level measurements for groundwater from within select monitoring wells at the landfill.

3.2.1.4 Quality – Groundwater

- Semi-annual to annual groundwater samples collected from within select monitoring wells at the landfill, including off-site monitoring location Cemetery Well.
- Biennial (every other year) groundwater samples collected from the interface aquifer monitoring wells for Volatile Organic Compounds (VOCs), including off-site monitoring location Cemetery Well.
- Although the Cemetery Well is located approximately 80m south of the southern TCEC property line and approximately 80m from Nauvoo Road, the assessment of the Cemetery Well analytical data was completed in conjunction with the assessment of the on-site monitoring wells, as required by the sampling program outlined in the EMP for the TCEC.

The on-site hydrogeology field studies/monitoring are described in **Section 4**.

3.2.2 Rationale for On-Site Monitoring Frequency

The groundwater monitoring component of the TCEC's Environmental Monitoring Plan (EMP) was designed based on well understood hydrogeological conditions. The clayey soil overburden has a very low hydraulic conductivity of approximately $1x10^{-10}$ m/s (or 3 mm/year), which significantly reduces the rate to which groundwater (leachate) and contaminants can migrate. Clayey soils also have natural absorptive characteristics, which will further remove contaminants (such as metals, inorganics, and organics) from migrating plumes. Groundwater monitoring frequency is optimized in consideration of the low hydraulic conductivity clayey soils and expected contaminant migration rates. For example, sampling groundwater semi-annually (or approximately every 6 months) will provide sufficient time for groundwater to recover in a well such that the next representative sample can be collected. Groundwater may take several weeks to several months to recover to static conditions in these very fine-grained soils, as seen at the TCEC.

Liquid levels are measured monthly from pumping stations of the SDL (e.g., PS2, PS4, PS6, and PS8) for the Expansion Landfill. Levels within the SDL would be the first to be influenced by the levels within the PDL.

Daily leachate levels are automatically recorded (via pressure transducers) within the PDL of the Expansion Landfill as leachate levels are subject to more rapid changes than in groundwater because waste has a much greater hydraulic gradient allowing quicker responses to fluctuating levels due to precipitation infiltration. Moreover, daily levels at the pumping stations (PS1, PS3, PS5, and PS7) provide information toward hydraulic containment, which is the primary basis for which the Expansion Landfill maintains environmental compliance to protect groundwater resources at the TCEC.

VOCs are tested biennially in groundwater for the Interface Aquifer (IA). Most Active Aquitard (AA) and Interstadial Silt & Sand (ISS) wells are sampled annually for VOCs. Select wells within both the AA and ISS are also sampled for VOCs semi-annually. The AA and ISS wells are sampled more frequently as these groundwater

hydrostratigraphic units have a greater potential to be impacted by landfill leachate compared to its deeper counterpart wells installed within the IA. Beneath the waste mound of the Expansion Landfill there is a minimum of 20 m clayey soils, which act as a natural protective layer (secondary liner (SL)) to preclude leachate migration to the IA beneath the TCEC. Moreover, historical monitoring data show that VOCs are very rarely detected in the groundwater at the TCEC, and when detected, are at concentrations near the laboratory detection limit, and satisfy the established trigger criteria. It is noted that based on the established monitoring prescribed by the EMP, VOCs have never been detected in the groundwater within the IA at the TCEC.

The EMP for the TCEC does allow flexibility for the monitoring program to adapt to changing conditions and to address emerging trends that may be cause for concern.

3.2.3 Off-Site Hydrogeology Field Studies/Monitoring

Other than as noted in **Section 3.2.2**, no supplemental off-site field studies were required to further evaluate hydrogeologic Existing Conditions. As mentioned previously, though the Cemetery Well is located off-site to the TCEC, it is considered part of the groundwater quality evaluation and forms part of the landfill EMPs monitoring program.

3.2.3.1 Water Supply Well Property Owner Survey

Within the Off-Site Study Area, a water supply well survey (Well Survey) was prepared for Well Owners who have a MECP-documented water supply well record (i.e., on the Ontario WWR) within the Off-Site Study Area.

Further details pertaining to the Well Survey are provided in **Section 4.9**.

3.3 Characterization of Existing Conditions

The Existing Conditions as it relates to hydrogeology were characterized as follows:

1. Information collected from the sources identified in **Table 3-1** were reviewed;
2. Field studies described in **Section 3.2** were evaluated in the context of existing hydrogeological conditions at the TCEC; and
3. Information from all sources was compiled and interpreted.

3.3.1 On-Site Study Area Characterization

For the groundwater quality assessment, Existing Conditions for the On-Site Study Area were defined using the established groundwater quality compliance monitoring completed per the EMP.

The groundwater quality monitoring program for the TCEC is developed to assess that groundwater quality that moves beyond the TCEC boundary is not unacceptably degraded in comparison to the background groundwater quality that naturally/normally flows onto the TCEC site property.

3.3.2 Off-Site Study Area Characterization

The Off-Site Study Area characterization efforts consisted of the completion of a water supply Well Survey.

4 Description of Existing Conditions

The evaluation of Hydrogeology Existing Conditions considers the following:

- Description of the geological setting;
- Description of the hydrogeological setting at the TCEC;
- Description of the hydraulic trap concept for the Expansion Landfill including supporting liquid level monitoring data;
- Evaluation of leachate quality for both the Existing and Expansion Landfills;
- Overview of leachate management practices and generation rates;
- Evaluation of groundwater flow at the TCEC;
- Evaluation of groundwater chemical analytical data; and,
- Consideration of the Expansion Landfill's CLS.

Though there is a CLS associated with the Existing Landfill, it is of a much smaller period compared to the Expansion Landfill. As such, the Expansion Landfill's CLS was considered toward the Existing Conditions assessment.

The evaluation of leachate and groundwater chemical analytical data was completed considering the following aspects:

- Historical concentration ranges (i.e., maximums & minimums);
- Historical geometric concentration and/or value means; and,
- Chemical analytical trends.

4.1 Geologic Setting

4.1.1 Overview

On-Site geologic conditions were characterized by Jagger Hims Limited (JHL) and described in the document entitled *Warwick Landfill Expansion Environmental Assessment, Hydrogeologic Assessment* (JHL, September 2005) (2005 Hydrogeologic Report), prepared for WM.

In areas not affected by construction activities, the thousands of years old natural subsurface geologic conditions are stable and remain constant at the TCEC. Thus, previously documented subsurface geological conditions presented within the 2005 Hydrogeologic Report remains relevant and are therefore, reiterated below.

Additionally, where applicable, the previously understood geologic subsurface conditions was supplemented with information acquired by various subsurface data collected to date.

The 2005 Hydrogeologic Report discussed subsurface geological conditions observed for monitoring wells sequentially numbered up to location OW70. Since 2005, several monitoring locations and/or monitoring wells have been installed.

- Monitoring locations OW71 to OW85, as well as GP1 to GP10 have since been installed at the TCEC. It is noted that monitoring location OW74 (installed in 2008) was approved for decommissioning as part of Expansion Landfill construction activities.
- A few historical monitoring well locations that were damaged and required decommissioning, were subsequently replaced as OW16-5, OW39A-26, OW40D-4, OW40A-7, OW40A-28, OW49-29, OW54A-4, OW58-6, OW58-17, OW59-6, OW62-5, and OW70B-5.

Borehole logs and well installation details for existing monitoring wells are presented in **Appendix A**. Construction details of the monitoring wells at the TCEC including depth, screen length, fill pack interval, etc., are included in **Table A-1**.

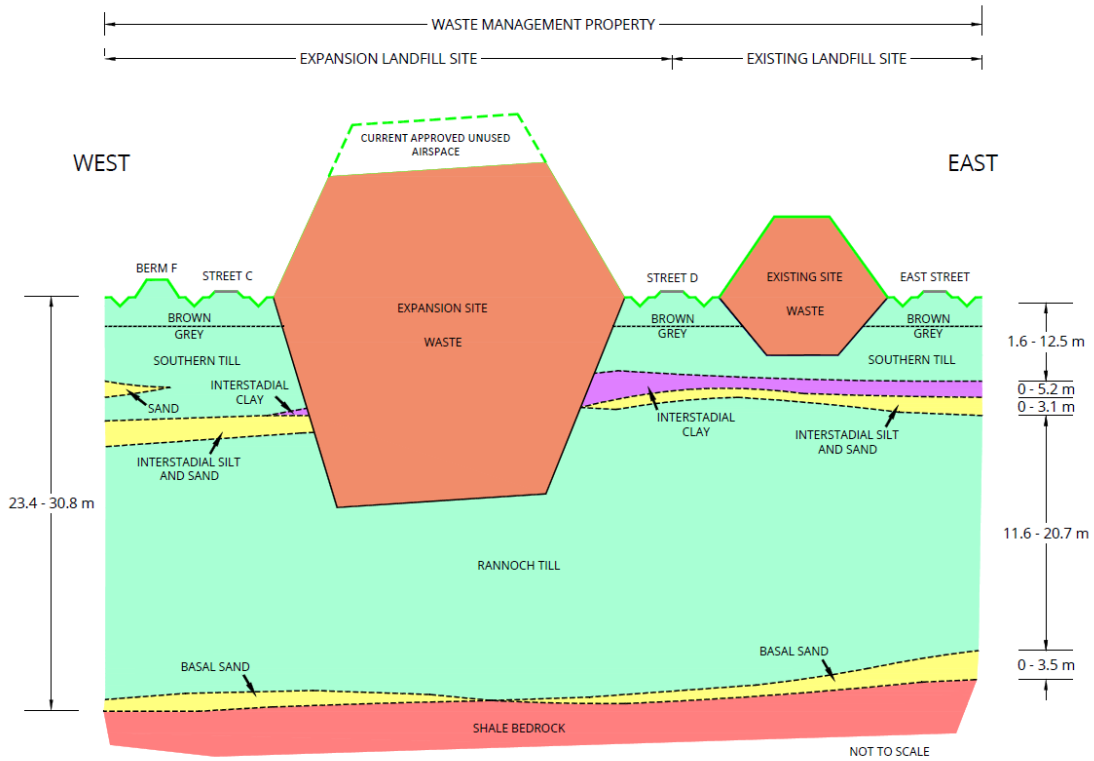
The observed drift thickness at the TCEC (excluding the presence of waste) ranges from 23.4 m to 30.8 m, reflects the influence of the bedrock topography and the surficial topography and is within the interpreted range for drift thickness based on the regional mapping. Thickness is generally greater along the topographic divide that centrally transects the TCEC in a northwest-southeast direction and is less toward the bedrock high to the northwest, and less toward topographic lows in the area of Kersey Drain to the southeast and the Van Kessel Drain to the southwest (for general overview of this divide and drain locations refer to **Attached Figure 8**).

The On-Site Study Area geologic stratigraphy is comprised of a thin layer of topsoil or imported fill material, underlain by the following main naturally occurring geologic units:

1. The Southern Till;
2. Interstadial deposits;
3. The Rannoch Till; and
4. Bedrock and the overlying basal sand.

These units are depicted in the schematic drawing below and are further described in the following sections. Geologic cross-sections for the site are provided in **Attached Figures 3** through **6**. The geologic cross-sections also depict the direction of groundwater flow within the Interface Aquifer (bedrock) hydrostratigraphic unit. Cross-section lateral planes are depicted on **Figure 4-1**.

Figure 4-1. Cross-Section Lateral Planes



4.1.2 Topsoil & Imported Fill

A surficial layer of topsoil occurs in areas undisturbed by the landfill waste and related features. The topsoil layer varied in colour between light brown and black and was generally clayey silt to silty clay in texture. Where identified in the subsurface information, the thickness of the topsoil layer ranged from 0.1 m to 1.5 m, with an average thickness of about 0.3 m (number of wells considered (n) n=25). In developed areas the topsoil has been removed and replaced with fill material.

4.1.3 Southern Till

The **Southern Till** unit consists of silty clay to clayey silt with trace amounts of disseminated sand and gravel. Occasional discontinuous layers or lenses of sand were observed within this unit. At the TCEC, this unit is continuous and ranges in thickness from approximately 1.6 m to 12.5 m with an average thickness of about 4.2 m (n=78).

The clayey silt to silty clay unit changes in colour with depth. The upper portion is generally brown to mottled brown in colour with grey, orange, and black. With depth the colour grades to a grey-brown, then grey. The brown and mottled portion of the unit (brown zone) is attributed to weathering effects, while the deeper grey portion of the unit (grey zone) is identified as unweathered. A transitional zone of grey-brown occurs between the weathered and unweathered soil.

The upper 1.6 m to 5.0 m of the Southern Till is weathered and is generally identified by a brown colour. The brown zone is typically blocky and friable in structure, contains roots, rootlets, and root casts, and numerous soil fractures. Both the frequency and interconnection of the fractures decrease with depth. The fractures were identified by discolouration relative to the surrounding silty clay to clayey silt matrix. The soil fractures are numerous near ground surface and decrease in frequency with depth.

Within the transitional zone between the brown and grey zones, the colour gradually changes from brown to grey. The frequency of roots, rootlets, and root casts decreases with depth and becomes infrequent within the underlying grey zone. Similarly, the frequency and interconnection of the soil fractures decrease with depth. As noted for the brown zone, the fractures were evident by grey, orange, and black discolouration relative to the colour of the surrounding soil matrix.

The underlying unweathered Southern Till is grey in colour and contains occasional fractures. The grey zone occurred across the site and was detected below the landfill waste at most boreholes. Discounting the reduced thickness below the waste, the thickness of the grey zone ranged from less than 0.6 m to 7.8 m, with an average thickness of 3.0 m (n=50). Roots, rootlets, or root casts were not reported or observed to extend into the grey zone and thus are assumed to be infrequent. Infrequent subvertical fractures were detected in the grey zone to a maximum depth of about 7.9 mbgs. Within the grey soil, the fractures were typically visible by brown discolouration although grey fractures or partings were identified at some locations. The range of depths for the visible fractures in the grey zone was from 1.6 m to 7.9 mbgs, with an average depth of about 4.3 m (n=55).

Historical excavations completed within Cells 4, 5, and 6 of the Existing Landfill footprint permitted the interpretation of the continuity of the clayey silt to silty clay unit. The thickness of the unit was identified to range between 3.6 m and 6.3 mbgs. Discontinuous and unconnected lenses of silt and sand were identified. The upper 2 m to 4 m was brown, weathered, and fractured, with numerous roots and rootlets. A transition zone into the underlying grey soil was also identified. No rootlets and less fractures were observed within the grey soil.

Based on the tactile examination and the laboratory tests, the Southern Till and the deep-water glaciolacustrine unit consist of a silty clay to clayey silt. The till contains trace amounts of disseminated sand and gravel, while the deep-water glaciolacustrine unit contains laminae of silt and sand. Within the soil matrix of the till, occasional layers or lenses of sand were also detected.

Details on the particle size distribution as documented in the 2005 Hydrogeologic Report for the TCEC are summarized in **Table 4-1**.

Soil moisture content in the Southern Till, as documented in the 2005 Hydrogeologic Report is summarized in **Table 4-2**.

Table 4-1. Particle Size Distribution (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	GRAVEL (>2 mm)	Sand (2 – 0.06 mm)	Silt (0.06 – 0.002 mm)	Clay (< 0.002 mm)	Number of Samples
Brown Zone	<1 - 7	<1 – 13	48 – 76	20 - 50	10
Grey Zone	<1 - 3	<1 – 6	46 - 76	24 - 48	16

Note: Soil classification based on MIT Classification System

Table 4-2. Soil Moisture Content in the Southern Till (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	Moisture Content (%)	Number of Samples	Liquid Limit	Plastic Limit	Plasticity Index	Number of Samples
Brown Zone	16 - 23	20	29- 46	16 – 24	8 – 22	12
Grey Zone	15 – 30	17	22 – 46	15 – 21	5 – 21	24

The optimum moisture content for the brown zone was about 18 % (n=1) and for the grey zone ranged from 13 % to 31 %, with an average of about 22% (n=9). Based on the Atterberg Limit test results, the soil within the brown and grey zones is classified as dominantly a clay of low plasticity by the Unified Classification System. The soil within the brown zone was typically drier than the plastic limit (DTPL), whereas the plasticity increased with depth to wetter than the plastic limit (WTPL) near the base of the grey zone.

Unit weights for the grey zone ranged between 2.0 g/cm³ and 2.2 g/cm³, with an average of about 2.1 g/cm³ (n=5). The total porosity of the soil matrix is between 33 % and 44 % (n=2), as determined for the grey zone. However, the soil fracturing could result in an effective porosity of 0.01 % to 5 % within the brown zone.

The mineralogical composition of the clayey soil (dominantly illite and chlorite) of the Southern Till is detailed in the document entitled Mineralogical and Pore Water Analyses Southern Till and Glaciolacustrine Clay Samples Warwick Landfill Study (University of Western Ontario, 1984), Prepared for Morrison Beatty Limited, as well as detailed in the document entitled Report of Soil Mineralogy, Carbonate and Cation Exchange Capacity Analyses (University of Western Ontario, 1999), Prepared for Jagger Hims Limited. These reports are contained in **Appendix A**.

4.1.4 Interstadial Deposits

The **interstadial deposits** at the TCEC consist of two (2) distinct deposits: 1) an upper deposit of silt and clay, often varved, that is up to 5.2 m in thickness; and 2) a lower deposit of silt to sand that is up to 3.1 m in thickness. At some borehole locations, one or both deposits were not detected, which infers these deposits to be discontinuous. Below the TCEC, the interstadial silt and sand ranges from 4.0 m to 11.7 mbgs and ranged in thickness from 0.3 m to 4.2 m.

4.1.4.1 Interstadial Clay

As noted in the 2005 Hydrogeologic Report, the upper interstadial deposit of silt and clay was historically documented as the interstadial clay. The **interstadial clay** is discontinuous, but where detected, it was noted to range in thickness from 0.2 m to 5.2 m (n=41). The interstadial clay is inferred to have been encountered post-2005 at borehole locations OW72, OW78, OW79, OW80, OW81, OW82, OW83, OW84, and OW85, based on lithological soil descriptions from the borehole logs.

Tactile descriptions completed in the field characterized the interstadial clay as a unit of silt and/or clay, with varve and/or laminae reported for some boreholes. These soil structures were interpreted to occur at monitoring locations OW81, OW82, OW83, and OW84 and were noted at similar depths as other monitoring well locations. Soil fractures were not identified within the interstadial clay for the monitoring wells installed post-2005.

Particle size distribution testing as documented in the 2005 Hydrogeologic Report for the TCEC are summarized in **Table 4-3**. The soil is identified as a silt and clay or clayey silt.

Table 4-3. Particle Size Distribution Testing for the Interstadial Clay (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	GRAVEL (>2 mm)	Sand (2 – 0.06 mm)	Silt (0.06 – 0.002 mm)	Clay (< 0.002 mm)	Number of Samples
Interstadial Clay	<1	1 – 10	47 – 70	20 – 50	5

Note: Soil classification based on MIT Classification System.

Soil moisture content in the Interstadial Clay unit, as documented in the 2005 Hydrogeologic Report are summarized in **Table 4-4**.

Table 4-4. Soil Moisture Content for the Interstadial Clay (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	Moisture Content (%)	Number of Samples	Liquid Limit	Plastic Limit	Plasticity Index	Number of Samples
Interstadial Clay	20 – 32	6	38 – 45	18 – 26	19 – 23	4

Based on the Atterberg Limit test results, the soil within the interstadial clay is classified as a clay of low plasticity by the Unified Classification System. The soil was typically at plastic limit (APL). Similar to the grey zone of the clayey silt to silty clay, a total soil porosity of between 30 % and 45 % was determined.

4.1.4.2 Interstadial Silt & Sand

The **interstadial silt and sand** unit consisted of laminated silt and clay with lenses and laminae of silt and fine sand, which is deposited between the overlying interstadial clay and the underlying Rannoch Till (see below for further description).

For the eastern portion of the TCEC surrounding the Existing Landfill, the interstadial silt and sand is discontinuous. For the western portion of the TCEC around the Expansion Landfill, the interstadial silt and sand is continuous as observed during cell excavation efforts.

The top of the interstadial silt and sand unit ranges in depth from 4.0 m to 11.7 mbgs, where detected, with a thickness ranging from less than 0.1 m to 3.1 m. An average thickness of 0.6 m (n=58) is estimated based on confirmed thicknesses of the unit. Cross-sections presented in **Attached Figures 3** through **6** show the variable thickness of the interstadial silt and sand below the TCEC.

As noted above, the interstadial silt and sand ranges in texture from silt to sand. Varying amounts of clay and gravel were also identified. Particle size distribution for the unit is summarized in **Table 4-5** and taken from the 2005 Hydrogeologic Report. Based on the laboratory results, the soil ranges in texture from a clayey silt to a gravelly sand.

Table 4-5. Particle Size Distribution Testing for the Interstadial Silt and Sand (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	GRAVEL (>2 mm)	Sand (2 – 0.06 mm)	Silt (0.06 – 0.002 mm)	Clay (< 0.002 mm)	Number of Samples
Interstadial Silt and Sand	<1 – 26	<1 – 70	38 – 78	4 – 37	9

Note: Soil classification based on MIT Classification System.

The soil moisture content and Atterberg Limits for the clayey silt portions of the unit as presented in the 2005 Hydrogeologic Report, are summarized in **Table 4-6**.

Table 4-6. Soil Moisture Content for the Interstadial Silt and Sand (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	Moisture Content (%)	Number of Samples	Liquid Limit	Plastic Limit	Plasticity Index	Number of Samples
Interstadial Silt and Sand	14 – 27	2	22 – 24	13 – 17	5 – 10	3

Based on the Atterberg Limit test results, the silt within the interstadial silt and sand unit was classified as a silt or clay of low plasticity by the Unified Classification System. Owing to the sand content, a total porosity of 25 % to 30 % is inferred.

Based on available standard penetration resistance ‘N’ values, the soil compactness for the interstadial silt and sand unit ranged from loose to very dense.

4.1.5 Rannoch Till

At about 4.2 m to 12.5 mbgs is the **Rannoch Till**. This till is a gritty to moderately stony clayey silt to silt till, although some textural variations occur. At some borehole locations, layers, or lenses of silt to sand were detected within the till. The Rannoch Till was up to about 22.1 m thick below the TCEC.

Based on the subsurface investigations completed on the TCEC, the Rannoch Till has a clayey silt texture. Disseminated sand and gravel particles were detected throughout the clayey silt matrix, and in some instances, lenses of silt to sand were also detected both historically and since 2005, namely at monitoring locations OW79, OW80, OW81, OW82, OW83, and OW84. Particle size distribution for the Rannoch Till hydrostratigraphic unit is summarized below and taken from the 2005 Hydrogeologic Report.

Table 4-7. Particle Size Distribution Testing for the Rannoch Till (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	GRAVEL (>2 mm)	Sand (2 – 0.06 mm)	Silt (0.06 – 0.002 mm)	Clay (< 0.002 mm)	Number of Samples
Rannoch Till	<1 – 4	2 – 19	54 – 76	20 – 42	30

Note: Soil classification based on MIT Classification System

The upper surface of the Rannoch Till was at its highest elevation between about 231 mASL and 234 mASL. Localized variations occurred, such as at OW57 where a higher elevation was detected and at monitoring location OW81 and OW82, where a much lower elevation was noted. The elevation of the upper contact of the Rannoch Till typically decreases toward the east and west, inferring a topographic correlation with the ground surface contour. The lowest elevation of the upper contact of the Rannoch Till was identified at OW82.

The thickness of the Rannoch Till ranged from 7.6 m to 22.1 m at boreholes advanced within the TCEC, although it is inferred from the cross-sections that the Rannoch Till may be thicker along the local surficial topographic divide.

Within the landfill excavations, the Rannoch Till was differentiated from the grey zone of the Southern Till's clayey silt to silty clay unit by a greater abundance of gravel, cobbles, and occasional boulders. Occasional sand lenses were also observed within the silt till matrix.

The soil moisture content and Atterberg Limits for the Rannoch Till as described within the 2005 Hydrogeologic Report, are summarized below.

Table 4-8. Soil Moisture Content for the Rannoch Till (from the 2005 TCEC Hydrogeologic Report)

Stratigraphic Unit	Moisture Content (%)	Number of Samples	Liquid Limit	Plastic Limit	Plasticity Index	Number of Samples
Rannoch Till	7 – 24	84	22 – 37	13 – 22	7 – 18	41

Based on the Atterberg Limit test results, the soil within the Rannoch Till is classified as a clay of low plasticity by the Unified Classification System. The soil moisture ranged from drier than the plastic limit (DTPL) to wetter than the plastic limit (WTPL).

Wet unit weights for the Rannoch Till range between 2.0 g/cm³ and 2.3 g/cm³, with an average of about 2.2 g/cm³ (n=12). Based on three laboratory tests, the total porosity for the Rannoch Till ranged from about 31 % to 36 % (n=3).

4.1.6 Bedrock & Overlying Basal Sand

Occasional discontinuous layers of sand and gravel between the Rannoch Till and the underlying bedrock constitute the **basal sand**. The **bedrock** was encountered at a depth of between 23.4 mbgs and 30.8 mbgs at the TCEC and consists of the black bituminous shale of the Kettle Point Formation. The upper fractured portion of the bedrock and the overlying basal sand form the local bedrock aquifer.

Based on subsurface investigative findings to date, the basal sand unit ranges in thickness from 0.1 m to 3.5 m where detected (OW3, OW13, OW17, OW38, OW39, OW42, OW43, OW60, OW61, OW62, OW81, OW82, and OW84). The basal sand unit was not detected at former monitoring locations OW40, OW41, and at more recent monitoring locations OW79, OW80, and OW83. Similar to the interstadial silt and sand unit, the total porosity of the basal sand was determined to range between 25% and 30%.

Bedrock weathering and/or fractures have been encountered at the deep (bedrock) borehole locations. Owing to the presence of fractures, the effective porosity of the upper portion of the bedrock was estimated to be between 0.01% and 0.5%, which continues to be relevant for the deep boreholes advanced post-2005.

The bedrock topography is similar to the basal sand/bedrock topography and reflects the general regional bedrock topography trend. One notable difference from the regional bedrock topography is the bedrock high identified at the northwest corner of the TCEC. Overall, the elevation of the bedrock surface is lower to the southwest and toward the southeast.

4.2 Hydrogeologic Setting

There is an established groundwater setting below the TCEC. The stratigraphic sequence described above can be associated with hydrostratigraphic units, as summarized in **Table 4-9**. It is noted that although each stratigraphic unit is identified as part of a hydrostratigraphic unit, each unit has a hydraulic influence on the others.

Table 4-9. Hydrostratigraphic Sequencing

Stratigraphic Unit	Hydrostratigraphic Unit	Approximate Depth to top of Hydrostratigraphic Unit (m)
Southern Till: Brown Zone	Active Aquitard	0.0
Southern Till: Grey Zone	Upper Aquitard	1.6 to 7.9
Interstadial Deposits: Clay and Silt		
Interstadial Deposits: Silt and Sand	Interstadial Silt & Sand	4.0 to 11.7

Stratigraphic Unit	Hydrostratigraphic Unit	Approximate Depth to top of Hydrostratigraphic Unit (m)
Rannoch Till	Lower Aquitard	4.2 to 12.5
Fractured Bedrock and Basal Sand	Interface Aquifer	22.8 to 29.3

The characteristics of each of the hydrogeologic units are documented below in **Section 4.7** to outline Existing Conditions at the TCEC.

The hydrostratigraphic units including the **Active Aquitard**; **Interstadial Silt and Sand**; and **Interface Aquifer** are monitored in accordance with the TCEC's established EMP to assess for potential landfill leachate effects on groundwater quality.

The approximate groundwater monitoring locations at the TCEC are provided in **Attached Figure 2**. Some of the monitoring locations consist of nested monitoring wells, for example, monitoring location OW79 on **Attached Figure 2** represents monitoring wells OW79-5, OW79-7, and OW79-26.

Groundwater monitoring wells are developed within each of the hydrostratigraphic units that have the greatest potential to readily show potential landfill leachate effects, as well as are sources of drinking water supply in the vicinity of the TCEC. A summary of existing groundwater monitoring wells that form the groundwater monitoring network in consideration of the Landfill EMP at the TCEC is presented in **Table 4-10**.

Table 4-10. Summary of Existing Groundwater Monitoring Wells per the EMP

Hydrostratigraphic Unit	Actively Monitored Groundwater Wells
Active Aquitard	OW16-6, OW17-4, OW40D-4, OW54A-4, OW56-4, OW57-4, OW58-6, OW59-6, OW60-4, **OW61-4**, **OW62-5**, OW67-4, OW68-5, OW69-5, OW70B-5, OW71A-5, OW72-6, OW73-6, **OW75-3**, **OW76-5**, **OW77-4**, **OW78-4**, OW79-5, OW80-3, OW81-5, OW82-5, OW83-5, OW84-6, **OW85-5**
Interstadial Silt and Sand	OW16-7, OW40A-7, OW46-7, OW47-6, OW54-10, OW57-15, OW58-17, OW60-8, **OW61-6**, **OW62-7**, OW67-11, OW72-10, OW73-9, **OW75-7**, **OW78-6**, OW79-7, OW80-6, OW81-7, OW82-14, OW83-9, OW84-11, **OW85-8**
Interface Aquifer	OW17-30, OW19-29, OW39A-26, OW40A-28, OW49-29, OW60-25, **OW61-26**, **OW62-30**, OW79-26, OW80-27, OW81-27, OW82-28, OW83-29, OW84-31, Cemetery Well

Note: As of the summer of 2022 monitoring wells listed within the EMP have been installed. **Bolded** monitoring well designations denote monitoring wells that are temporarily idle and will resume being monitored 2 months prior to irrigation application to the Poplar Plantation in accordance with Condition 8.7(r) of the Sewage ECA.

Details pertaining to each defined hydrostratigraphic unit, including groundwater movement, groundwater elevation patterns and trends, as well as a discussion on groundwater vertical hydraulic gradients, is provided in **Section 4.7.3** and **4.7.5**.

4.2.1 Hydrogeology and Source Water Protection

Under the *Clean Water Act* (2006), Conservation Authorities across Ontario were required to prepare watershed-based source water protection assessment reports. These assessment reports were prepared for specific regional watersheds and sub-watersheds. The TCEC is situated within the St. Clair Region Source Water Protection Area within the Thames-Sydenham Regional Drinking Water Source Protection Area.

Based on available Source Water Protection mapping provided by the SCRCA, the eastern portion of the southern half of the TCEC's lands are located within an area designated by the SCRCA as a SGRA whereby groundwater recharge rates are predicted to be typically greater than the surrounding areas average annual groundwater recharge rates. The outlined SGRA coincides with lands that border Brown Creek/Kersey Drain. Although Source Water Protection mapping identifies this southeastern portion of the TCEC lands as a 'significant groundwater recharge zone', its designation is 'NA'. The 'NA' designation indicates that the area cannot be defined as a significant groundwater recharge zone as there is insufficient data available to justify its designation. Notwithstanding, the Conservation Authority has conservatively designated these lands as a potentially significant groundwater recharge zone.

Though a portion of the TCEC is identified within a SGRA, there are no identified on-site activities within the SGRA as defined by SCRCA mapping that has the potential to cause adverse effects to the underlying aquifer (i.e., groundwater takings). Moreover, the TCEC is adequately monitored such that any threat to drinking water resources would be identified and drinking water protection is thus inherently achieved at the TCEC.

Based on the prevalent clayey soil overburden, groundwater is not expected to significantly contribute to the Kersey Drain and this area is not a key location for groundwater infiltration and recharge. Monitoring wells OW60, 62, 75, 76, 77, and 85 were installed within this zone. Based on borehole advancement findings, the shallow subsurface soil consists of a continuous clayey silt to silty clay for the surficial 6 to 8 metres of overburden. Thus, irrigation liquid infiltration is not expected to have any greater potential to impact groundwater quality in this zone than at other areas of the TCEC. The soil stockpile, which is also located within the SGRA zone of TCEC lands, is the result of excavated natural soils, which are unimpacted by waste handling operations. When necessary, erosion controls are installed for the berm (silt fencing, straw bale check dams, topographic controls, etc.) to prevent excessive sedimentation to either the on-site storm ponds (typically Pond 1 for this area) or the nearby Kersey Drain.

There are no other identified source water protection zones as defined within the St. Clair Region Source Water Protection Assessment Report at or nearby the TCEC. **Attached Figure 7** shows the area designated as the SGRA, which overlays a portion of the TCEC's southeastern lands.

In summary, any groundwater contribution to the Kersey Drain is understood to be negligible. Moreover, the SCRCA Source Protection Plan indicates a low groundwater vulnerability score of 2 for Brown Creek/Kersey Drain and a score of N/A as a significant groundwater recharge area. The fine-textured condition of the natural soils in the area of the TCEC act as an aquiclude, which significantly slows the migration of groundwater and subsequently the transport of contaminants within the subsurface. Notwithstanding the above, groundwater quality monitoring is ongoing at monitoring location OW60, which is located within the mapped significant groundwater recharge zone and shows groundwater quality that is not impacted by landfill leachate.

4.3 TCEC Leachate Collection Infrastructure

The leachate collection infrastructure is critical to the protection of groundwater resources at the TCEC. The fundamental design of the Expansion Landfill is hydraulic containment, which is the inducement of groundwater flow towards the landfill footprint thereby preventing the outward movement of leachate.

For the Existing Landfill, though the movement of groundwater compared to leachate is evaluated, its overall effectiveness to encapsulate waste and its associated leachate is assessed through groundwater and surface water quality monitoring.

Documentation of the details of the interaction of the leachate collection systems for both the Existing and Expansion Landfills on the groundwater within each hydrostratigraphic unit was completed to outline how these systems protect the groundwater resources at the TCEC.

4.3.1 Existing Landfill Leachate Collection Infrastructure

Within the Existing Landfill, Cells 3S, 4, 5, 6, 7, 8, 9, 10, 11, Cell 12 and the West Cell are completed with leachate collection and/or remotely operational pumping systems, while Cell 3 relies on the leachate collection systems of the adjacent cells. Accessible maintenance holes for each of the waste cells, along with 9 inter-waste leachate level monitoring wells are assessed semi-annually per the EMP for input toward leachate management.

The assessed maintenance holes and leachate level monitoring wells of the Existing Landfill are presented on **Attached Figure 2**.

The design of the waste cells within the Existing Landfill, such as for Cells 3S, 4, 5, 6, 7, 8, 9, 10, and 11, as well as Cell 12 (only the southern third is constructed) contain waste underdrains that direct leachate to a perimeter collector system. Cells 10 and 12 are hydraulically connected, with leachate extraction typically occurring from maintenance hole MH12.

For most cells with waste underdrains, when the leachate shutoff valve is open leachate flows freely between a cell's in-series maintenance holes (typically enumerated as "A" and "B", etc.). For Cell 4, there are two distinct (north third and south two-thirds) waste underdrain systems, which independently gravitationally drain

to their respective low end maintenance holes, MH4A (south system) and MH4B (north system). MH4B gravity drains through a toe drain to MH4A.

The West Cell is completed with a collection “Sump” to collect leachate for extraction purposes. The South Cell is completed with finger drains that direct leachate to a perimeter collection system along its southern boundary that include accessible maintenance holes MH16, MH17, and MH18. Cell 3 does not have a leachate collection system, however, based on historical liquid levels the leachate in this cell is understood to be managed by the adjacent cells (Cell 3S and/or Cell 4).

Beginning in 2017, a dedicated maintenance hole for each waste cell with a leachate collection system within the Existing Landfill was equipped with a pumping system that can be independently operated year-round. Each pumping station operates via SCADA-control (automated) using liquid level sensors that actuate or turn off the pumps based on pre-programmed leachate levels. Leachate from the Existing Landfill waste cells is managed via pumping to either the equalization tank or to the Poplar System irrigation holding tanks.

See **Section 4.3.3** for the results of the Existing Landfill Leachate Elevation Assessment.

4.3.1.1 Existing Landfill Leachate Management Practices

Leachate generated at the TCEC can be managed either on-site through phytoremediation or off-site via transport for treatment and disposal.

Leachate management with the Existing Landfill considers a general leachate best management practice of hydraulic containment as a target and the destination location for the leachate treatment (i.e., on-site or off-site). It is noted that groundwater environmental compliance around the Existing Landfill is based on its quality, not flow towards the waste footprint.

Since 2019, leachate management practices within the Existing Landfill considers storing weak-strength leachate in the waste during late winter to spring as an initial reserve irrigation application to the on-site Poplar System for the upcoming growing season. From an environmental stewardship perspective, the leachate within the Existing Landfill is preferentially treated via the Poplar System as opposed to off-site at a wastewater treatment plant. This leachate management practice has not indicated adverse effects to nearby groundwater or surface water quality.

The Poplar System, in its expanded 9.3 ha form, became operational in September 2017. The expanded Poplar System consists of four (4) zones, with each zone consisting of 40 to 45 rows of trees, planted in an east-west directional pattern. Trees in each row are separated by a spacing of approximately 0.6 m and rows are approximately 3 m apart. Each row is approximately 186 m in length. The Poplar System includes infection-resistant poplar tree hybrids and willow trees.

Leachate is pumped into the holding tank system for the Poplar System. The leachate from the holding tank system is then fed gravitationally to a pumping station that pumps leachate directly up the drip line network of the Poplar System.

4.3.2 Expansion Landfill Leachate Collection Infrastructure

Hydraulic containment of the Expansion Landfill occurs immediately upon excavation of a given waste disposal cell.

The leachate collection system in the PDL of the Expansion Landfill is designed to maintain a hydraulic trap whereby leachate is maintained below the SDL groundwater level, as well as adjacent groundwater levels and pressures. Pumping stations PS2, PS4, PS6, and PS8 are operated in a 'normally off' position to allow groundwater to accumulate within the SDL.

The PDL and SDL pumping stations are managed in accordance with the EMP and 2008 Design & Operations Report for the Expansion Landfill (2008 D&O) (Henderson Paddon, 2008). Additionally, to supplement the PDL pumping station leachate level monitoring, inter-waste leachate levels are assessed from select early vertical gas collection wells. The spring 2022 liquid level elevation assessment completed for the PDL, SDL, and inter-waste early vertical gas collection wells, are presented on **Attached Figure 8**.

Leachate within the pumping stations of the PDL are SCADA controlled to maintain conformance with the liquid level targets noted below in Section **4.5.1**.

4.3.2.1 Expansion Landfill Leachate Collection System

Leachate within each cell of the Expansion Landfill gravity drains to a sump where it is managed by pumping stations PS1, PS3, PS5, and PS7 (Cell 1, Cell 2, Cell 4, and Cell 6, respectfully) for conveyance to the Equalization Tank. Each pumping station operates via SCADA-control (automated) using liquid level sensors that actuate or turn off the pumps based on pre-programmed leachate levels. Leachate retrieval from the Equalization Tank is controlled by pump station PS10. The leachate collector pumping station commissioning dates are summarized in **Table 4-11**.

Table 4-11. Expansion Landfill Pumping Station Commissioning Summary

Leachate Pumping Station Identification	Date Commissioned
PS1	November 16, 2009
PS3	November 21, 2013
PS5	October 1, 2019
PS7	September 14, 2022

4.3.3 Leachate Treatment Plant Considerations

Per Condition 8.6 (1) (a) of the Waste ECA, within a minimum of three (3) years prior to the closure of the TCEC, a leachate treatment system is to be installed and operational at the Site.

With a projected full landfill capacity to be attained by the end of 2031, the studies toward the viability and/or design of a leachate treatment plant (LTP) are expected to begin around 2024 with planning for the design and construction of an LTP by 2028. However, with the potential for approval of the Landfill Optimization Project, these studies would be further delayed as the landfill capacity would subsequently increase. Considerations toward leachate treatment and the operation of an LTP for the TCEC is detailed within HDR's Leachate Management Plan (LMP, 2023) with a 5-year projected leachate management plan. Existing conditions will continue to be monitored as input toward these studies and eventual design of a future LTP.

The stipulations of Condition 8.6 of the Waste ECA will be evaluated as part of the alternative methods effects study portion of the TCEC Landfill Optimization Project during the next stage of the EA.

4.4 Existing Landfill Leachate Elevation Assessment

4.4.1 Existing Landfill Leachate Elevation Patterns

Leachate elevations vary across the TCEC. For the Existing Landfill, overall, since 2019 with the operation of the Poplar System, leachate elevations generally increase from November to May and then decrease from May to November. On occasion, there are exceptions whereby leachate may accumulate within a waste cell due to various factors including, but not limited to, inclement weather preventing application to the trees due to saturated ground conditions.

Based on the most recent 2022 leachate elevations, the hydraulically connected in-series maintenance holes ("A" and "B") in the Existing Landfill generally showed an elevation difference that was equal within the same cell or that differed by less than 0.15 m. Though exceptions to this pattern occurred for Cell 3S (at MH3SC and MH3SD), Cell 8, Cell 9, and Cell 11, these exceptions are consistent with historical observations at each location.

4.4.2 Existing Landfill Leachate Elevation Trends

To assess elevation trends, a constant trend is defined as having 0.1 m or less of seasonal variation. Leachate elevation data related to the waste cells beneath the Poplar System are provided in **Table B-1, Appendix B**. Hydrographs of leachate elevations for nearby leachate monitoring points to the Poplar System are presented on **Figures B-1** and **B-2, Appendix B.** Leachate elevations pertaining to the Existing Landfill collector system maintenance holes are provided in **Table B-2**, **Appendix B**. Hydrographs representing leachate elevations for the maintenance holes of the Existing Landfill are provided on **Figures B-3** to **B-12**, **Appendix B**.

Most of the long-term leachate elevation trends for the waste cells of the Existing Landfill fluctuate with no apparent increasing or decreasing trend.

Of note, however, leachate within Cell 6 and the West Cell appear to have increased in recent years. Leachate elevations within the South Cell measured at monitoring locations OW22A-10 and OW53-10 increased historically until about 2015 when leachate levels appear to have stabilized and have since been fluctuating with no distinct increasing or decreasing trends year-over-year. Overall decreasing trends are observed for leachate elevations within Cells 7, 9, 10, 11, and 12.

4.4.2.1 Hydraulic Containment Assessment

The implication of potential risks to nearby water resources when leachate elevations are above surrounding ground surface and/or nearby shallow groundwater elevations is understood. Because of the older design for some of the waste cells of the Existing Landfill, the protection of water resources is based on acceptable chemical quality per the EMP.

As an added value toward environmental protection, the completion of the hydraulic assessment of leachate compared to nearby shallow groundwater is utilized as an additional guidance tool toward managing leachate for the Existing Landfill. For example, hydraulic containment is seldom achieved for the West Cell and the South Cell of the Existing Landfill based on field liquid level measurements. Therefore, there is increased focus for these areas in the context of groundwater quality assessment from the EMP's standpoint, as well as more vigilance in the routine Site inspections to verify for any leachate seepage. To date, no negative effects to nearby shallow groundwater quality from a landfill leachate effect have been detected as a result of outward hydraulic gradients for the West and South Cells of the Existing Landfill.

4.4.2.2 Poplar System Leachate Level Assessment

Based on leachate level data, the average annual leachate elevation within each cell below the Poplar System indicates that the application of irrigation liquid is consumed by the trees and is therefore, not causing leachate mounding within the waste. A comparison of the levels measured since 2019 at leachate collection system maintenance holes and leachate wells shows a typical pattern of greater elevations in the spring prior to irrigation than in the fall shortly after irrigation.

WM continues to manage leachate from the Existing Landfill in consideration of on-site phytoremediation through the irrigation of leachate to poplar trees of the Poplar System. Priority is given to waste cells that have more elevated leachate, but also considers the availability of weaker strength leachate such that stronger leachate (i.e., that of the West Cell) can be further diluted to acceptable irrigation quality for the trees of the expanded Poplar System. Based on the leachate levels measured historically and in 2022, the average annual leachate elevation within each cell below the cap surface within the footprint of the Poplar System (i.e., Cells 3, 3S, 4, South Cell, and

West Cell) indicates that the application of irrigation liquid is consumed by the trees and is therefore, not causing leachate mounding within the waste.

Based on a comparison of the levels measured at leachate collection system maintenance holes and leachate wells in May and November 2022, some leachate levels slightly increased by the fall while others decreased. This pattern of increasing leachate levels from May 2022 to November 2022 is attributable to the reduced leachate extraction from select cells for irrigation purposes in 2022 compared to 2019 and 2020. This was attributable to limited availability of weaker strength leachate, as well as some periods of wet conditions due to significant precipitation events. Where leachate levels slightly increased into the fall of 2022, the levels were generally within their respective historical ranges.

4.4.2.3 Collector System Leachate Level Assessment

In general, leachate elevations fluctuate within the waste cells of the Existing Landfill with some exceptions. There have been more significant fluctuations in leachate levels since 2018/2019 because of the leachate management practices during operation of the Poplar System. Most recently during 2022, the leachate elevations within select maintenance holes typically decreased during the application seasons with significant fluctuations that represented drawdown events while leachate was extracted at the pumping stations to supply irrigation liquid to the trees of the Poplar System.

Over past years, leachate elevations have mostly fluctuated with some exceptions, as shown in **Appendix B**. The historically increasing leachate elevation trends that were noted in 2019 for Cell 3S (at MH3SC and MH3SD), Cell 6 (at MH6A and MH6B), and the West Cell (Sump) were noted to have slightly decreased since then or have generally been fluctuating below their historical upper limit levels.

Typically, the elevation ranges post-2019 leachate management practices remained within their respective historical pre-2019 ranges.

Over the long-term, leachate elevations are expected to continue to decrease and eventually stabilize since the Existing Site is capped and leachate is extracted from cells within the Existing Site for the operation of the Poplar System and for off-Site disposal. It should be noted that over time, the amount of leachate removed from storage will likely increase with the operation of the expanded Poplar System, as the system matures.

4.4.2.4 Existing Landfill Supplemental Leachate Level Assessment

Per the Leachate Management Plan (LMP), dated March 2023 (HDR, 2023), the leachate level monitoring program was supplemented with six (6) leachate level monitoring wells within select waste cells of the Existing Landfill. The supplemental leachate level monitoring locations (LW1 to LW6) were installed in 2017, at locations depicted on **Attached Figure 2**. These monitoring wells are monitored semi-annually, concurrently with the established semi-annual spring and fall monitoring. The leachate liquid level monitoring for these supplemental leachate wells serve to provide further

insight toward leachate elevation patterns within select waste cells of the Existing Landfill.

Of the six (6) supplemental leachate monitoring wells installed, monitoring locations LW4 (Cell 4), as well as LW5 and LW6 (South Cell), are installed nearby and/or within the Poplar System.

The leachate elevations within leachate monitoring wells LW1 to LW6 did not appear to respond to leachate maintenance hole drawdown events, such as being influenced themselves to drawdown during leachate extraction events. This observation infers that there may be entrapped, or some other effect such as, but not necessarily limited to, the sustained negative pressure to which the landfill is under during landfill gas extraction activities, causing leachate to potentially be perched within the waste mound that is not directed to, or captured by, the leachate underdrain collection system, and consequently is not having an effect to the groundwater potentiometric pressures.

It is noted that this effect is observed in waste cells that are both positioned under and away from the Poplar System, which denotes that the operation of the Poplar System is not the cause of leachate elevation differential effects.

There was no observable negative affect observed to the sideslope of the Existing Site, such as leachate seeps, soil staining, stress vegetation, soil slumping or erosion, as a result of this leachate elevation differential. The exact cause of the leachate differential is unknown, but it is not causing a detrimental effect to the operation of the Poplar System, excluding limiting leachate volume availability, and is not causing visible stress to the landfill cap and as such does not represent an immediate concern.

4.5 Expansion Landfill Leachate Elevation Assessment

Leachate level monitoring within the Expansion Landfill is completed to assess leachate pressures on the PDL and the effectiveness of the leachate management system. Leachate levels measured for pumping stations PS1, PS3, PS5, and PS7 with comparisons between May and November leachate elevations with ground surface and groundwater elevations outside the Expansion Landfill waste footprint for the past five years (since 2018) is provided in **Table B-3**, **Appendix B**.

4.5.1 Expansion Landfill Leachate Level Trigger Mechanism

The trigger mechanism for implementation of groundwater contingency measures for the Expansion Landfill is the loss of hydraulic containment of the landfill waste footprint. The loss of hydraulic containment occurs when leachate levels within the PDL are higher than the surrounding groundwater elevation for the active aquitard and the groundwater pressures for the interface aquifer.

Leachate liquid levels for the pumping stations of the Expansion Landfill are evaluated through Conditions 7.18 and 14.1 of the Waste ECA, as follows:

- Condition 7.18 of the Waste ECA requires that a maximum leachate target head of 300 mm (or 0.30 metres (m)) on the landfill liner is not exceeded; and
- Condition 14.1 of the Waste ECA requires that, for PS1, PS3, PS5, and PS7, the trigger leachate elevations for hydraulic containment for the protection of groundwater are established at elevations that are summarized in **Table 4-12**.

Table 4-12. Expansion Landfill Leachate Elevation Trigger Elevations

Leachate Pumping Station Identification	Leachate Elevation (mASL)
PS1	232.7
PS3	232.6
PS5	232.8
PS7	233.4

The above triggering elevations represent a maximum leachate head of approximately 6 m above the landfill liner of each respective cell, as presented in the EMP.

Occasionally, after major storm events when a part of the active waste disposal area within the Expansion Landfill is not final capped, a large percentage of precipitation will collect onto the cell floor and the leachate pumping rates for PS1, PS3, PS5, and PS7 are less than the rate of incoming volume of liquid. These periods of temporarily elevated leachate occurrences are expected from time-to-time and are described in the 2008 D&O. Leachate levels of the Expansion Landfill are governed by Conditions 7.18 and 14.1 of the Waste ECA. Condition 7.18 requires the leachate head to remain at no more than 300 mm above the landfill liner.

In general, it is understood and planned as part of the Expansion Landfill design that the leachate head may, on occasion, be above the Condition 7.18 target during and after large/intense, or prolonged precipitation events. This most commonly occurs early in the construction phase of a cell, or when there is a larger area that is not final capped that will allow a greater amount of precipitation to easily infiltrate the waste mound. These periodic increases of leachate head under such circumstances are not considered ‘out of compliance’, as noted within the Waste ECA. Notwithstanding these temporary instances of increased leachate head onto the PDL, WM has implemented an Expansion Landfill Leachate Level Contingency Plan (RWDI, April 30, 2021). The plan enables WM to be made aware of increasing leachate levels as they approach (i.e., about 80%) the Waste ECA-established leachate head above the PDL criteria.

When the majority of the waste mound in a cell is still lower in elevation than the surrounding ground surface and the waste mound has a large flat top surface area compared to sideslope area, it is more susceptible to greater precipitation infiltration than a cell where the waste mound is above ground surface with sideslope areas completed with the required 0.6 m thick interim clayey soil cover. The sideslope area compared to the flat top area preferentially sheds stormwater away from the waste mound (note, the ‘flat top' areas of large cell tops are also sloped during waste cell filling). As landfilling in a cell progresses above ground surface, the exposure to

precipitation infiltration will decrease as the large flat top is progressively reduced with increasing height and sideslopes are developed and eventually completed as a 20:1 slope when final capped.

Condition 14.1 of the Waste ECA identifies trigger levels whereby leachate elevations that are above these 'triggering' levels will cause the potential for loss of hydraulic containment and cause potential risks to groundwater resources from leachate impacts. These levels represent a maximum leachate head of approximately 6 m above the landfill liner. To account for potential instances or events whereby leachate levels within the Expansion Landfill are above Condition 14.1 elevations, there are redundancies designed in place to protect groundwater at and beyond the property boundary. Beyond the low leachate level maintenance by the PDL, the additional groundwater protection redundancies are: 1) a Primary Liner (PL); 2) a SDL; and 3) a Secondary Liner (SL).

The PL is a 0.8 m thick recompacted clayey soil liner with a designed minimum hydraulic conductivity of 5.0 x 10-10 m/sec, with verified hydraulic conductivity rates routinely less than 2.0 x 10-10 m/sec. The protection established by the PL is that leachate would take approximately 250 years to migrate through its thickness.

The SDL would be used to manage leachate in the unlikely event leachate were to migrate through the PL. The operation of the SDL would be in the same manner as the PDL, where levels in the SDL would be maintained to facilitate the hydraulic trap principle.

The natural clayey soil at the TCEC represents a very large barrier to protect groundwater resources and serve as the SL. In the example of the drinking water within the Interface Aquifer, there is a minimum overlaying thickness of 20 m of natural clayey soil (SL), which has a an average hydraulic conductivity of 4 x 10-10 m/s, and a pumping test conductivity of 1 x 10-10 m/s. Utilizing the more conservative hydraulic conductivity value, it would take another estimated 1,600 years for leachate to reach the Interface Aquifer not considering the assimilative capacity of clayey soils on contaminants. Assuming the SDL were to fail, it would take approximately 1,850 years for leachate to migrate to the Interface Aquifer below the waste mound of the Expansion Landfill.

Notwithstanding the effectiveness of the protection of groundwater resources described above, in the very unlikely occurrence of the need to implement a remedial measure to address a potential leachate migration to groundwater resources at the TCEC, responses in the form of contingency and remedial measures will be completed per the MECP-approved Contingency and Remedial Action Plan (Jagger Hims Limited, April 2008). This plan outlines proposed actions based on whether elevated leachate levels are identified as adversely impacting groundwater quality, and the management of excess leachate from the landfill to re-establish the hydraulic trap.

Ultimately, if rising leachate head becomes a concern, WM can evaluate for any cause(s) to the rising condition and implement remedial actions, some of which are detailed within the 2008 D&O.

Of note, in 2022 from approximately January 1st to April 4th, leachate elevation readouts from pumping station PS3 were erroneously reported as a result of a faulty level sensor. Though incorrect, the erroneously reported leachate level readouts are presented in **Table B-4**, **Appendix B** with a note describing the inaccurate readouts in early 2022 (see Note 5)**.** The level sensor was repaired by April 6, 2022.

4.5.2 Expansion Landfill Leachate Elevation Trends

Leachate levels within PS1, PS3, PS5, and PS7 continue to fluctuate as presented in **Table B-4** and graphically represented on **Figure B-13**, **Appendix B**.

Leachate elevations at PS1, PS3, PS5, and PS7 are below groundwater elevations in the active aquitard and the interstadial silt and sand flow systems. Therefore, the leachate within below ground waste Cells 1, 2, 4, and 6 is hydraulically contained from the groundwater flow systems.

4.5.3 Expansion Landfill Supplemental Leachate Level Assessment

Similar to aforementioned supplemental leachate levels within the Existing Landfill, leachate elevations for the Expansion Landfill are also measured from intra-waste locations at early vertical landfill gas extraction wells (EVGW): EV229 in Cell 1A (Stage 1); EV268 in Cell 1A (Stage 2); EV022 in Cell 2B; and EV226 in Cell 2D. Intra-waste leachate elevations measured within the EVGWs are presented in **Table B-5**, **Appendix B**.

Since approximately May 2019, obstructions have been sporadically encountered at elevations that were higher than the base of the aforementioned EVGWs, which prevented deeper intra-well field measurements. The cause of the obstructions could not be determined during various field monitoring events. In 2018, these same EVGWs were assessed to be dry at the bottom of then-constructed EVGWs, which represented elevations that are typically between approximately 1.0 to 1.5 m above the PDL at each of the locations. Up until 2021, EVGW EV268 in Cell 1A (Stage 2) was dry at an elevation that is within 1 m above the PDL.

4.6 Site Leachate Management Assessment

4.6.1 Leachate Volume Generation

The primary leachate source is from precipitation infiltrating into and percolating through the waste. The groundwater contribution is negligible. Leachate generated at the TCEC is either managed by 1) off-site treatment and disposal of stronger strength leachate (i.e., Expansion Landfill leachate); or 2) storage of weaker strength leachate (i.e., Existing Landfill leachate) for use as irrigation liquid to the Poplar System.

Between January 1 and December 31, 2022, a total of 54,626.76 m³ of leachate was managed, of which 47,454.19 m³ of leachate was removed and transported off-site for

treatment and disposal at the Chatham Water Pollution Control Plant, while 7,172.57 m³ was irrigated to the Poplar System.

As noted within HDR's Leachate Management Plan (HDR, 2023), based on empirical leachate volume estimates in the last 4 years, the TCEC is projected to generate approximately 55,000 m³ of leachate per year for the next 5 years (2023 to 2027). These projected leachate generation volumes remain below the 2008 D&O predictions for the Expansion Landfill.

A breakdown of how leachate has been managed at the TCEC since 2020 is presented in **Table 4-13**.

Of the 54,626.76 m³ of leachate managed from the TCEC for 2022, the approximate ratio of leachate source location between the Existing Landfill and the Expansion Landfill is 24% (13,132.37 m³) and 76% (41,494.39 m³), respectively. This ratio is based on the leachate source distribution which incorporates the separate approximate volumes of leachate extracted from the: 1) Existing Landfill (38% of area); and 2) Expansion Landfill (62% of area).

Table 4-13. Leachate Volumes Managed since 2020

Area of Leachate Extraction	Treatment (m³)		
Year	**2020**	**2021**	**2022**
Off-Site Treatment Management			
Existing Landfill	890.72	639.75	613.03
Pumping Station PS10 – From Expansion Landfill	31,970.99	39,143.55	41,137.26
Pumping Station PS10 – From Existing Landfill	6,081.51	4,501.53	5,703.90
Sub-Total	38,972.22	44,284.83	47,454.19
On-Site Treatment Management			
Poplar System – From Expansion Landfill	2,885.11	64.50	357.13
Poplar System – From Existing Landfill	7,938.06	6338.53	6,815.44
Sub-Total	10,823.17	6,403.03	7,172.57
Total	**49,795.39**	**50,687.86**	**54,626.76**

Note:

1) m³ denotes cubic metre. 1 m³ is equivalent to 1,000 L (litres).

2) Existing Landfill denotes leachate extracted by tanker truck directly from one of, or a combination of, Cells 3S, 4, 5, 6, 7, 8, 9, 10/12, 11, South Cell, &/or West Cell (Sump).

3) The source cell leachate make-up in the Equalization Tank, as sampled from PS10, changes over time.

4.6.2 Leachate Seeps & Stains

Seepage along finished and/or interim sideslopes of a landfill may expectedly occur on occasion over time. Leachate seeps from the capped areas of the waste mound are visually identified and immediately addressed as there are staff completing daily inspections at the TCEC. When identified, they are repaired as soon as practicable to reduce the potential for seepage overland into perimeter ditching and ultimately off-site via the surface water network. Similarly, the repairs are completed to reduce the potential for seeps to infiltrate into the shallow soil of the Southern Till and influence the groundwater quality of the AA at this location.

Seepage along the sideslopes of the Expansion and Existing Landfill's do occur on occasion. Repairs, when warranted, will be promptly implemented upon discovery. Seepage is typically repaired by excavating the seep and re-establishing the hydraulic connection within the waste then recapping the excavated area. Regardless of the nature of the seeping liquid, WM treats seepage as they were leachate related. Thus, repairs are made within hours to less than a few days upon discovery.

4.6.3 Hydraulic Containment of the Expansion Landfill

As discussed, the hydraulic containment of the Expansion Landfill occurs immediately upon excavation of a given waste disposal cell. The upward and inward movement of groundwater is slowly saturating the SDL.

Liquid elevations from the SDL are provided in **Table B-6** and graphically represented on **Figure B-14**, **Appendix B**.

As shown in **Figure B-14**, the initial slow increase over time of the SDL water elevation within Cell 1 since its installation is a result of the large pore volume for water to accumulate within the 0.3 m thick granular layer that comprises the SDL within the western half of Cell 1. The rapid increases in SDL elevation within subsequent waste cell construction for Cell 2, Cell 4, and Cell 6, are reflective of the much smaller pore volume within a 0.01 m (1 cm) thick Geonet® that is installed as the SDL for Cell 2, Cell 4, and Cell 6 (and the eastern portion of Cell 1).

It is noted that the periodic short duration level decreases within the SDL for Cell 1, Cell 2, and Cell 4 represent water taking activities for: 1) cell-to-cell connection activities, and/or, 2) soil moisture conditioning of the clayey soil liner material used in the construction of subsequent cell liner systems. These periodic SDL level decreases are expected to occur during the Expansion Landfill construction and do not represent a concern to nearby groundwater resources. Once a cell is excavated, groundwater movement will immediately be toward the cell excavation, thereby hydraulically containing any liquid (both in SDL and PDL) within the excavated cell. Of note, water taking from the SDL, including that of pumping stations PS2, PS4, PS6, and PS8, are approved under the TCECs PTTW No. 4682-BLJRYJ, dated November 8, 2021.

For comparative purposes, the elevations of the PDL and SDL elevations for each waste cells of the Expansion Landfill are provided on **Figures B-15** to **B-18**,

Appendix B. There is no obvious relationship between PDL and SDL levels as the PDL levels are automatically controlled to remain below the target 0.3 m head elevation.

4.7 On-Site Study Area Groundwater Flow

The Landfill Optimization Project has the potential to affect groundwater quantity, or more specifically groundwater flow. This is important as the Expansion Landfill is designed based on hydraulic containment, which consists of inducing inward groundwater gradients towards the waste mound, which will prevent leachate from migrating outward from the waste and into the nearby subsurface environment.

The Existing Landfill is not assessed for its hydraulic containment capability, but rather is assessed for its performance based on nearby groundwater quality conditions.

An evaluation of the mechanics of the monitoring program was completed to evaluate possible landfill effects on groundwater flow as a component toward evaluating the hydrogeological On-Site Study Area Existing Conditions.

4.7.1 Active Aquitard

4.7.1.1 Groundwater Movement

The active aquitard consists of the brown zone of the clayey silt to silty clay unit and represents a shallow groundwater flow system whereby precipitation infiltrates into soil fractures, root casts, and other weathering features and moves in a dominantly lateral direction. The low permeability of the silty clay to clayey silt matrix reduces the volume of groundwater movement through the active aquitard. The TCEC fill areas extend through the active aquitard. Due to the hydraulic trap design, groundwater gradients in the active aquitard are induced towards the SDL of the liner system of the Expansion Landfill.

Though groundwater movement within the shallow active aquitard is influenced by the landfill cells, such as the hydraulic trap design of the Expansion Landfill. Influences of the hydraulic trap design are minimal to the groundwater quantity within this hydrostratigraphic unit. This minimal effect is attributed to the low hydraulic conductivity of this hydrostratigraphic unit. It is noted that active water taking at the TCEC does not occur within this hydrostratigraphic unit. Moreover, there are no known water takings occurring within the Off-Site Study Area within this hydrostratigraphic unit.

4.7.1.2 Groundwater Elevation Patterns

The low volume of water within the active aquitard is evident by the slow recovery of monitoring wells after purging and sampling. Groundwater elevations measured during the recent annual monitoring program conducted in 2022 are presented with historical data in **Table B-7, Appendix B**.

Groundwater elevations measured for the Active Aquitard, along with the leachate elevations in May 2022, are presented on **Attached Figure 8**. As shown in **Attached Figure 8**, considering the north-south flow divide through the Poplar Plantation and historical patterns of groundwater movement, an easterly and westerly direction of groundwater movement is inferred. Surficial features such as ditches, waste cells, excavations, ponds, berms, and the leachate management systems, as well as precipitation amounts, will locally influence the groundwater flow direction. The westerly groundwater movement is influenced by the low topography near Sedimentation Pond 2 and the Van Kessel Drain. Hydraulic gradients ranging from approximately 0.006 within the western and northeastern portions of the TCEC to 0.014 in the southeastern portion of the site have been observed.

The depth of the groundwater table below ground surface varies on a seasonal basis. Overall, the depth to the groundwater table ranged between about ground surface and 6.3 mbgs (n=677), including historical data presented in the 2005 Hydrogeological Report). Typically, the groundwater table was closer to ground surface after periods of snow melt, during the spring months, and after prolonged and/or immediately following inclement periods of precipitation.

4.7.1.3 Groundwater Elevation Trends

Groundwater elevations measured in 2022 are presented with historical data in **Table B-7**, **Appendix B**. Groundwater elevation hydrographs for the active aquitard are presented on **Figures B-19** through **B-24**, **Appendix B**.

In the long-term within the active aquitard, the groundwater elevations typically fluctuated because of seasonal effects from precipitation and snow melt, as well as irregular periods of prolonged precipitation or lower than normal precipitation. The notable changes in groundwater elevations reflect the hydraulic activity of the weathered soil and the soil fractures. Overall, groundwater elevations are generally consistent overtime, and also show the effects of the hydraulic trap design of induced flow towards the Expansion Landfill.

4.7.2 Interstadial Silt & Sand

4.7.2.1 Groundwater Movement

The interstadial silt and sand hydrostratigraphic unit consists of silt and sand layers or lenses within the interstadial deposit that overlies the Rannoch Till. Groundwater movement within the interstadial silt and sand are controlled by hydraulic gradients and the soil texture.

Groundwater movement within the interstadial silt and sand hydrostratigraphic unit is influenced by the Expansion Landfilling area. Groundwater is initially drawn toward open cell excavation activities but is subsequently plugged/capped with remoulded clay liner material as part of cell construction activities.

Though groundwater movement within the interstadial silt and sand hydrostratigraphic unit is influenced by the hydraulic trap design of the Expansion Landfill, its influence is minimized to the low permeable clay liner material cap discussed above. Initially, influences to groundwater quantity from cell excavation activities are more prominent in comparison to that of the active aquitard hydrostratigraphic unit, but are short-term (less than 10 years) until the SDL becomes saturated.

It is noted that active water taking at the TCEC does not occur within this hydrostratigraphic unit. Moreover, there are no known water takings occurring within the Off-Site Study Area within this hydrostratigraphic unit.

4.7.2.2 Groundwater Elevation Patterns

Groundwater elevations measured from within the interstadial silt and sand hydrostratigraphic unit up to 2022 are presented on **Attached Figure 9**. Groundwater pressures for the overall TCEC indicate a consistent pattern over time of an easterly and westerly groundwater flow direction from a north-south groundwater divide that extends from Confederation Line to Zion Line.

However, per the hydraulic trap design, groundwater potentiometric pressures within the interstadial silt and sand hydrostratigraphic unit is induced toward the SDL of the Expansion Landfill. These lowered groundwater pressures are expected to return to pre-Existing Conditions as the soil mass is replaced with waste mass and SDL levels stabilize at equilibrium groundwater conditions.

Groundwater elevations measured in 2022 are presented with historical data in **Table B-7**, **Appendix B**. Hydrographs for the interstadial silt and sand are provided on **Figures B-25** through **B-28**, **Appendix B**.

4.7.2.3 Groundwater Elevation Trends

Groundwater elevation trends within the interstadial silt and sand have generally fluctuated in the long-term, with the elevations at OW54-10, OW67-11, OW72-10, and OW73-9 exhibiting generally decreasing and fluctuating trends from 2008 but appear to stabilize around 2015. Conversely, groundwater elevations at monitoring locations OW16 and OW46 appear to slightly increase in the long-term but are appearing more stabilized since approximately 2018.

In general, seasonal variations in the groundwater elevation trends within the interstadial silt and sand flow system are not pervasive across the flow system, but some monitoring locations do show seasonal influences.

4.7.3 Interstadial Silt & Sand Vertical Hydraulic Gradients

Vertical hydraulic gradients below the TCEC in the active aquitard to the interstadial silt and sand hydrostratigraphic unit continue to be dominantly downward toward the interface aquifer around the waste footprints and below the Existing Landfill. On occasion, localized upward hydraulic gradients occur from the interstadial silt and sand

to the active aquitard. Calculated vertical hydraulic gradients are presented in **Table B-8**, **Appendix B**.

4.7.4 Interface Aquifer

4.7.4.1 Groundwater Movement

Occasional discontinuous layers of sand and gravel between the Rannoch Till and underlying bedrock constitute the basal sand. The upper fractured portion of the bedrock and the overlying basal sand form the local bedrock aquifer and are generally referred to as the interface aquifer.

Groundwater elevations measured in 2022 are presented with historical data in **Table B-7**, **Appendix B**. Hydrographs are provided on **Figures B-29** and **B-30**, **Appendix B**.

Influences on groundwater movement within the interface aquifer hydrostratigraphic unit is limited to vertical potentiometric pressures at the TCEC. Specifically, with the increased mass of waste being placed in the Expansion Landfill, there is a corresponding increase in potentiometric pressures within the interface aquifer. This increase in potentiometric pressures strengthens, or enhances, the magnitude of the hydraulic trap design of the landfill. This will not have an effect to the quantity of water within the interface aquifer as there is no actual water taking from this hydrostratigraphic unit at the TCEC. As noted, the overlying Rannoch Till is an aquitard (i.e., confining layer) protecting groundwater resources within this hydrostratigraphic unit.

4.7.4.2 Groundwater Elevation Patterns

Groundwater elevations measured for the Interface Aquifer in 2022 are presented on **Attached Figure 10**. Overall, a southwesterly groundwater flow direction was apparent below the TCEC. This flow direction is consistent with historical observations for the interface aquifer. Of note, as more overburden soil is removed during landfill cell construction, interface aquifer pressures are expected to decrease temporarily. Subsequently, as more waste is deposited within the waste cells of the Expansion Landfill, the increase in overlying mass is expected to increase the groundwater pressures of the bedrock aquifer.

4.7.4.3 Groundwater Elevation Trends

Groundwater pressure elevation trends and patterns for the interface aquifer continue to be generally consistent and shows a fluctuating trend with time. Additionally, most monitoring wells in the interface aquifer were showing a fluctuating and decreasing trend from about 2010 to 2018. This pattern at these locations was expected as it indicates a response to depressurization from the removal of overlying soil within the Expansion Landfill waste footprint. As discussed, these decreasing elevation trends will be temporary, and pressures (i.e., groundwater levels) will begin to increase once

a sufficient waste mass is landfilled to replace the excavated clayey soil. As expected, monitoring wells OW39A-26, OW79-26, OW80-27, and OW81-27 are showing a fluctuating and increasing trend since about 2018 as a significant waste mass has been progressively landfilled into the southern half of the Expansion Landfill.

4.7.5 Interface Aquifer Vertical Hydraulic Gradients

Vertical hydraulic gradients below the TCEC in the interstadial silt and sand to the interface aquifer hydrostratigraphic unit are presented in **Table B-8**, **Appendix B**. Vertical hydraulic gradients were most recently noted to be downward in 2022 from the Interstadial Silt and Sand to the Interface Aquifer. However, as discussed, groundwater pressures will begin to increase once a sufficient waste mass is landfilled to replace the excavated clayey soil.

4.8 On-Site Study Area Groundwater Quality Assessment

Groundwater and leachate quality data collected from the TCEC serves as a comprehensive baseline assessment of hydrogeologic environmental conditions at the TCEC both pre- and post- waste placement in the Expansion Landfill that occurred beginning late 2009.

An assessment of the Primary and Secondary Leachate Indicator List (PLIL and SLIL) parameters that were established pre-landfill expansion as part of the EMP was examined for their current and future relevance based on groundwater and leachate quality data that has been collected from the Expansion Landfill.

4.8.1 Leachate Quality Trends

An evaluation of leachate chemical quality characteristics is necessary to assess for potential landfill leachate influences on groundwater quality. Once the chemical characteristics from each matrix of the leachate and groundwater are understood, an evaluation can be made whether a chemical constituent, based on its prevalence within the leachate relative to groundwater, can be identified as an indicator of potential leachate effects on groundwater resources. For the purposes of this groundwater quality component of the EA, historical leachate quality data was evaluated for each individual landfilling area at the TCEC, namely the Expansion Landfill and the Existing Landfill. A comparison of leachate quality was then made between the two (2) landfilling areas to evaluate similarities and differences in constituent concentration trends and how the leachate from the two (2) landfilling areas could potentially impact the groundwater quality at the TCEC.

4.8.1.1 Expansion Landfill Leachate Quality

Leachate quality monitoring for the Expansion Landfill began in 2010 with leachate samples collected from the Equalization Tank as being representative of the leachate quality within Cell 1 of the Expansion Landfill, prior to the commissioning of pumping station PS3. The Equalization Tank would represent leachate from the Expansion

Landfill until late 2013, when pumping station PS3 was commissioned, and leachate characteristics from Expansion Cell 1 and Cell 2 were added. Starting in 2017, leachate within the Equalization Tank included cells of the Existing Landfill (excluding Cell 3 and the West Central Cell) when the Existing Landfill cells' downstream maintenance holes were converted to automated pumping stations. Leachate characteristics in the Equalization Tank eventually also represented that of leachate from Cell 4 (PS5) and Cell 6 (PS7) of the Expansion Landfill in late 2019 and 2022, respectively.

Thus, leachate quality for the purposes of evaluating the Expansion Landfill was assessed from samples collected at individual pumping stations, including PS1, PS3, and PS5. Pumping stations are assessed annually in the spring, as such PS7 was not evaluated as part of this assessment as it came online in the fall of 2022.

It is noted that leachate within Cell 6 would represent very young waste, less than 1 year old, and would not be of a strength to be reflective of older waste characteristics, such as that from PS1 (13 years old for the waste deposited in late 2009).

Constituent concentrations within the leachate of the Expansion Landfill show variable individual trends that are either increasing, decreasing, or remaining relatively constant as summarized below in **Table 4-14**.

Table 4-14. Expansion Landfill Leachate Constituent Concentration Trends

Parameter	Pumping Station PS1	Pumping Station PS3	Pumping Station PS5
Chloride	I	I	I
Nitrate	I	I	I
Boron	I	I	I
Alkalinity	I/C	I/C	C
Ammonia	I/C	I	C
Barium	F	F	C
Cadmium	F	F	C
Calcium	F	F	C
Electrical Conductivity	I/C	I/C	C
Dissolved Organic Carbon (DOC)	F	I	C
Iron	F	F	C
Lead	F	F	C
Magnesium	F	F	C
pH	F	F	F
Potassium	I/C	I/C	I
Sodium	I	I	I
Sulphate	F	F	C
Total Dissolved Solids (TDS)	F	F	F

Table 4-14. Expansion Landfill Leachate Constituent Concentration Trends

Parameter	Pumping Station PS1	Pumping Station PS3	Pumping Station PS5
Phenols	F	F	F
Arsenic	F	F	C
Chemical Oxygen Demand (COD)	F	F	D
Chromium	I	D/C	D
Copper	F	F	C
Total Kjeldahl Nitrogen (TKN)	I	I	I
Manganese	F	F	C
Nickel	F	F	C
Phosphorous	I/F	D/F	D
Zinc	F	F	C
Unionized Ammonia	I	I	C
Nitrite	C	C	C
Mercury	C	C	I

Notes: I = Increasing Trend; D = Decreasing Trend; C = Constant Trend; F = Fluctuating Trend; n/a = Not applicable

As noted above, several constituent concentrations continue to show an increasing trend into 2023, where others appear to have increased in concentration initially, but have either peaked in concentration and remained constant, or slightly fluctuate over time at a stable concentration range.

For leachate quality at monitoring station PS5, there are only three (3) datasets and the trends noted are very short-term and not necessarily indicative of the leachate quality trend in the long-term for this monitoring location.

4.8.1.2 Existing Landfill Leachate Quality

Leachate quality within the Equalization Tank is representative of the leachate quality from the Existing Landfill, Expansion Landfill, and landfill gas condensate. As such, leachate quality for the purposes of evaluating the Existing Landfill was assessed from samples collected as part of the ongoing compliance monitoring program per the EMP at the TCEC. Therefore, the Existing Landfill Leachate considered leachate samples as follows:

- South Fill Area (MH18);
- West Central Fill Area (Sump); and
- Central Fill Area (Composite of MH3, MH4, MH5, MH6, MH7, MH9, MH11).

Constituent concentrations within the leachate of the Existing Landfill show variable individual trends that are either decreasing or remaining relatively constant as

summarized below in **Table 4-15**, which was derived from the historical leachate chemical data contained in **Appendix A**.

Table 4-15. Existing Landfill Leachate Constituent Concentration Trends

Parameter	MH18	SUMP	CFA-COMP
Chloride	F	F	D/F
Nitrate	C	D/C	C
Boron	F	D/F	D/F
Alkalinity	F	D/F	D/F
Ammonia	F	D/F	D/F
Barium	C	C	C
Cadmium	C	C	D/C
Calcium	F	F	D/F
Electrical Conductivity	F	D/F	D/F
DOC	F	D/F	D/F
Iron	C	F	D/F
Lead	C	C	D/C
Magnesium	F	D/F	D/F
pH	C	C	C
Potassium	F	D/F	D/F
Sodium	F	D/F	D/F
Sulphate	F	D/F	D/F
TDS	F	D/F	D/F
Phenols	C	F	D/C
Arsenic	C	C	C
COD	F	D/F	D/F
Chromium	C	D/C	C
Copper	C	C	D/C
TKN	F	D/F	D/F
Manganese	C	D/C	D/C
Nickel	C	D/C	D/C
Phosphorous	C	D/C	D/C
Zinc	C	C	C
Unionized Ammonia	F	F	D/F
Nitrite	C	C	C
Mercury	C	C	C

Notes: I = Increasing Trend; D = Decreasing Trend; C = Constant Trend; F = Fluctuating Trend; n/a = Not applicable

As noted in **Table 4-15**, most constituent concentrations at the SUMP and the CFA-COMP monitoring locations continue to show a decreasing and fluctuating trend through 2022 whereas others remained constant or slightly fluctuate over time at a stable concentration range. Most constituent concentrations at the MH18 monitoring location continue to show a fluctuating trend through 2022 whereas others have remained constant. As has been observed at the West Central Fill Area (at the Sump) and at the Central Fill Area (CFA-COMP), it is expected that as more leachate is extracted from the South Fill Area (at MH18), the constituent concentrations will show more of a decreasing and fluctuating trend.

4.8.1.3 Overall Leachate Quality Evaluation

When evaluating the overall historical average leachate constituent concentrations for the Existing Landfill compared to that of the Expansion Landfill, chemical constituent concentrations within the leachate of the Expansion Landfill are generally above those of the Existing Landfill's leachate.

When considering the predicted peak leachate constituent concentration values for the Expansion Landfill tabulated within Table 6-9 of the 2008 D&O, both the geometric mean and the arithmetic mean for most tested constituent concentrations (> 75%) remain below their respective predicted values. **Table C-1, Appendix C**, summarizes individual general chemical constituent historical concentration ranges, associated geometric mean, and arithmetic mean, within the leachate of the Expansion Landfill and Existing Landfill.

Table C-1, Appendix C also includes the 2008 D&O predicted peak leachate constituent concentration values as a comparison to general chemical constituent concentrations measured in the leachate of the Expansion Landfill since 2008/2009.

Constituent concentrations within the Expansion Landfill leachate have generally remained below their predicted peak values presented in the 2008 D&O. Some of the reasons may relate to, but not necessarily be limited to, the following.

- Peak leachate constituent concentrations in 2008 considered leachate chemical compositions from other similarly constructed landfills from other jurisdictions (i.e., the U.S.).
- The composition of waste from other jurisdictions was predicted to remain relatively similar into the future for the Expansion Landfill. Waste streams and material compositions that are now landfilled slightly shifted over the years, mainly due to a fluctuating economy (i.e., using different materials in construction, packaging, etc.), municipal waste management collection and/or waste segregation initiatives (i.e., removal of specific materials from waste streams), etc.
- The likely larger contributing factor is that the waste mound is not fully constructed, therefore there is less waste contributing chemical loading to the percolating rainwater that becomes leachate. In other words, as the Expansion Landfill has not yet reached its peak volume, the observation that leachate strength has yet to

reach its 2008 predicted concentrations is logical in the current lifecycle of the waste mound.

- As more of the Expansion Landfill waste mound is covered with interim or final cover, less precipitation is expected to infiltrate into the waste. With a much smaller volume of leachate being generated due to less precipitation infiltration, the strength of leachate could approach the 2008 predicted values.

Also, concentration fluctuations over time are expected due to the nature of leachate, as well as to the variations in the relative contribution of weaker leachate from new waste (i.e., new waste in Cell 6A) or from the monofill cells (i.e., Cells 10/12) of the Existing Site to stronger leachate from the aging waste (i.e., waste in Cell 1) or from the West Cell (Sump) of the Existing Site.

As the Expansion Landfill leachate constituent concentrations generally remain below the predicted peak leachate values noted in the 2008 D&O, the selected Leachate Indicator List parameters for evaluating potential leachate effects on groundwater quality outlined in the EMP remain relevant.

A comparison of Expansion Landfill historical average leachate concentrations to that of the Existing Landfill's historical average leachate concentrations was also completed. Based on the collected analytical data to the end of 2022, the existing condition of leachate strength in the Expansion Landfill, on average, has mostly reached, and often is above the historical average leachate constituent concentrations of the Existing Landfill.

Other parameters not necessarily identified as a PLIL or SLIL parameter, such as select organic compounds, are also noted to be elevated within the leachate. VOC parameters suite Benzene, Toluene, Ethylbenzene, Xylene (BTEX) are deemed indicators for the presence of VOCs. They have not typically been detected within the groundwater at the TCEC. Notwithstanding, BTEX is present within the leachate at sufficient concentrations that warrant their analyses within the groundwater at the TCEC. **Table C-2, Appendix C**, summarizes individual organic chemical constituent historical concentrations within the leachate of the Expansion Landfill and Existing Landfill.

The evaluation of the leachate dataset included identifying other potential leachate indicator parameter candidates that could be utilized toward the assessment for landfill leachate impacts to groundwater. In general, the PLIL and SLIL parameters currently established to monitor for landfill leachate effects to groundwater continues to be effective as these parameters are noted to be elevated within the leachate when compared to the groundwater.

Though elevated in leachate, some chemical parameters may not necessarily indicate a leachate impact to groundwater, but rather an impact inherent to TCEC operational practices, such as on-site tracking of road salt (elevated natural metals such as magnesium, calcium, sodium, as well as inorganics such as chloride), or anthropological effects, such as nearby agricultural practices that can introduce

fertilizer-related chemicals and compounds such as nitrates, nitrites, phosphorous, potassium, as well as micronutrient additives such as manganese, magnesium, zinc, boron, iron, copper, nickel, cobalt, and sodium.

Overall, the established PLIL and SLIL parameters are effective in monitoring for potential landfill leachate effects to groundwater quality and represent constituents that are typically noted to be elevated within the leachate at the TCEC. Observations to external, non-leachate, related effects are necessary to ascertain if detected PLIL and SLIL concentrations in groundwater are landfill leachate related or related to some other factor(s).

4.8.1.4 Leachate Indicator List

Based on a comparison of individual leachate constituent concentrations to background groundwater concentrations, the following parameters are notably elevated within the leachate.

- Electrical Conductivity
- Alkalinity
- Calcium
- Magnesium
- Sodium
- Potassium
- Chloride
- DOC
- Ammonia
- TKN
- Boron
- BTEX

To differentiate landfill leachate effects from natural water quality variability, a group of parameters indicative of landfill leachate was selected based on the following items.

- Elevated concentrations in leachate.
- Mobility and stability in groundwater.
- Representative of a larger chemical grouping (e.g., boron for metals).
- Applicable Ontario Drinking Water Standards (ODWS) (MOE, 2006).

The PLIL are summarized in **Table 4-16**.

Table 4-16. Primary Leachate Indicator List Compounds for Groundwater

Primary Leachate Indicator List (PLIL)
Chloride Nitrate (as N) Boron

A supplemental group of parameters, termed the SLIL, is selected based on elevated concentrations within the leachate. The SLIL is used for quality assurance of the chemical database, for input to establish trigger concentrations, and for further data analyses in the event of trigger concentration exceedances. The SLIL parameters are summarized in **Table 4-17**.

Table 4-17. Secondary Leachate Indicator List Compounds for Groundwater

Secondary Leachate Indicator List (SLIL)	
Alkalinity Sulphate Calcium Magnesium Potassium Sodium Barium Iron DOC TDS	Ammonia (total) TKN pH Conductivity Cadmium Lead Benzene Toluene Ethylbenzene Xylenes

Per the EMP, similar to the PLIL, the SLIL were also selected based on elevated concentrations within the leachate relative to groundwater. The SLIL of parameters are used for quality assurance of the chemical database, as input toward establishing trigger concentrations, as well as utilized as a means for further interpretation of chemical data for a groundwater triggering event.

The concentrations of leachate constituents are expected to vary with time. Leachate quality monitoring will continue at the Existing Landfill and the Expansion Landfill to assess the changing leachate characteristics from a potential landfill impact assessment perspective and for leachate management considerations.

4.8.1.5 Trigger Mechanism Assessment

Groundwater compliance is assessed based on criteria calculated with respect to the MECP's Guideline B-7 Reasonable Use Concept (Guideline B-7) and evaluated at the TCEC property boundaries (Points of Compliance). The groundwater trigger concentrations are based on 80% of the calculated Guideline B-7 criteria for the reasonable use of groundwater (MOE, 1994), in accordance with Condition 14.2 of the Waste ECA. When background groundwater quality satisfies the ODWS, background groundwater quality cannot be degraded by more than 25% of the ODWS for health-related parameters (e.g., nitrate) or by more than 50% of the ODWS for aesthetic-related parameters (e.g., sodium). Where background concentrations naturally exceed the ODWS, background groundwater quality becomes the criteria.

Historical background groundwater quality for local monitoring wells is used to calculate the trigger concentrations at the TCEC. As a screening process, trigger concentrations for the PLIL are calculated and assessed based on values presented in Table 4 of the EMP.

At the TCEC, individual trigger criteria are established for PLIL parameters chloride, boron, and nitrate for each of the three (3) hydrostratigraphic units, while SLIL parameters cadmium, lead, benzene, toluene, 1,4-dichlorobenzene, dichloromethane, and vinyl chloride each have a set criterion that applies to all three (3) hydrostratigraphic units.

Points of Compliance

Monitoring wells are used at strategic locations around the TCEC to obtain suitable representation of groundwater quality moving beyond the TCEC boundary. These strategic locations are termed Points of Compliance and are assessed using Guideline B-7.

To account for natural groundwater quality variability, the trigger concentrations consider the PLIL parameters discussed in **Section 4.8.1.4**. Where a parameter concentration is noted to be above its trigger concentration within the groundwater at a monitoring well, the assessment process, as detailed within **Attached Figure 3**, of the EMP is initiated.

Verification groundwater monitoring at the TCEC adheres to Condition 14.4 of the Waste ECA, which references the landfill EMP. Groundwater verification is required to be completed for two (2) subsequent events separated by six months with the first verification monitoring event taking place within one month of the initial sampling event, where warranted.

4.8.2 Compliance Monitoring Groundwater Quality Trends

4.8.2.1 General Chemical Trend Assessment

To assess long-term chemical trends with time, time-concentration graphs for PLILs were prepared for each hydrostratigraphic unit and are discussed in relevant sub-sections below through 2022.

Based on background monitoring location findings, groundwater constituent concentrations were considered constant where analytical values varied by less than 15 milligrams per litre (mg/L) for chloride, 0.5 mg/L for nitrate, and 0.2 mg/L for boron. Concentration trends that varied by greater than these concentration ranges were interpreted as increasing, decreasing, or fluctuating.

General chemical quality data for sampled groundwater at the TCEC is tabulated in **Table D-1**, **Appendix D**.

Active Aquitard

In general, the Active Aquitard groundwater PLIL concentrations typically shows long-term concentration trends with relatively constant or fluctuating concentrations with time, with some exceptions, which are discussed below.

Time concentration graphs for the active aquitard are presented in **Figures D-1 through D-7, Appendix D**.

Chloride

Groundwater chloride concentrations at monitoring well OW16-6 have been generally stable since noting a short-term historically elevated concentration of 77 mg/L in May 2015. Chloride has since decreased to an approximate average concentration of 45 mg/L.

Within the groundwater at monitoring well OW17-4, the chloride concentrations have been generally stable after a short-term historically elevated concentration of 71 mg/L noted in May 2016. Like the chloride trend noted at OW16-6, chloride at OW17-4 also decreased, but to an approximate average concentration of 30 mg/L.

The groundwater chloride concentrations at monitoring well OW54A-4 have been increasing and fluctuating since 2014 but have begun to indicate stabilization around a concentration of 26 mg/L since 2018.

Although not a compliance monitoring location, at monitoring location OW71, the chloride concentrations are showing an increasing trend up to a new upper historical range concentration of 32 mg/L in 2022.

The groundwater chloride concentrations discussed above are notably less than the established trigger concentration of 106 mg/L. Therefore, none of these concentration trends of note warrant any concern with respect to groundwater quality.

Nitrate

Groundwater nitrate concentrations at the location of monitoring well OW56-4 have historically been low (< 1 mg/L) and relatively constant, however, isolated elevated concentrations have occurred (between 2003 and 2018). Elevated nitrate concentrations are inferred to be attributable to nearby agricultural land fertilizer application effects. Nitrate concentrations have continued to be low (< 1 mg/L) and constant since 2018.

Boron

At monitoring well OW69-5, groundwater boron concentrations continue to show a generally constant but slightly increased fluctuating trend with concentrations approaching the shallow groundwater boron trigger concentration of 1.1 mg/L since monitoring began at this location. The long-term geometric mean boron concentration is 1.0 mg/L with a maximum value of 1.3 mg/L (2014) and minimum value of 0.71 mg/L (2004).

Boron concentrations nearing the shallow groundwater flow system's trigger criteria of 1.1 mg/L at monitoring well OW69-5 are not a concern as the more mobile parameter chloride would firstly be observed if the contributing source of boron in the groundwater were leachate. It is likely that, similar to observations for former monitoring well OW58-14, that was decommissioned for this reason per MECP approval in 2016, where this monitoring well's bentonite seal had moved into the filter screen material of the monitoring well. As such similar to former monitoring well OW58-14, monitoring well OW69-5 may require decommissioning and replacement in the future depending on chemical results.

Chloride, Nitrate, and Boron

At monitoring well OW67-4, the concentrations of chloride, nitrate, and boron have exhibited generally decreasing and fluctuating trends over time. Periodic increases in concentrations for each parameter have occurred over time, including chloride in 2022 and nitrate in 2008/2009.

However, the overall trend for each PLIL parameter has generally been decreasing and fluctuating since monitoring began at OW67-4. It is noted that the PLIL parameter concentrations have been below their respective trigger concentrations since 2019.

Secondary Leachate Indicator List Compounds

At monitoring well OW69-5, the concentrations of alkalinity have shown a gradual increasing trend since approximately 2017. However, concentrations of PLIL parameters chloride, boron, and nitrate, have been fluctuating within their respective historical concentration ranges.

At monitoring well OW80-6, the concentrations of barium have shown a decreasing and fluctuating trend since its construction. Relative to the other AA monitoring wells, concentrations of barium at OW71A-5 have been slightly more elevated, however, the concentration trend is noted to be fluctuating similar to as observed for PLIL parameters chloride, boron, and nitrate, within their respective historical concentration ranges.

At monitoring wells OW16-6, OW58-6, OW59-6, OW73-6, the concentrations of sodium increased in 2006 (at OW58-6), from approximately 2006 to 2007 (at OW59-6), from 2008 to 2010 (at OW73-6), and from 2011 to 2015 (at OW16-6), but have since been gradually decreasing and fluctuating.

With respect to lead concentrations observed at monitoring wells within the AA, an elevated fluctuating lead concentration trend was noted within the groundwater at monitoring well OW60-4 since approximately 2015. As concentrations of PLIL parameters chloride, boron, and nitrate, were low and within their respective historical concentration ranges, the MECP approved to discontinue the use of lead as a SLIL parameter for groundwater at the location of OW60-4 per a letter dated October 2, 2020. However, lead continues to be documented for tracking purposes at OW60-4.

Generally, the AA SLIL parameters show long-term constant or fluctuating concentration trends with time.

Interstadial Silt and Sand

In general, the interstadial silt and sand groundwater PLIL concentrations typically shows long-term concentration trends with relatively constant or fluctuating concentrations with time, with some exceptions, which are discussed below.

Time concentration graphs for the interstadial silt and sand are presented in **Figures D-8 through D-12, Appendix D**.

Boron

At monitoring well OW46-7, groundwater boron concentrations are fluctuating and increasing since 2019, which is similar to a historical short-term increase observed in 2015 at this monitoring location. Notwithstanding an observed increasing overall trend, the boron concentrations remain below the trigger concentration of 2.1 mg/L. The other PLIL parameters are not elevated or showing an increasing trend at this monitoring location.

It is understood that periodic increases in boron concentrations are an effect from the bentonite seal moving into the filter pack of the monitoring well, similar to as observed at former monitoring well OW58-14 and current monitoring well OW69-5.

Chloride, Nitrate, and Boron

At monitoring well OW67-11, groundwater chloride concentrations showed an increasing trend from about 2009 to 2013 and have since fluctuated. Groundwater nitrate concentrations have continued to fluctuate since monitoring began at this location. Boron concentrations within the groundwater at OW67-11 have fluctuated and decreased since about 2011. The chloride and boron concentrations within the groundwater at monitoring well OW67-11 are notably below their trigger concentrations of 2.3 mg/L and 116 mg/L, respectively, for the interstadial silt and sand hydrostratigraphic unit. There is not an immediate concern at this location with respect to groundwater quality as all three PLIL parameters are not showing increasing concentration trends.

Secondary Leachate Indicator List Compounds

At monitoring well OW47-6, the concentrations of ammonia increased from approximately 2012 to 2016, but significantly decreased from 2016 to 2019, and have typically been non-detectable since 2019.

Relative to the other ISS monitoring wells, concentrations of barium at OW80-6 have been slightly more elevated but constant over time. Additionally, concentrations of PLIL parameters chloride, boron, and nitrate at OW80-6 have been fluctuating within their respective historical concentration ranges over time.

Generally, the ISS SLIL parameters show long-term constant or fluctuating concentration trends with time.

Interface Aquifer

In general, the interface aquifer groundwater PLIL concentrations typically shows long-term concentration trends with relatively constant or fluctuating concentrations with time.

Time concentration graphs for the interface aquifer are presented in **Figures D-13 through D-14, Appendix D**.

Secondary Leachate Indicator List Compounds

Within the IA, at monitoring well OW49-29, the concentrations of ammonia gradually increased approximately from 2007 to 2019, but have since been gradually decreasing and fluctuating. Also at monitoring well OW49-29, the concentrations of sulphate gradually increased approximately from 2007 to 2017, but have since been constant. However, the concentrations of PLIL parameters chloride, boron, and nitrate at OW49-29 have been relatively constant within their historical ranges over time.

Generally, the IA SLIL parameters show long-term constant or fluctuating concentration trends with time.

4.8.2.2 Organic Chemistry

Active Aquitard, Interstadial Silt and Sand, as well as Interface Aquifer

Typically, tested organic chemical constituents at each groundwater monitoring location were not detected at concentrations greater than their respective laboratory Reportable Detection Limit (laboratory data-related) (RDL). Since 2008, when construction began on the Expansion Landfill, organic constituents have infrequently and sporadically been detected (n=21), albeit at low concentrations, at select groundwater monitoring wells. Concentrations of benzene (n=4), toluene (n=2), dichloromethane (n=9), m&p xylenes (n=2), and vinyl chloride (n=4), have historically been detected within the groundwater one or more times within each of the hydrostratigraphic units. Where detected, the organic constituent concentration satisfied its ODWS, where applicable. Notwithstanding sporadic organic chemical constituent detections, no corrective measures are required to address organic chemical results.

The 2022 and historical organic chemical results are provided in **Table D-2**, **Appendix D**.

4.8.3 Triggering Mechanism Exceptions

Since the implementation of the EMP when the Expansion Landfill construction began in late 2008, groundwater quality has typically satisfied the trigger criteria set forth in Table 3 of the EMP. None of the detected groundwater trigger mechanism exceedances were related to landfill leachate or operational effects.

On occasion, there were constituent concentrations within the groundwater that were elevated above their respective triggering criterion but were not related to landfill

leachate or operational effects. In these occurrences, MECP approval to discontinue the noted assessment was approved as the parameters were consistently or commonly noted to be elevated, and often above their trigger concentrations, not as a result of landfill leachate. Though these specific parameters are exempt from verification monitoring at the noted monitoring wells, the parameters continue to be monitored for comparative purposes and chemical trend evaluation.

Table D-3, Appendix D, lists the groundwater monitoring locations that have been removed from the trigger mechanism evaluation process, per MECP approval.

4.8.4 Contaminating Lifespan Assessment

Leachate at the TCEC is generated by the percolation of infiltrating precipitation through the column of waste. Waste is degraded by the percolation of infiltrating precipitation over time. At a point in time in the future, the waste will be so degraded that the percolating precipitation will no longer generate leachate of sufficient strength to unacceptably affect groundwater quality.

There is a requirement for the TCEC to calculate the point in time in the future when the leachate would no longer negatively affect surface water quality at the TCEC. Surface water quality is the primary matrix of concern because, surface water would be the most likely matrix to be impacted by leachate if the landfill leachate was left unmanaged.

The duration of time in the future when the leachate would no longer negatively affect surface water quality is termed the contaminating lifespan (CLS). As the Expansion Landfill has newer (less decayed), as well as a larger area and volume of waste than the Existing Landfill, it is the waste in the Expansion Landfill that defines the duration of the CLS for the TCEC.

4.8.4.1 Contaminating Lifespan Model

The CLS evaluation is based on a model developed by Rowe (Rowe, 1983-1990). The model predicts future concentrations of contaminants within the leachate of a waste disposal site under predicted and/or known conditions. The model considers the migration of contaminants from landfill sites through fractured tills and into underlying aquifers with potential for migration of contaminants through advective, diffusive, and dispersive transport. The model considers potential effects of fractures on migration flow rates in an underlying aquifer and also considers effects from the installation of compacted clay liner above and/or a natural intact clayey layer below the fractured soil.

The parameter chloride is considered a conservative contaminant because it is highly soluble and readily leaches in waste. Moreover, chloride does not naturally decay. The CLS evaluation for the TCEC has utilized chloride as its indicator constituent since at least 2007. The 2008 D&O considered future chloride concentrations based on the model by Rowe.

The target CLS chloride concentration of 210 mg/L was determined in 2007 and utilized as part of the EA efforts in 2008. This value continues to be utilized to calculate the Expansion Landfill's CLS to this day. This value represents a leachate concentration at which chloride is not expected to be contaminating the environment based on specific geological conditions of the Site.

4.8.4.2 Existing Conditions Contaminating Lifespan

The CLS of the Expansion Landfill was calculated to evaluate the time it is predicted to take for landfill leachate to degrade such that the chloride concentration satisfies the EMP-defined trigger concentration for chloride (210 mg/L) in surface water. In essence, the CLS models the decrease of chloride concentrations overtime within a closed landfill setting, assuming that the waste is sufficiently covered to allow for the removal of chloride within the waste mass through the collection of leachate and/or recirculation of leachate. The CLS model requires input of variables that inter-relate with the model's calculation. As completed for past CLS calculations, input parameters are taken from Table 4 of the MECP's Landfill Standards (MECP, 2010) and equations by Rowe (Rowe, 1991), as well as empirical field values, where appropriate.

To calculate the CLS for this Existing Conditions evaluation, the scenario presumes as-is conditions (i.e., area and waste mass) for a landfill closure by December 31, 2022. **Section 4.8.5** presents a predicted CLS assuming the Expansion Landfill at capacity using current empirical data, as warranted.

The determination of the CLS for the TCEC considers the waste to contain a finite mass of leachate constituents. Based on the Rowe equations, the finite mass of leachate constituents exponentially decays over time. These equations are as follows.

1. Reference height of leachate for the leachate parameter:

   $H_r = m_{TC} / c_0 * A_0$, where;

   H_r → Reference height of leachate for the leachate parameter (m)
   m_{TC} → Mass of leachate parameter in the waste (kg/m²)
   c_0 → Peak concentration of leachate parameter in leachate (kg/m³)
   A_0 → Area of leachate in waste mound (m²)

2. Mass of parameter in leachate:

   $m_{TC} = H_w \rho_{dw} \rho A_0$, where;

   m_{TC} → Mass of leachate parameter in the waste (kg/m²)
   H_w → Average waste height (m)
   ρ_{dw} → Average density of waste (kg/m³)
   ρ → Mass of parameter in waste (unitless)
   A_0 → Area of leachate in waste mound (m²)

3. Contaminating Lifespan:

$t = H_r/q_0 * \ln(c_t/c_0)$, where;

t → Contaminating lifespan (yrs)
H_r → Reference height of leachate for the leachate parameter (m)
q_0 → Water percolation rate through waste (mm/yr)
c_t → Concentration of parameter at contaminating lifespan (mg/L)
c_0 → Peak concentration of leachate parameter in leachate (mg/L)

Input variable values entered in the CLS model in consideration of landfill closure by the end of 2022, are summarized in **Table 4-18**.

Table 4-18. CLS Empirical Input Variables for Existing Conditions

Input Variable	Value (unit of measure)
Volume of Consumed Airspace	12,154,124 m³
Landfill Area Occupied by Waste (A_0)	557,731 m²
Cumulative Tonnage	10,786,085 MT
Cumulative Waste Density (ρ_{dw})	887.4 kg/m³ (0.887 MT/m³)
Average Waste Height (H_w)	21.8 m
Proportional Mass of Chloride (ρ)	0.000905 (unitless)
Total Mass of Contaminant (m_{TC})	17.50 kg/m²
Peak Chloride Concentration in Leachate (c_0)	3,600 mg/L
Leachate Reference Height (H_r)	4.86 m

The above values were obtained empirically using field measurements and monitoring data. Further details are provided below.

By the end of 2022, the Expansion Landfill had consumed 12,154,124 m³ of airspace and approximately 557,731 m² of area, based on topographic survey data.

The tonnage on record received by the Expansion Landfill since it began receiving waste in November 2009 amounts to 10,786,085 metric tonnes (MT). Thus, an overall **cumulative waste density** (ρ_{dw}) is calculated to be approximately 887.4 kg/m³.

The **average waste height** (H_w) is obtained simply be dividing the consumed volume by the consumed area.

The **proportional mass of chloride** (ρ) within the waste was derived by collecting actual chloride concentrations from 69 tested waste samples collected from thirteen (13) boreholes in 2014 and 2017. Boreholes were advanced into the waste mound of the Expansion Landfill for exploratory purposes. The results of that undertaking showed chloride concentrations ranging from 63 milligrams per kilogram (mg/kg) to 2,200 mg/kg, with a geometric mean concentration of 905 mg/kg. Thus, considering that a concentration of 10,000 mg/kg equates to 1%, then the geometric mean chloride concentration within the waste of the Expansion Landfill of 905 mg/kg would equate to 0.0905% or 0.000905 in decimal nomenclature.

The **total mass of contaminant** (m_{TC}) is obtained by multiplying the cumulative density by the **average waste height** (H_w) and the unitless proportional mass of the contaminant, in this case, chloride.

The **peak chloride concentration** (c_0) is that of the peak concentration of chloride observed through analytical testing within leachate samples collected from pumping stations PS1 to PS5, as well as the Equalization Tank (up to approximately 2017 when Existing Landfill leachate was introduced to the Equalization Tank). Since 2022, the peak chloride concentration in leachate observed was noted at pumping station PS1 in 2021 with a value of 3,600 mg/L (or 3.6 kg/m³). Thus, the **reference height of leachate** (H_r) is obtained by dividing the total mass of the chloride contaminant (m_{TC} in kg/m²) by the peak concentration of chloride (kg/m³) to obtain a reference height in metres (m).

To calculate the chloride concentration at a specified point in time (*t*), Rowe's equation can be reconfigured as follows.

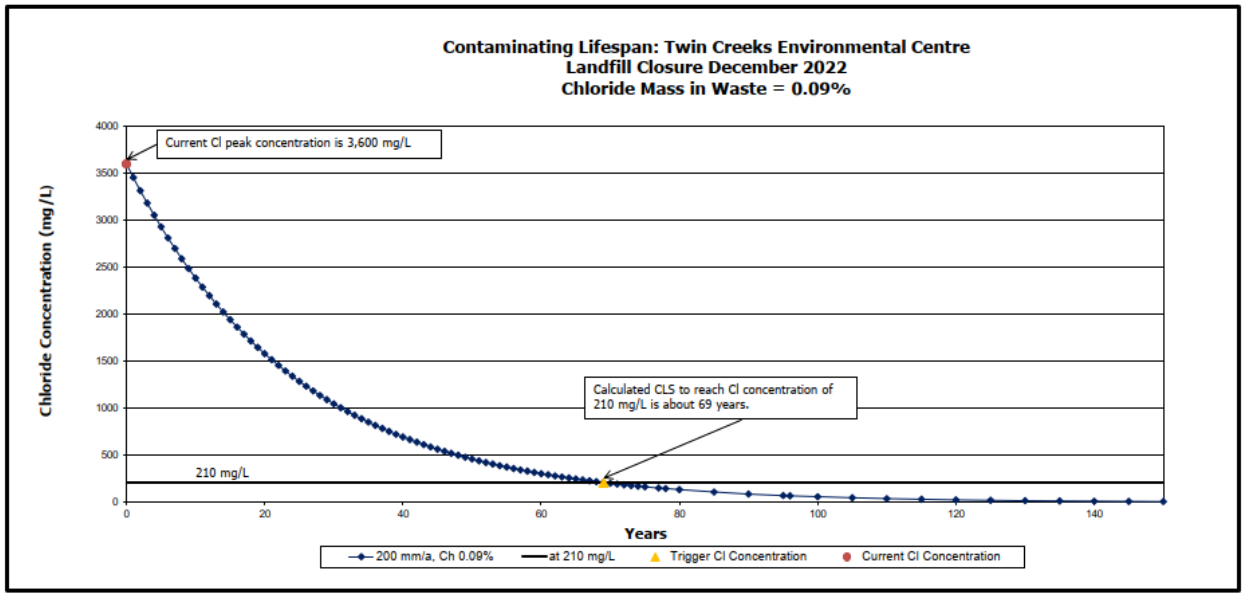
$c_t = c_o \exp((-q_o t)/H_r)$, where;

c_t → Concentration at time (*t*) (kg/m³)
c_0 → Initial concentration or peak concentration (kg/m³)
$-q_0$ → Infiltration rate (mm/yr)
t → time (yrs)
H_r → Leachate reference height (m)

The **infiltration rate** ($-q_0$) was derived from the Landfill Standards (MECP, 2016, with updates to 2021) and considers a minimum infiltration rate of 150 mm/yr (0.15 m/a). For the Expansion Landfill, an infiltration rate of 200 mm/yr was determined in 2007 and remains relevant today.

Based on the above input variables and Rowe's equation, the CLS based on the Existing Conditions for the Expansion Landfill is 69 years, presuming landfill closure on December 31, 2022. Below is **Figure 4-2** displaying the CLS curve over time and the intersection of the target chloride concentration of 210 mg/L and the CLS curve at 69 years.

Figure 4-2. CLS Curve for Existing Conditions



4.8.5 At-Capacity Contaminating Lifespan

Similar to the above exercise, a prediction was made toward the CLS of the landfill should it reach the full MECP-approved waste capacity under the existing Waste ECA conditions (At-Capacity). The At-Capacity CLS considered utilizing the same values for waste density, proportional and total mass of chloride contaminant, as well as the peak leachate chloride concentration into the CLS. The associated At-Capacity CLS input variables are summarized in **Table 4-19**.

Table 4-19. CLS Input Variables Assuming At-Capacity

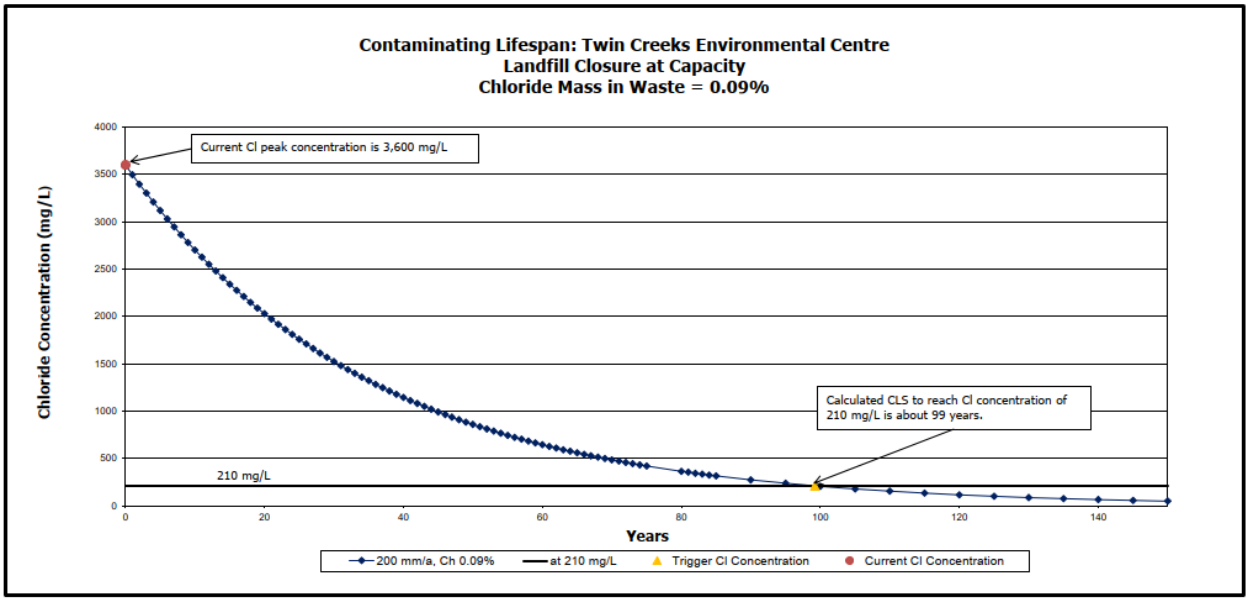
Input Variable	Value (unit of measure)
Volume of Consumed Airspace	23,590,629 m³
Landfill Area Occupied by Waste (A_0)	753,800 m²
Cumulative Tonnage	20,935,325 MT
Cumulative Waste Density (ρ_{dw})	887.4 kg/m³
Average Waste Height (H_w)	31.3 m
Proportional Mass of Chloride (ρ)	0.000905 (unitless)
Total Mass of Contaminant (m_{TC})	25.13 kg
Peak Chloride Concentration in Leachate (c_0)	3,600 mg/L
Leachate Reference Height (H_r)	6.98 m

Based on the above input variable values, the At-Capacity CLS was calculated to be 99 years post-closure.

Figure 4-3 displays the At-Capacity CLS curve over time and the intersection of the target chloride concentration of 210 mg/L and the CLS curve at 99 years. Assuming the Expansion Landfill is filled to its currently approved capacity by an anticipated

closure year of 2031, the Expansion Landfill is expected to have the potential to contaminate the subsurface environment until about 2132. The At-Capacity CLS is calculated using empirical values obtained up to the end of 2022 for waste density, peak chloride concentrations, and mass of contaminant.

Figure 4-3. CLS Curve at Capacity



4.9 Off-Site Water Supply Well Survey

A water supply well survey (Well Survey) was prepared for Well Owners who have a MECP-documented water supply well record (i.e., on the WWR) within the Off-Site Study Area.

The individual WWR for wells located in the Off-Site Study Area of the TCEC were plotted using the referenced grid coordinates provided in the WWRs and shown on **Attached Figure 11**. To maintain confidentiality, the Provincial Government has redacted land ownership/address information contained within individual WWR. Some of the plotted locations include wells that have been reported as abandoned/sealed or decommissioned. The individual water well records indicate which water wells are noted to be active and which are noted to be abandoned/decommissioned.

Of the 59 MECP-documented WWRs within the Off-Site Study Area, 21 WWRs identified supply wells actively being used for domestic consumption purposes, 8 WWRs are utilized for commercial and/or livestock use, 10 WWRs were identified as test holes and/or monitoring wells, 4 WWRs identified unknown groundwater usage, whereas 16 WWRs were identified as inactive/abandoned. Only wells that were identified for active use were included in the Well Survey. Therefore, 43 WWRs were determined to be suitable for the purposes of the Well Survey.

Of the WWRs included in the Well Survey, there were instances where more than one water supply well was determined to be owned by the same individual. For these instances, the Well Owner was provided a form for each water supply well on record. A blank copy of the Well Survey Form that was delivered to the Well Owners in the summer of 2023 is provided in **Appendix E-1, Appendix E**.

Of the 25 total Well Owners (across 43 Water Well Records) within the Off-Site Study Area, Well Survey Forms were able to be directly hand-delivered to 19 Well Owners. Three (3) Well Survey Packages were dropped off at the residential dwellings as the occupant(s) were not home at the time of delivery attempts. The remaining three (3) packages could not be delivered to a physical place of residence.

Of the 22 Well Survey Forms successfully delivered, only one (1) response was received. The respondent indicated that there was an existing well located on their property and noted that the water was used for irrigation and commercial uses as often as on a weekly basis. The respondent further indicated that there was not, nor were they aware of a requirement for, a PTTW to utilize the supply well. The associated completed Well Survey Form, is contained in **Appendix E-2, Appendix E**.

According to the WWRs, groundwater users within the Off-Site Study Area take the water from depths equal to or deeper than the interface aquifer hydrostratigraphic unit. Any water taking from within the interface aquifer in the Off-Site Study Area has not had a discernible impact on the groundwater potentiometric pressures at the TCEC.

Thus, based on the evaluated data, groundwater users within the Off-Site Study Area are not impacted by, nor causing impacts to, groundwater quantity as it relates to the operation of the TCEC.

4.10 Summary of Existing Conditions

The following conclusions are provided as a summary of the findings from this Hydrogeology Existing Conditions evaluation for the TCEC.

- Geological and hydrogeological conditions are well understood. Monitoring well installations completed since the 2005 Hydrogeologic Report (JHL, 2005), confirm historical observations of subsurface environmental conditions. Subsurface hydrostratigraphic units, such as the active aquitard, interstadial silt and sand, and interface aquifer, that were identified during the 2005 investigative efforts, were confirmed on several occasions during multiple subsurface drilling programs since. Subsequent drilling program occurred post-2007 with the approval of the Landfill EMP.
- The drilling programs included the installation of various monitoring wells and monitoring well nests across the TCEC in consideration of the groundwater monitoring program requirements stipulated within the Landfill EMP.
- Leachate level monitoring provides an understanding of Existing Conditions at the TCEC.

    - Leachate level monitoring of the Existing Landfill waste cells is utilized to preferentially manage leachate through the Poplar System on-site verses off-site management.
    - Leachate levels within the Expansion Landfill are managed to maintain the hydraulic trap of leachate.
- Leachate generation rates thus far for the Expansion Landfill are below the predicted generation rates from the 2008 D&O Report and are projected to remain below historical predictions for the next 5 years, but are anticipated to approach the predicted 2008 leachate constituent concentration values as more waste is disposed into the Expansion Landfill.
- Groundwater levels are well understood nearby the Existing Landfill. For newer monitoring well locations nearby the Expansion Landfill, groundwater level trends continue to be monitored.
    - Within the active aquitard, groundwater elevations seasonally fluctuate based on climatic conditions. An easterly and westerly direction of shallow groundwater movement occurs at the north-south divide through the Poplar Plantation. Anthropological features locally influence the shallow groundwater flow direction. To the west, shallow groundwater movement is influenced by the low topography near Sedimentation Pond 2 and the Van Kessel Drain.
    - Within the interstadial silt and sand, groundwater elevations can be seasonally affected based on climatic conditions. Groundwater elevations also show a similar pattern as those of the active aquitard along the north-south divide. Groundwater pressures within the interstadial silt and sand unit are also influenced by the hydraulic trap design of the Expansion Landfill whereby nearby groundwater flow is being induced toward the waste.
    - Overall, a southwesterly groundwater flow direction was apparent below the TCEC within the interface aquifer. Of note, as more overburden soil is removed during landfill cell construction, interface aquifer pressures are expected to decrease. Consequently, as more waste is deposited, the increase in overlying mass is expected to increase groundwater pressures of the interface aquifer.
- Leachate quality monitoring provides a tracking mechanism to evaluate chemical trends within the waste cells at the TCEC.
    - Leachate quality monitoring completed for the waste cells of the Existing Landfill has remained consistent with historical monitoring findings.
    - The evaluation of leachate quality within the Expansion Landfill shows that most tested parameters are showing increasing trends. Expansion Landfill leachate constituent concentrations are typically greater than within the Existing Landfill, an expectedly below the predicted peak leachate constituent concentrations presented in the 2008 D&O.

- The monitoring program as it relates to the Compliance Leachate and Groundwater Monitoring Programs is effective in evaluating potential landfill leachate effects to groundwater quality based on leachate and groundwater Existing Conditions.
    - The selected PLIL and SLIL parameters for evaluating potential leachate effects on groundwater quality as outlined in the EMP remains relevant based on leachate and groundwater quality Existing Conditions.
- Based on the evaluation of groundwater Existing Conditions, the current trigger concentration mechanism is suitable for discerning potential landfill leachate impacts to groundwater quality.
- Groundwater quality in each of the assessed hydrostratigraphic units shows acceptable groundwater quality that is not negatively impacted by landfill leachate or operations.
- The projected CLS for the Expansion Landfill under Existing Conditions is 69 years and is calculated to be 99 years for At-Capacity conditions.
- A Water Well Survey of MECP-documented WWRs was completed in the Off-Site Study Area. A total of 25 Well Owners were identified of which 1 response has been provided. The response indicated that the well is used approximately monthly and not for domestic consumption.
- Based on the evaluated data, groundwater users within the Off-Site Study Area are not impacted by, nor causing impacts to, groundwater quantity as it relates to the operation of the TCEC.

5 References

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HDR

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RWDI AIR Inc.

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University of Western Ontario

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1999 Report of Soil Mineralogy, Carbonate and Cation Exchange Capacity Analyses, Prepared for Jagger Hims Limited

6 Closure

We trust this Hydrogeology Existing Conditions report is satisfactory for your requirements. Please contact us if you have any questions.

Yours very truly,

RWDI

Jeff Cleland, B.Eng., P.Eng.
Environmental Engineer | Geoscience
May 29, 2026

Brent J. Langille, B.Sc. P.Geo.
Senior Technical Director | Principal
May 29, 2026

FIGURES

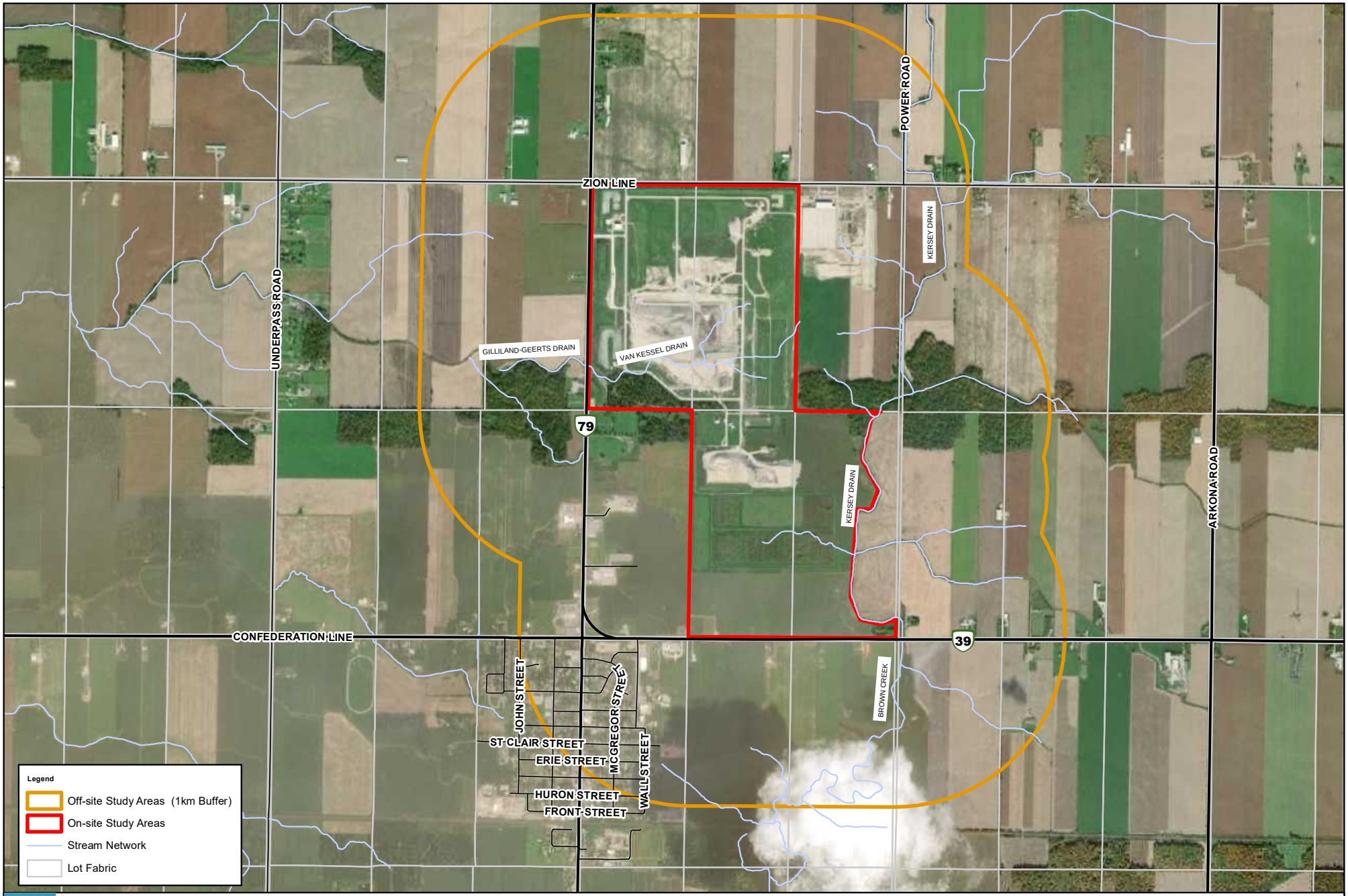
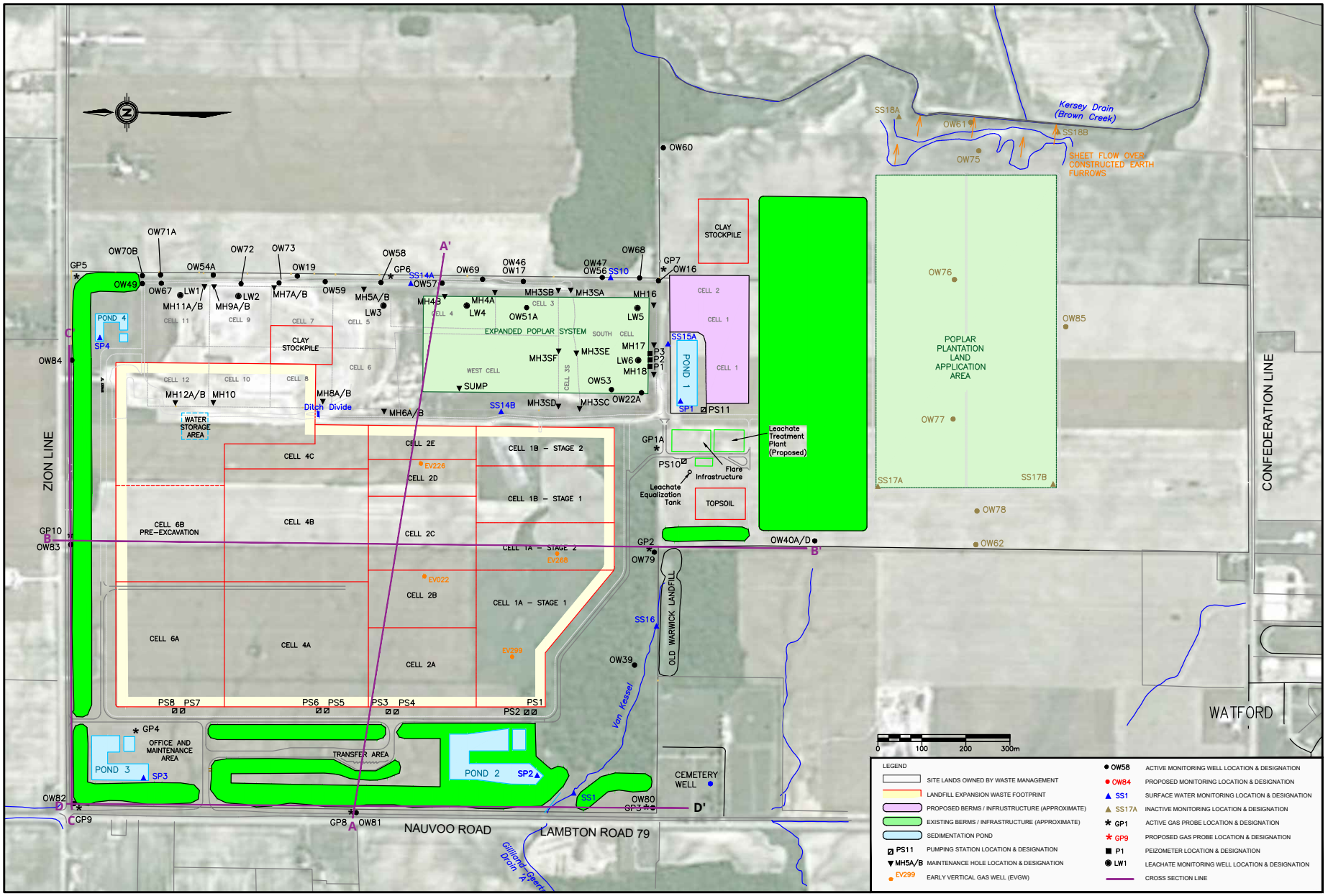


FIGURE 1

PROJECT STUDY AREA



MAP SOURCE:
AERIAL PHOTO PROVIDED BY GOOGLE EARTH (2011), ACCESSED ON JANUARY 2014.
FIGURE PROVIDED BY GENIVAR INC., FIGURE 2, FILE REF NO. 111-53111-00-F2-SP 12CM Q4, DATED FEBRUARY 2013.

NOTE: LOCATION OF CONSTRUCTION SEDIMENTATION PONDS, BERMS, POPLAR PLANTATION, TREATMENT PLANT, & EFFLUENT LAGOONS FROM NOVEMBER 2010 SURVEY PLAN.

WASTE MANAGEMENT

SITE PLAN

Environmental Assessment (EA) Hydrogeology/ Existing Conditions Report

TWIN CREEKS ENVIRONMENTAL CENTRE
TOWNSHIP OF WARWICK, ONTARIO

DWN BY: AJV
CHK BY: JCL
DATE: October 2023
SCALE: 1:8,000

WASTE MANAGEMENT OF CANADA CORP.

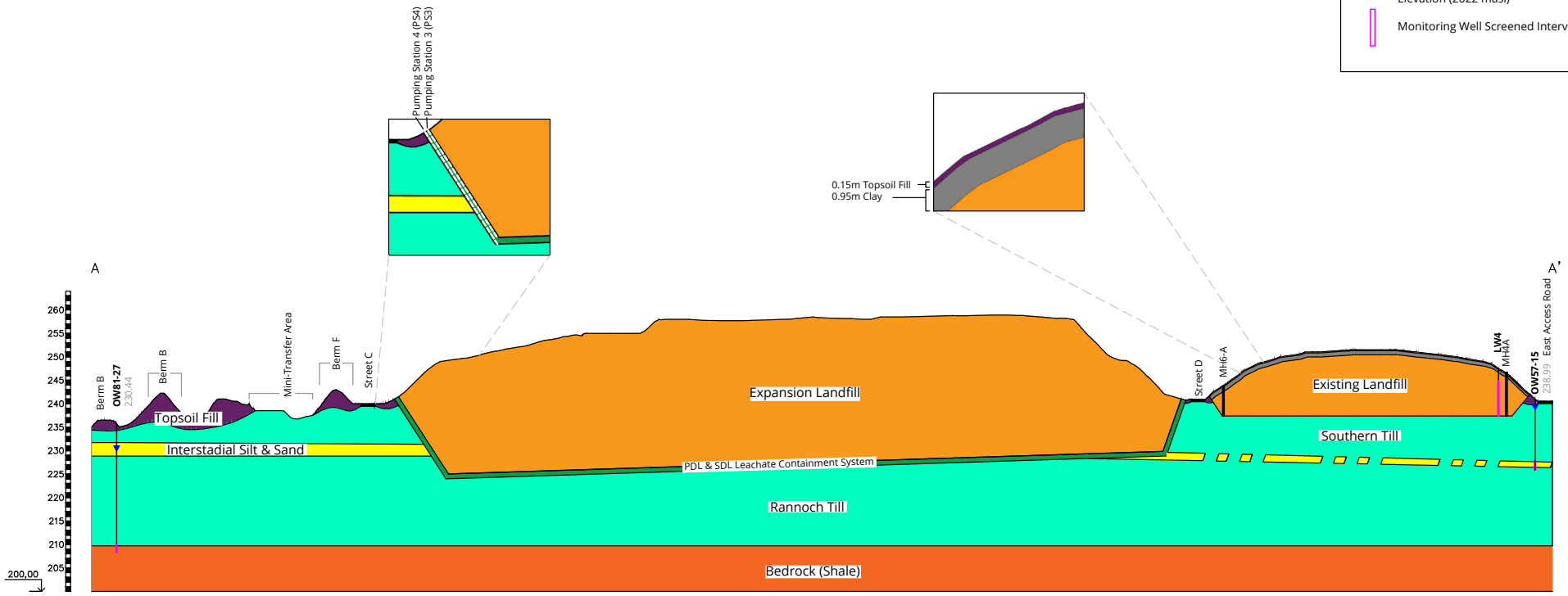
PROJECT FILE REF. NO. 2101750

FIGURE 2

FACING NORTH

LEGEND:

- Average Groundwater Depth and Elevation (2022 masl)[1]
- Monitoring Well Screened Interval



Horizontal Scale (approx.): 1:3,600
Vertical Scale (approx.): 1:900

Note:

1. Groundwater elevations presented are mean averages of 2022 data.
2. Locations are approximate and provided for illustrative purposes only.

A-A' Geological Cross Section
Hydrogeology Existing Conditions Report

Waste Management - Twin Creeks Environmental Center, 5768 Nauvoo Rd, Watford, ON

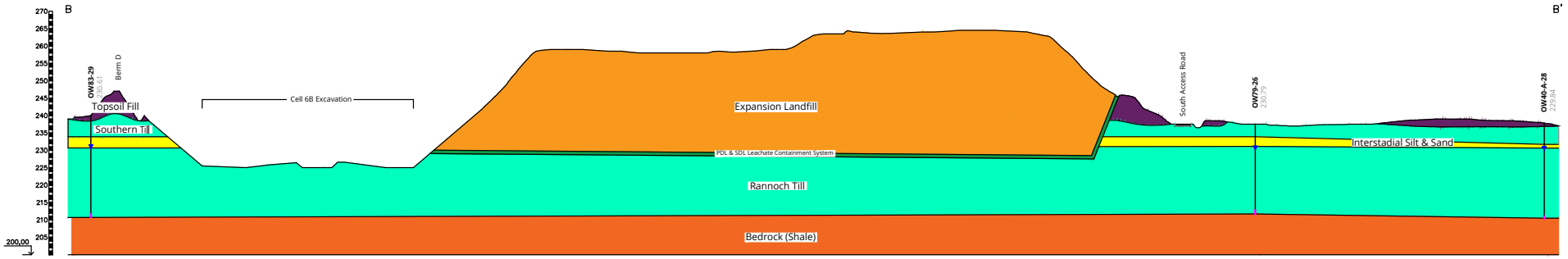
Project #2101750

Drawn by: EW	Figure: 3
Approx. Scale: See Figure	
Date Revised: Oct. 5, 2023	

FACING EAST

LEGEND:

- Average Groundwater Depth and Elevation (2022 masl)[1]
- Monitoring Well Screened Interval



Horizontal Scale (approx.): 1:4,600
Vertical Scale (approx.): 1:11,50

Note:

1. Groundwater elevations presented are mean averages of 2022 data.
2. Locations are approximate and provided for illustrative purposes only.

B-B' Geological Cross Section
Hydrogeology Existing Conditions Report

Waste Management - Twin Creeks Environmental Center, 5768 Nauvoo Rd, Watford, ON

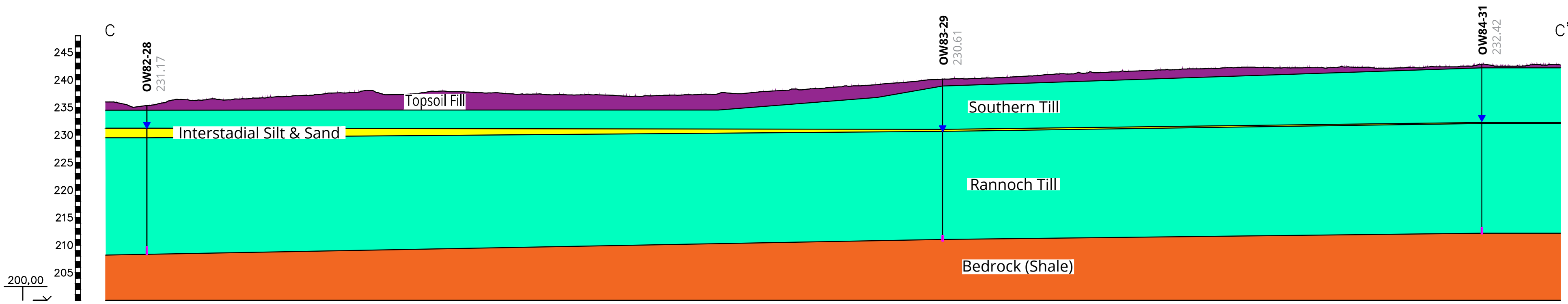
Project #2101750

Drawn by: EW	Figure: 4
Approx. Scale: See Figure	
Date Revised: Oct. 03, 2023	

FACING NORTH

LEGEND:

- Average Groundwater Depth and Elevation (2022 masl)[1]
- Monitoring Well Screened Interval



Horizontal Scale (approx.): 1:2,900
Vertical Scale (approx.): 1:700

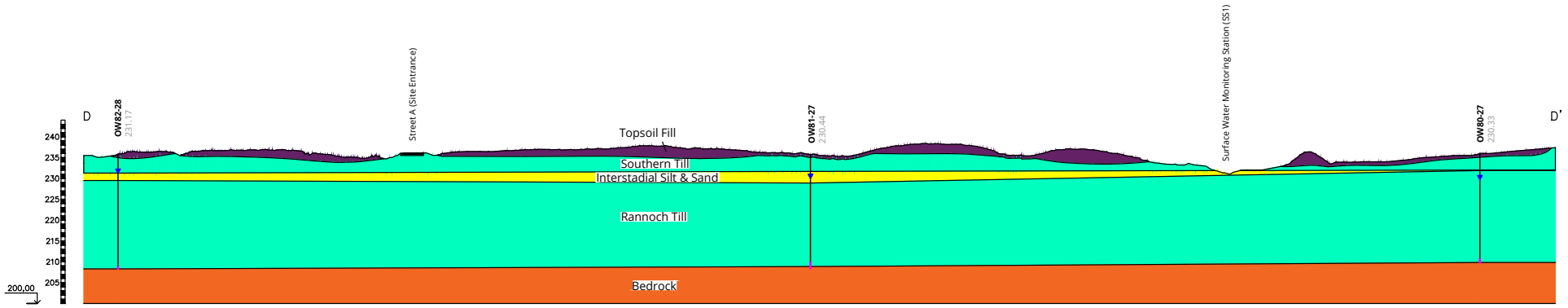
Note:
1. Groundwater elevations presented are mean averages of 2022 data.
2. Locations are approximate and provided for illustrative purposes only.

C-C' Geological Cross Section Hydrogeology Existing Conditions Report	Drawn by: EW	Figure: 5
	Approx. Scale: See Figure	
Waste Management - Twin Creeks Environmental Center, 5768 Nauvoo Rd, Watford, ON — Project #2101750	Date Revised: Sept. 29, 2023	

FACING EAST

LEGEND:

- Average Groundwater Depth and Elevation (2022 masl)[1]
- Monitoring Well Screened Interval



Horizontal Scale (approx.): 1:3,800
Vertical Scale (approx.): 1:1,000

Note:

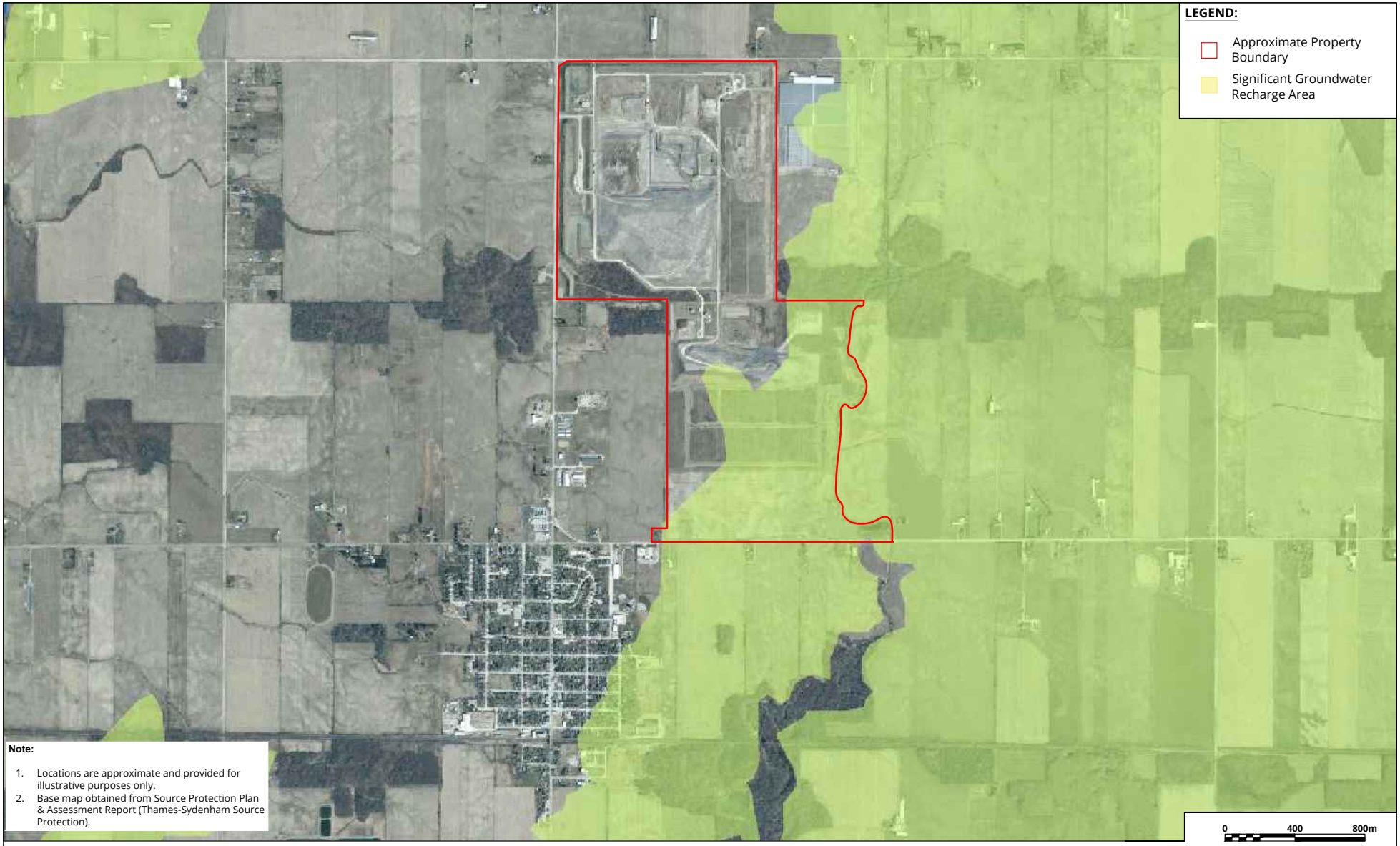
1. Groundwater elevations presented are mean averages of 2022 data.
2. Locations are approximate and provided for illustrative purposes only.

D-D' Geological Cross Section
Hydrogeology Existing Conditions Report

Waste Management - Twin Creeks Environmental Center, 5768 Nauvoo Rd, Watford, ON

Project #2101750

Drawn by: EW | Figure: 6
Approx. Scale: See Figure
Date Revised: Oct. 3, 2023



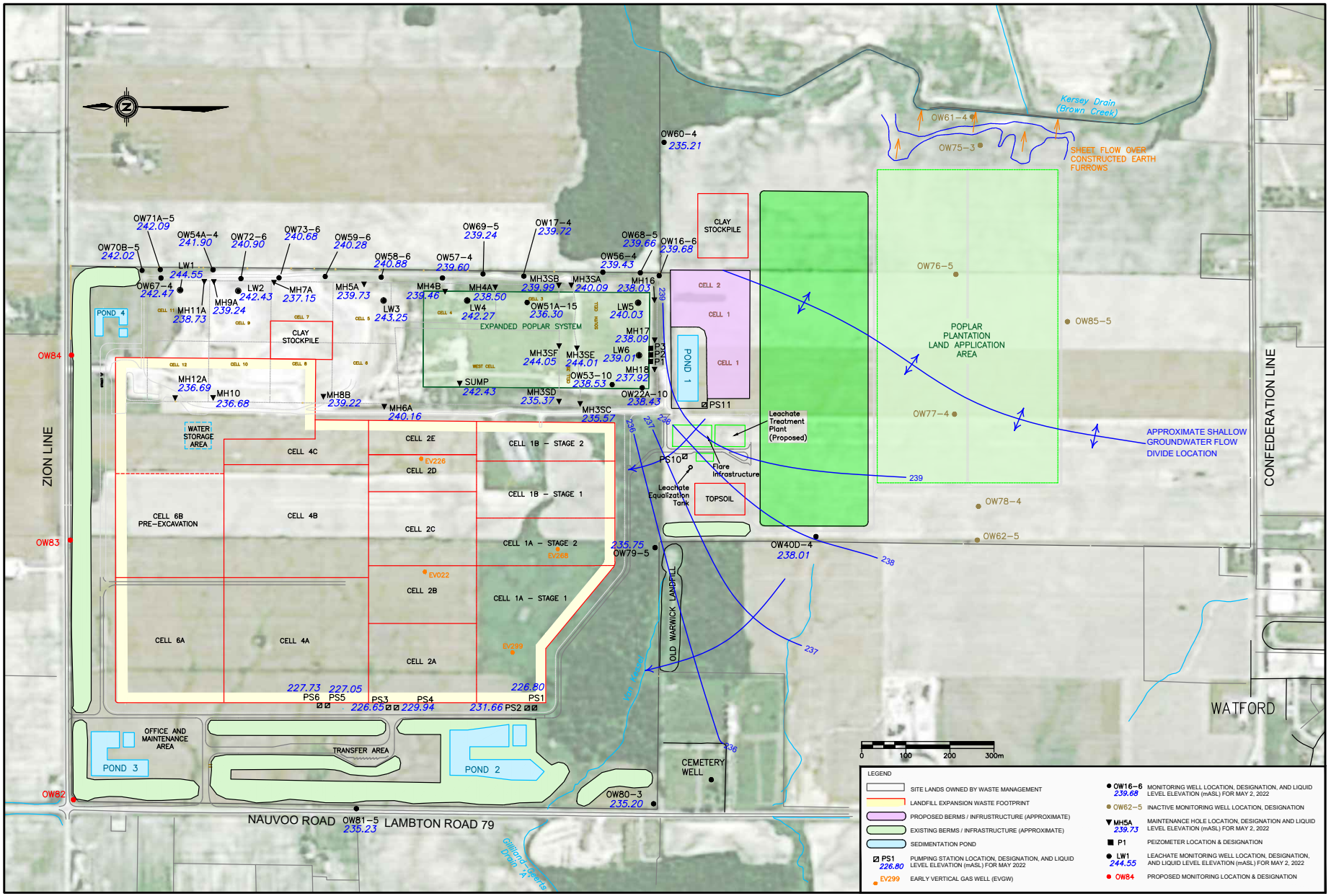
St. Clair Region Source Water Protection
Hydrogeology Existing Conditions Report

Waste Management - Twin Creeks Environmental Center, 5768 Nauvoo Rd, Watford, ON

True North

Project #2101750

Drawn by: EW	Figure: 7
Approx. Scale:	1:20,320
Date Revised:	Oct 3, 2023



MAP SOURCE:
AERIAL PHOTO PROVIDED BY GOOGLE EARTH (2011), ACCESSED ON JANUARY 2014.
FIGURE PROVIDED BY GENIVAR INC., FIGURE 3, FILE REF NO. 111-53111-00-F4-GW 12CM Q4, DATED FEBUARY 2013.

NOTE:
LOCATION OF CONSTRUCTION SEDIMENTATION PONDS, BERMS, POPLAR PLANTATION, TREATMENT PLANT, & EFFLUENT LAGOONS FROM DECEMBER 2010 SURVEY PLAN.

RWDI

WASTE MANAGEMENT

LEACHATE & SHALLOW GROUNDWATER ELEVATIONS
Environmental Assessment (EA) Hydrogeology Existing Conditions Report

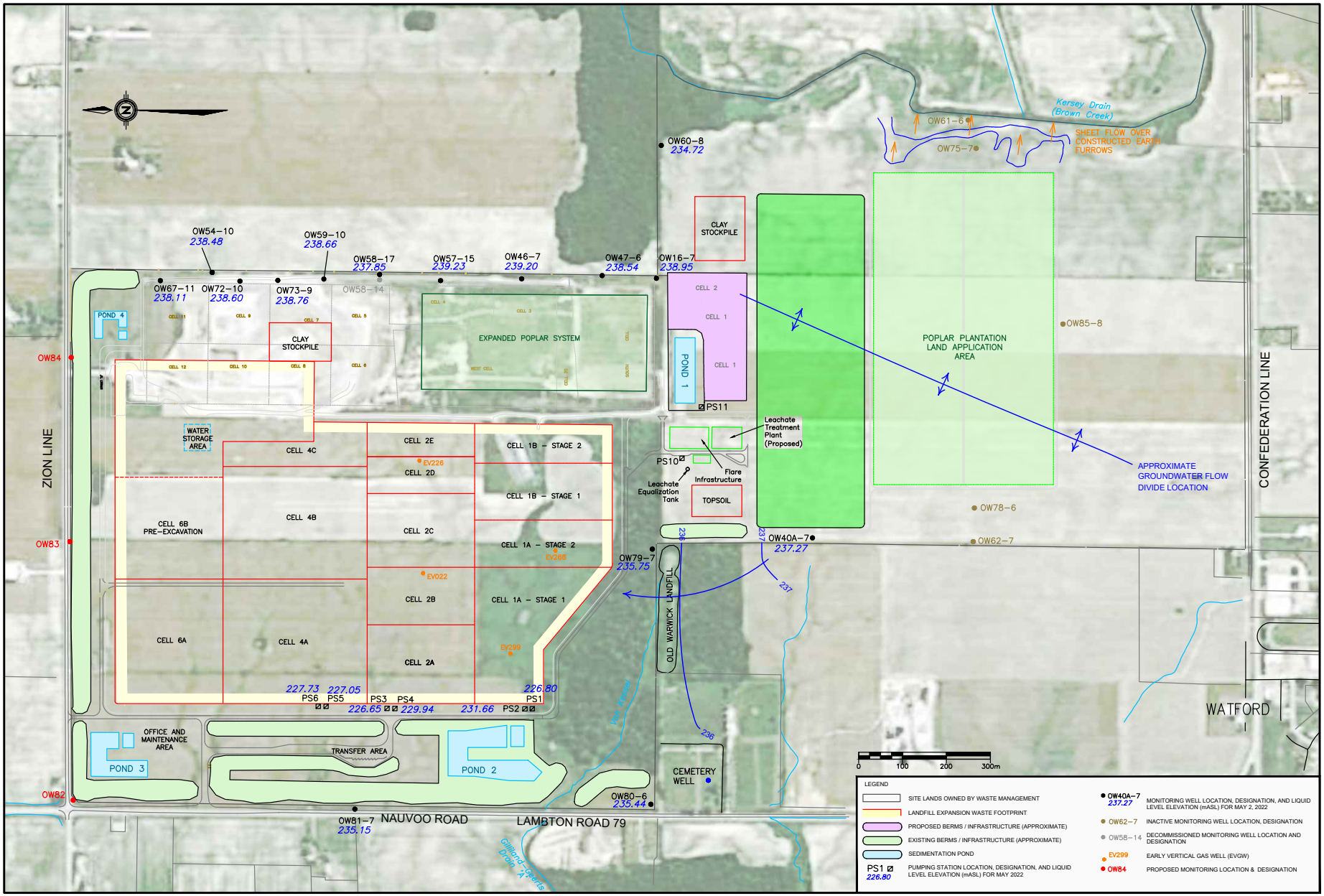
TWIN CREEKS ENVIRONMENTAL CENTRE
TOWNSHIP OF WARWICK, ONTARIO

DWN BY: EW
CHK BY: JCL
DATE: NOVEMBER 2023
SCALE: 1:8,000

WASTE MANAGEMENT OF CANADA CORP.

PROJECT FILE REF. NO. 2101750

FIGURE 8



MAP SOURCE:
AERIAL PHOTO PROVIDED BY GOOGLE EARTH (2011), ACCESSED ON JANUARY 2014.
FIGURE PROVIDED BY GENIVAR INC., FIGURE 3, FILE REF NO. 111-53111-00-F5-GW 12CM Q4, DATED FEBUARY 2013.

NOTE:
LOCATION OF CONSTRUCTION SEDIMENTATION PONDS, BERMS, POPLAR PLANTATION, TREATMENT PLANT, & EFFLUENT LAGOONS FROM DECEMBER 2010 SURVEY PLAN.

RWDI

WASTE MANAGEMENT

INTERSTADIAL SILT AND SAND GROUNDWATER ELEVATIONS
Environmental Assessment (EA) Hydrogeology Existing Conditions Report

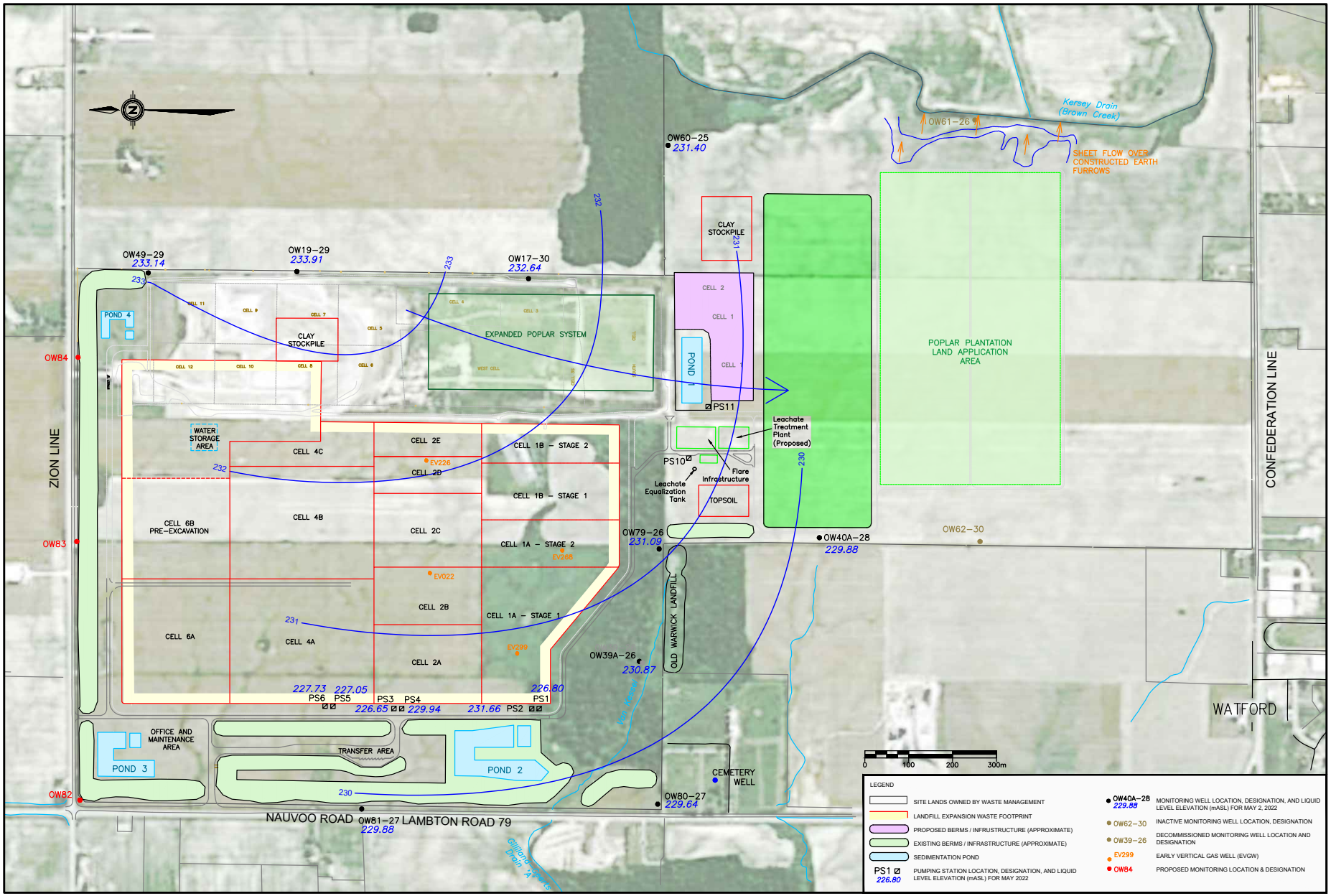
TWIN CREEKS ENVIRONMENTAL CENTRE
TOWNSHIP OF WARWICK, ONTARIO

DWN BY: EW
CHK BY: JCL
DATE: NOVEMBER 2023
SCALE: 1:8,000

WASTE MANAGEMENT OF CANADA CORP.

PROJECT FILE REF. NO. 2101750

FIGURE 9



MAP SOURCE:
AERIAL PHOTO PROVIDED BY GOOGLE EARTH (2011), ACCESSED ON JANUARY 2014.
FIGURE PROVIDED BY GENIVAR INC., FIGURE 3, FILE REF NO. 111-53111-00-F6-GW 12CM Q4, DATED FEBUARY 2013.

NOTE:
LOCATION OF CONSTRUCTION SEDIMENTATION PONDS, BERMS, POPLAR PLANTATION, TREATMENT PLANT, & EFFLUENT LAGOONS FROM DECEMBER 2010 SURVEY PLAN.

RWDI

WASTE MANAGEMENT

INTERFACE AQUIFER
GROUNDWATER ELEVATIONS
Environmental Assessment (EA) Hydrogeology Existing Conditions Report

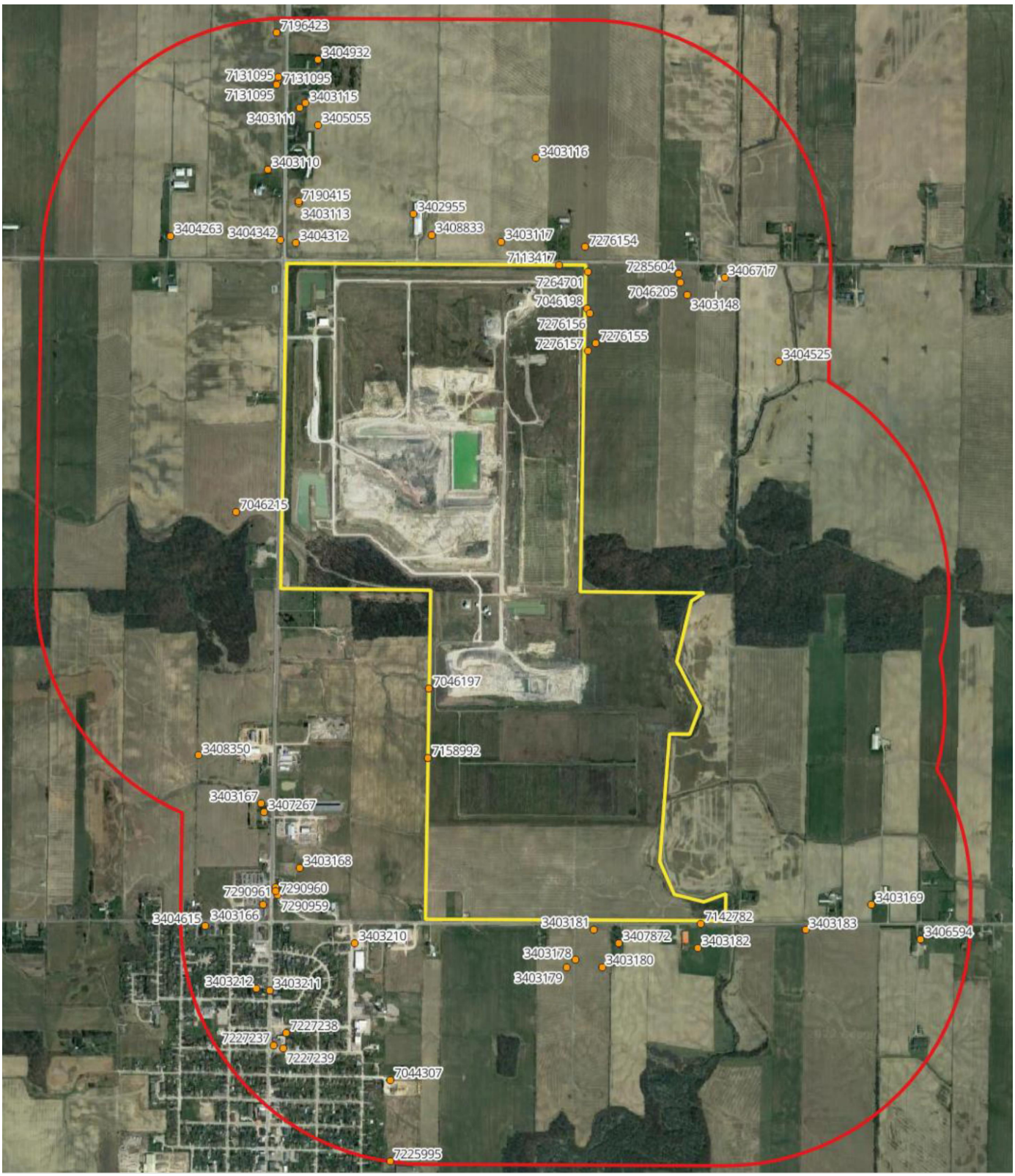
TWIN CREEKS ENVIRONMENTAL CENTRE
TOWNSHIP OF WARWICK, ONTARIO

DWN BY: EW
CHK BY: JCL
DATE: NOVEMBER 2023
SCALE: 1:8,000

WASTE MANAGEMENT OF CANADA CORP.

PROJECT FILE REF. NO. 2101750

FIGURE
10



LEGEND:

- Groundwater Well
- On-Site Study Area Boundary
- Off-Site Study Area Boundary

Note:

1. **Locations are approximate and provided for illustrative purposes only.**

0 450 900m

MECP-Documented Water Well Records Site Plan

Hydrogeology Existing Conditions Report

True North

Waste Management - Twin Creeks Environmental Center, 5768 Nauvoo Rd, Watford, ON

Project #2101750

Drawn by:	EW	Figure: 11
Approx. Scale:	1:16,900	
Date Revised:	Oct. 6, 2023	

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A

Monitoring Well Installation Details, Borehole Logs, and Mineralogy Reports

Table A-1
Monitoring Well Details Summary
Twin Creeks Environmental Centre

Borehole NO.	Monitor NO.	Monitor Type	Screen Diameter (mm)	Ground Surface (mASL)	Monitor (T.O.P) (mASL)	Screened Interval (m ASL)	Filter Pack (m ASL)	Seal (Granular Bentonite or Dry Benseal) (m ASL)	Seal (Bentonite Grout) (m ASL)	Backfill Elevation (m ASL)	Surface Seal (Concrete) (m ASL)	Unit Description	Monitoring Program Status
OW16	5	S	50	240.68	241.50	236.1 - 239.1	236.1 - 239.2	239.2 - 239.7	NA	NA	239.7 - 240.7	ST(w), ST, IC	Decommissioned
	6	S-ANG	50	240.70	241.36	234.76 - 235.86	234.67 - 236.19	236.62 - 240.70	NA	236.19 - 236.62	NA	ST(w)	Active
	7	P	50	240.56	241.55	234.0 - 234.5	234.0 - 234.6	234.6 - 235.0	NA	235.0 - 239.7	239.7 - 240.7	IC, IS, RT	Active
OW17	4	S	40	240.17	240.64	235.0 - 238.2	235.0 - 238.2	238.2 - 238.6	NA	NA	238.6 - 239.6	ST (w)	Active
	5	P	40	240.03	240.66	234.5 - 234.9	234.5 - 235.0	235.0 - 235.3	NA	235.3 - 238.7	238.7 - 239.7	ST (w), ST	Decommissioned
	12	P	40	240.01	240.50	227.6 - 228.0	227.6 - 228.2	228.2 - 228.4	NA	228.4 - 238.7	238.7 - 239.7	RT	Decommissioned
	30	P	40	240.09	240.72	209.6 - 211.9	209.6 - 212.1	212.1 - 213.0	NA	213.0 - 238.7	238.7 - 239.7	Deep Sand, Shale	Active
OW19	12	P	40	240.97	241.83	229.0 - 229.4	229.0 - 229.4	229.4 - 229.7	NA	229.7 - 240.0	240.0 - 241.0	RT	Inactive
	29	P	51	241.00	241.86	212.2 - 213.7	212.2 - 214.0	214.0 - 214.6	218.1 - 241.0	214.6 - 218.1**	NA	Deep Sand, Silt, Shale	Active
OW39	6	P	50	234.94	235.92	228.3 - 229.2	228.3 - 229.7	229.7 - 230.9	230.9 - 233.9	NA	233.9 - 234.9	ST	Inactive
	12	P	50	234.99	235.72	223.0 - 224.2	223.0 - 226.0	226.0 - 227.2	227.2 - 234.0	NA	234.0 - 235.0	IS	Inactive
	17	P	50	235.03	235.84	219.0 - 220.3	219.0 - 221.0	221.0 - 222.0	222.0 - 234.0	NA	234.0 - 235.0	RT	Inactive
OW39	26	P	51	234.90	235.74	209.3 - 211.8	209.3 - 211.1	211.1 - 212.2	212.2 - 234.9	NA	NA	Deep Sand, Shale	Decommissioned
OW39A	26	P	51	234.90	235.60	209.3 - 210.8	209.3 - 211.3	211.3 - 211.7	211.7 - 234.9	NA	NA	Deep Sand, Shale	Active
OW40A	4	P	50	238.11	239.08	233.54 - 237.02	233.54 - 237.32	237.32 - 238.11	NA	NA	NA	ST(w)	Decommissioned
	7	P	50	238.19	239.13	231.33 - 232.09	231.33 - 232.40	232.70 - 238.19	NA	232.40 - 232.70**	NA	RT	Active
	28	P	50	238.21	239.11	210.12 - 210.93	210.73 - 211.24	237.30 - 238.21	211.62 - 237.3	211.24 - 211.62**	NA	Deep Sand, Shale	Active
OW40B	4	S-ANG	50	238.11	238.74	233.87 - 234.94	233.85 - 235.16	235.39 - 238.11	NA	235.16 - 235.39**	NA	ST(w)	Decommissioned
	4r	S-ANG	50	238.05	238.66	233.74 - 234.93	233.74 - 235.46	235.68 - 238.05	NA	235.46 - 235.68**	NA	ST(w)	Decommissioned
OW40D	4	S-ANG	51	238.13	238.76	233.83 - 235.99	233.83 - 236.41	236.41 - 236.73	NA	236.73 - 238.13**	NA	ST(w)	Active
OW46	7	P	51	239.93	240.66	233.5 - 233.8	233.5 - 234.2	234.2 - 235.1	235.1 - 239.3	NA	239.3 - 239.8	IC, IS, RT	Active
OW47	GP	GP	25	239.93+	NA	237.7 - 238.9	237.7 - 238.9	238.9 - 239.4	NA	NA	239.4 - 239.9	ST(w)	Inactive
	6	P	51	240.08	240.77	233.5 - 233.8	237.7 - 238.9	238.9 - 239.4	NA	234.8 - 237.7	239.4 - 239.9	IC, IS	Active
							233.5 - 234.2	234.2 - 234.8					
OW49	29	P	51	242.35	243.21	213.51 - 214.27	213.49 - 214.81	242.01 - 242.35	215.33 - 242.01	214.81 - 215.33**	NA	Deep Sand, Shale	Active
OW54	10	P	51	242.41	243.44	232.34 - 233.10	232.33 - 233.72	234.03 - 242.41	NA	233.72 - 234.03**	NA	IS	Active
OW54A	4	S	51	242.10	242.95	237.07 - 238.59	237.07 - 239.36	239.66 - 242.10	NA	239.36 - 239.66	NA	ST(w)	Active
OW56	4	S-ANG	51	240.05	240.46	236.0 - 237.4	236.0 - 237.2	237.5 - 240.0		237.2 - 237.5		ST(w)	Active
OW57	4	S-ANG	51	240.68	241.32	236.9 - 238.0	236.9 - 238.4	238.6 - 240.8		238.4 - 238.6**	NA	ST(w)	Active
	15	P	51	240.68	241.44	228.7 - 230.3	228.7 - 230.6	240.5 - 240.7	231.0 - 240.5	230.6 - 230.7**	NA	RT, Silt	Active
								230.7 - 231.0		225.9 - 228.3			
								228.3 - 228.7					

NOTES: 1) m ASL denotes metres above sea level.
2) P denotes piezometer.
3) S denotes standpipe. ANG - Angled well.
4) GP denotes gas probe.
5) mm denotes millimetres.
6) * denotes bottom of screen.
7) Elevations are approximate based on available information.
8) NA denotes not applicable or data not available.
9) ST = Southern Till, ST(w) = Southern Till (weathered)
RT = Rannoch Till
IC = Interstadial Clay
IS = Interstadial Sand
10) ** denotes backfill is dried and pulverized clayey soil from borehole.
11) *** denotes borehole cave-in.
12) ( ) denotes ground surface at installation; based on 1984 data.
13) + denotes elevation prior to July 2004 survey.
14) Well details for OW17-30 based on imperial scale of borehole logs.

Table A-1
Monitoring Well Details Summary
Twin Creeks Environmental Centre

Borehole NO.	Monitor NO.	Monitor Type	Screen Diameter (mm)	Ground Surface (mASL)	Monitor (T.O.P) (mASL)	Screened Interval (m ASL)	Filter Pack (m ASL)	Seal (Granular Bentonite or Dry Benseal) (m ASL)	Seal (Bentonite Grout) (m ASL)	Backfill Elevation (m ASL)	Surface Seal (Concrete) (m ASL)	Unit Description	Monitoring Program Status
OW58	4	S-ANG	51	241.12	241.71	237.3 - 238.4	237.3 - 238.8	239.0 - 241.2		238.8 - 239.0**	NA	ST(w)	Decommissioned
	6	S-ANG	50	241.15	241.62	235.24 - 236.31	235.12 - 236.73	237.07 - 241.15	NA	236.73 - 237.07	NA	ST(w)	Active
	14	P	51	241.22	241.53	226.9 - 227.6	226.8 - 229.2	240.9 - 241.2	229.8 - 240.9	229.2 - 229.3**	NA	RT, Silt	Decommissioned
	17	P	51	241.49	242.17	225.0 - 226.7	210.5 - 225.0	210.7 - 212.3	212.3 - 240.6	224.99 - 227.69	NA	RT, Silt	Active
OW59	4	S-ANG	51	241.29	241.79	237.4 - 238.4	237.4 - 238.8	239.0 - 241.2		238.8 - 239.0**	NA	ST(w)	Decommissioned
	6	S-ANG	50	241.14	241.84	235.23 - 236.30	235.11 - 236.85	237.06 - 241.14	NA	236.85 - 237.06	NA	ST(w)	Active
	10	P	51	241.25	242.03	232.5 - 233.2	232.3 - 233.5	240.8 - 241.1	234.1 - 240.8	233.5 - 233.7**	NA	Silt (IS)	Inactive
								233.7 - 234.1					
								232.0 - 232.3					
OW60	4	S-ANG	51	235.21	235.73	231.6 - 232.07	231.6 - 233.1	233.2 - 235.2		233.1 - 233.2**		ST(w)	Active
	8	P	51	235.25	235.76	227.3 - 228.0	227.3 - 228.3	228.5 - 229.1	229.1 - 235.2	228.3 - 228.5**		Silt (IS)	Active
	25	P	51	235.24	235.74	210.2 - 211.7	210.2 - 212.4	212.4 - 213	213.0 - 235.2			RT, Deep Sand, Shale	Active
OW61	4	S-ANG	51	234.76	235.44	231.6 - 232.7	231.6 - 232.9	233.0 - 234.8		232.9 - 233.0**		ST(w)	Inactive
	6	P	51	234.60	235.34	228.2 - 229.0	228.2 - 229.4	229.7 - 230.1	230.1 - 234.6	229.4 - 229.7**		ST, Clayey Silt (IS)	Inactive
	26	P	51	234.67	235.54	208.7 - 209.5	206.7 - 209.6	209.6 - 210.3	210.3 - 234.7	208.5 - 208.7**		RT, Deep Sand	Inactive
OW62	4	S-ANG	51	240.06	240.89	236.8 - 237.9	236.8 - 238.1	238.2 - 240.1		238.1 - 238.2**		ST(w)	Decommissioned
	5	S-ANG	51	240.33	240.88	234.94 - 237.10	234.94 - 237.53	237.96 - 240.33		234.30 - 234.94		ST(w)	Inactive
										237.53 - 237.96**			
	7	P	51	240.27	240.55	233.6 - 234.3	233.6 - 234.8	234.9 - 240.3		234.9 - 234.9**		ST, Clayey Silt (IS)	Inactive
	30	P	51	240.14	240.90	210.4 - 211.9	210.4 - 212.9	212.9 - 213.9	213.9 - 240.1	210.1 - 210.4***		RT, Deep Sand	Inactive
OW67	4	S-ANG	51	242.61	243.26	238.9 - 240.0	238.9 - 240.3	240.5 - 240.8	240.8 - 242.6	240.3 - 240.5**	NA	ST(w)	Active
	11	P	51	242.60	243.10	231.9 - 232.7	231.8 - 233.1	233.1 - 233.7	233.7 - 242.6		NA	IS	Active
OW68	5	S	51	240.89	241.68	235.9 - 237.3	235.9 - 238.1	238.1 - 235.9	NA		NA	ST(w)	Active
OW69	5	S-ANG	51	240.11+	240.66+	235.1 - 236.5	235.1 - 237.7	237.7 - 240.1	NA		NA	ST(w)	Active
OW70B	5	S	51	241.96	242.84	236.77 - 238.91	236.77 - 239.22	239.52 - 241.96	NA	239.22 - 239.52	NA	ST(w)	Active
OW71	5	S-ANG	51	242.18	242.79	237.3 - 238.4	237.2 - 238.8	239.3 - 242.2	NA	238.8 - 239.3**	NA	ST(w)	Decommissioned
OW71A	5	S-ANG	51	242.32	242.75	237.69 - 239.84	236.69 - 240.25	240.68 - 242.32	NA	236.90 - 237.69	NA	ST(w)	Active
										240.25 - 240.68**			
OW72	6	S-ANG	50	242.10	242.72	236.19 - 237.25	236.06 - 237.47	237.59 - 242.1	NA	237.47 - 237.59	NA	ST(w)	Active
	10	P	50	242.12	243.09	232.57 - 233.34	232.37 - 233.74	234.04 - 242.12	NA	233.74 - 234.04	NA	IS	Active
								231.76 - 232.37					
OW73	6	S-ANG	50	241.78	242.43	235.87 - 236.93	235.74 - 237.27	237.48 - 241.78	NA	237.27 - 237.48	NA	ST(w)	Active
	9	P	50	241.83	242.88	232.69 - 233.45	232.69 - 233.75	234.06 - 241.83	NA	233.75 - 234.06	NA	IS	Active

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OW75	3	S-ANG	51	234.70	235.34	231.38 - 232.54	231.38 - 233.07	233.21 - 234.70	NA	233.07 - 233.21**	NA	ST(w)	Inactive
	7	P	51	234.66	235.65	227.66 - 229.18	227.66 - 228.86	229.17 - 234.66	NA	228.86 - 229.17	NA	IS, IC	Inactive
										227.06 - 227.66			
OW76	5	S-ANG	51	237.53	238.23	232.2 - 233.27	232.14 - 233.67	233.85 - 237.53	NA	233.67 - 233.85**	NA	ST, IC	Inactive
OW77	4	S-ANG	51	241.60	242.31	237.4 - 238.47	237.29 - 238.76	238.91 - 241.6	NA	238.76 - 238.91**	NA	ST(w)	Inactive
OW78	4	S-ANG	51	239.46	240.14	235.66 - 236.74	235.64 - 236.96	237.18 - 239.46	NA	236.96 - 237.18**	NA	ST(w)	Inactive
	6	P	51	239.45	240.45	233.16 - 233.92	233.15 - 234.37	234.7 - 239.45	NA	234.37 - 234.70**	NA	IC, IS	Inactive
OW79	5	S-ANG	51	237.85	238.56	232.99 - 234.06	232.98 - 234.37	234.59 - 237.85	NA	234.37 - 234.59**	NA	ST(w)	Active
	7	P	51	237.83	238.77	230.44 - 231.20	230.44 - 231.73	232.04 - 237.83	NA	231.73 - 232.04**	NA	IS	Active
	26	P	51	237.89	238.95	212.13 - 212.89	212.13 - 213.35	237.29 - 237.89	213.65 237.29	213.35 - 213.65**	NA	RT, Deep Sand	Active
										211.68 - 212.13***			
OW80	3	S-ANG	51	235.44	236.16	231.98 - 233.05	231.96 - 233.26	233.47 - 235.44	NA	233.26 - 233.47**	NA	ST(w)	Active
	6	P	51	235.51	236.59	229.71 - 230.47	229.70 - 230.94	231.24 - 235.51	NA	230.94 - 231.24**	NA	IS	Active
	27	P	51	235.40	236.58	208.78 - 209.54	208.48 - 209.70	235.10 - 235.4	210.02 235.10	209.70 - 210.02**	NA	RT, Deep Sand	Active
OW81	5	S-ANG	51	235.31	236.04	230.30 - 231.40	230.30 - 231.70	232.00 - 235.31	NA	231.70 - 232.00**	NA	ST(w)	Active
	7	P	51	235.84	236.50	228.40 - 229.40	228.40 - 229.80	230.10 - 235.84	N/A	229.80 - 230.1****	NA	IS	Active
	27	P	51	235.77	236.55	209.38 - 209.80	209.38 - 210.20	234.87 - 235.77	210.50 - 234.87	210.20 - 210.5****	NA	RT, Deep Sand	Active
OW82	5	S-ANG	51	236.13	236.76	230.72 - 231.48	230.72 - 231.80	232.13 - 236.13	NA	231.80 - 232.1****	NA	ST(w)	Active
	14	P	51	236.19	236.99	222.47 - 223.24	222.47 - 223.54	235.76 236.19	223.85 - 235.76	223.54 - 223.8****	NA	IS	Active
	28	P	51	236.25	236.92	208.21 - 208.97	208.21 - 209.35	235.82 - 236.25	209.73 - 235.82	209.35 - 209.7****	NA	RT, Deep Sand	Active
OW83	5	S-ANG	51	240.01	240.75	234.60 - 235.36	234.60 - 235.68	236.01 - 240.01	NA	235.73 - 236.0****	NA	ST(w)	Active
	9	P	51	240.17	240.89	230.87 - 231.64	230.87 - 231.94	237.73 - 240.17	232.25 - 237.73	231.94 - 232.2****	NA	IS	Active
	29	P	51	240.15	240.82	210.59 - 211.35	210.59 - 211.65	239.72 - 240.15	212.11 - 239.72	211.65 - 212.1****	NA	RT, Deep Sand	Active
OW84	6	S-ANG	51	243.18	243.86	236.70 - 237.45	236.70 - 237.73	238.10 - 243.18	NA	237.77 - 238.1****	NA	ST(w)	Active
	11	P	51	243.34	244.03	232.37 - 233.13	232.37 - 233.43	243.24 - 243.34	233.74 - 243.24	233.43 - 233.7****	NA	IS	Active
	31	P	51	243.26	243.91	212.35 - 213.09	212.35 - 213.45	243.16 - 243.26	213.85 - 243.16	213.45 - 213.8****	NA	RT, Deep Sand	Active
OW85	5	S-ANG	51	240.04	240.58	235.14 - 236.21	235.13 - 236.48	236.68 - 240.04	NA	236.48 - 236.68**	NA	ST(w)	Inactive
	8	P	51	240.08	241.19	232.29 - 233.81	232.28 - 234.58	234.88 - 240.08	NA	234.58 - 234.88**	NA	IS, IC	Inactive
								226.06 - 231.48		231.48 - 232.28**			

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Twin Creeks Environmental Centre

Borehole NO.	Monitor NO.	Monitor Type	Screen Diameter (mm)	Ground Surface (mASL)	Monitor (T.O.P) (mASL)	Screened Interval (m ASL)	Filter Pack (m ASL)	Seal (Granular Bentonite or Dry Benseal) (m ASL)	Seal (Bentonite Grout) (m ASL)	Backfill Elevation (m ASL)	Surface Seal (Concrete) (m ASL)	Unit Description	Monitoring Program Status
GP	1	GP	51	239.22	240.33	234.31 - 238.88	234.27 - 239.07	239.07 - 239.22	NA	239.07^	NA	ST(w), ST	Decommissioned
	1A	GP	51	238.86	239.89	233.7 - 238.27	233.69 - 238.42	238.42 - 238.86	NA	238.42 ^	NA	ST(w), ST	Active
GP	2	GP	51	237.85	238.91	233.25 - 237.52	233.22 - 237.70	237.7 - 237.85	NA	237.70^	NA	ST(w), ST	Active
GP	3	GP	51	235.52	236.51	231.17 - 235.13	231.16 - 235.22	235.22 - 235.52	NA	235.22 ^	NA	ST(w), ST	Active
GP	4	GP	51	237.87	238.85	232.80 - 237.37	232.8 - 237.52	237.52 - 237.87	NA	237.52 ^	NA	ST(w), ST	Active
GP	5	GP	51	241.11	242.79	235.93 - 240.50	235.92 - 240.65	240.65 - 241.11	NA	240.65 ^	NA	ST(w), ST	Active
GP	6	GP	51	241.49	242.57	236.64 - 241.21	236.61 - 241.34	241.34 - 241.49	NA	241.34^	NA	ST(w), ST	Active
GP	7	GP	51	240.60	241.79	235.75 - 240.32	235.75 - 240.35	240.35 - 240.60	NA	240.35^	NA	ST(w), ST	Active
GP	8	GP	51	235.95	236.82	230.80 - 235.10	230.80 - 235.30	235.30 - 235.95	NA	235.30^	NA	ST(w), ST	Active
GP	9	GP	51	236.15	236.982	230.66 - 235.24	230.66 - 235.69	235.72 - 236.15	NA	236.15^	NA	ST(w), ST	Active
GP	10	GP	51	240.16	240.771	234.67 - 239.25	234.67 - 239.70	239.73 - 240.16	NA	240.16^	NA	ST(w), ST	Active

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5) mm denotes millimetres.
6) * denotes bottom of screen.
7) Elevations are approximate based on available information.
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BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Clay	<0.002 mm		
Silt	0.002 to 0.06 mm	"trace" (e.g. trace sand)	<10%
Sand	0.06 to 2 mm	"some" (e.g. some sand)	10% - 20%
Gravel	2 to 60 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	60 to 200 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>200 mm	noun (e.g. sand)	>50%

* Extension of MIT Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

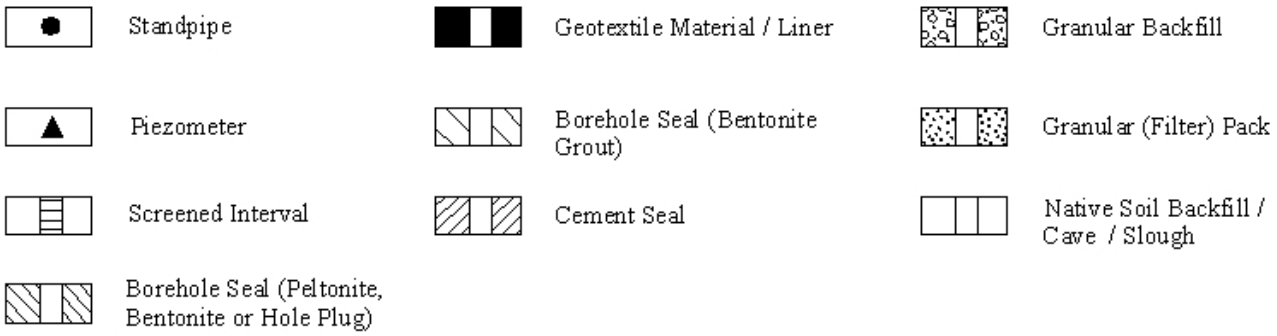
COHESIONLESS SOILS	COHESIVE SOILS		
Dry	DTPL	-	Drier Than Plastic Limit
Moist	APL	-	About Plastic Limit
Wet	WTPL	-	Wetter Than Plastic Limit
Saturated	MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.



Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS	=	Split Spoon	GS	=	Grab Sample
ST	=	Thin Walled Shelby Tube	CS	=	Channel Sample
AS	=	Auger Flight Sample	WS	=	Wash Sample
CC	=	Continuous Core	RC	=	Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60º steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{xBlows}{mm}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

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OW16-5
OW16-7

CLIENT LAIDLAW WASTE SYTEMS FILE NO. 400-841

PROJECT LANDFILL STUDY LOCATION LOT 20, CON. 3 SER; WARWICK TOWNSHIP

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.- MARCH 1984

DESCRIPTION	DEPTH m	DEPTH ft.	WELL DETAIL
SEE LAST WELL LOG FOR STRATIGRAPHIC DETAIL (fold out sheet)			16-7 16-5
TILL (SOUTHERN) brown, silt with some clay, weathered, damp, root network	1	5	
	2		
TILL (SOUTHERN) grey, clay with some silt, massive, moist cohesive	3	10	
	4		
CLAY silty, grey, (moist), occasional fine sand laminae (saturated)	5	15	
	6	20	EOH (C)
SAND med-coarse, dark grey to black, saturated	7		
	8	25	EOH (D)
TILL (RANNOCH) olive grey, silt with trace clay, pebbles, occasional cobbles, moist	9	30	
	10		
	11	35	
	12		
	13	40	

GAMMA RAY LOG: Seconds / 200 counts — 10 — 20

Penetrat Test: Blows / 1 — 25 50

NOTES: ALL WELLS ARE IN SEPARATE HOLES
(B) DEEPEST BOREHOLE CONTINUOUSLY SAMPLED
WELL TYPE, SEE CONSTRUCTION DETAILS (end of Appendix)

morrison beatty limited

OW16-5
OW16-7

CLIENT LAIDLAW WASTE SYTEMS FILE NO. 400-841

PROJECT LANDFILL STUDY LOCATION LOT 20, CON. 3 SER; WARWICK TOWNSHIP

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.- MARCH 1984

DESCRIPTION	DEPTH m	DEPTH ft.	WELL DETAIL	GAMMA RAY LOG	Penetration Test
SEE LAST WELL LOG FOR STRATIGRAPHIC DETAIL (fold out sheet)			OW16-7 OW16-5	Seconds / 200 counts 10 20	Blows / f 25 50 7
TILL (SOUTHERN) brown, silt with some clay, weathered, damp, root network	1	5			
	2				
TILL (SOUTHERN) grey, clay with some silt, massive, moist cohesive	3	10			
	4				
CLAY silty, grey, (moist), occasional fine sand laminae (saturated)	5	15	EOH (C)		
	6	20			
SAND med-coarse, dark grey to black, saturated	7				
		25	EOH (D)		
TILL (RANNOCH) olive grey, silt with trace clay, pebbles, occasional cobbles, moist	8				
	9	30			
	10				
		35			
	11				
	12	40			
	13				

NOTES: ALL WELLS ARE IN SEPARATE HOLES

(B) DEEPEST BOREHOLE CONTINUOUSLY SAMPLED

WELL TYPE, SEE CONSTRUCTION DETAILS (end of Appendix)

BOREHOLE NO. OW16-6

PROJECT NAME: WARWICK WELL REHABILITATION | **PROJECT NO.:** 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION | **DATE:** SEPTEMBER 7, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS | **SUPERVISOR:** AAP

GROUND ELEVATION: 240.70 m ASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN, CLAYEY SILT TO SILTY CLAY, DISSEMINATED FINE SAND, TRACE MEDIUM GRAVEL TO 5.0 m, FRACTURED, DTPL BECOMING APL AT 4.1 m, STIFF BECOMING SOFT AT 4.5 m, MASSIVE, ROOTLETS UP TO 5.0 m, NO ODOUR.										BOREHOLE INCLINED AT 45°. STRATIGRAPHIC DESCRIPTION BASED ON AUGER CUTTINGS AND CONTINUOUS CORE.
2											
4											
6	– 5.0 m BROWN–GREY WITH LIGHT GREY FRACTURES, APL, SOFT, MASSIVE.			CC			80				
6.0	BOREHOLE TERMINATED AT 6.0 m IN CLAYEY SILT TO SILTY CLAY.										
8											
10											
12											
14											
16											
18											
20											

Revision 2/ Aug 2003

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OW17-4
OW17-5
OW17-12

CLIENT LAIDLAW WASTE SYTEMS FILE NO. 400-841

PROJECT LANDFILL STUDY LOCATION LOT 20, CON 3 SER, WARWICK TOWNSHIP

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.- MARCH 1984

DESCRIPTION	DEPTH m	DEPTH ft.	WELL DETAIL	GAMMA RAY LOG	Penetration Test
SEE LAST WELL LOG FOR STRATIGRAPHIC DETAIL (fold out sheet)			17-12, 17-5, 17-4	Seconds / 200 counts	Blows / ft
TILL (SOUTHERN) brown, silt with some clay, weathered, damp, root network	1–3	5–10		10 20	25 50 75
TILL (SOUTHERN) grey, clay with some silt, massive, moist cohesive	4–5	15	EOH (A)		
CLAY silty, grey, (moist), occasional fine sand laminae (saturated)	6	20	EOH (B)		
SAND med-coarse, dark grey to black, saturated	7–8	25			
TILL (RANNOCH) olive grey, silt with trace clay, pebbles, occasional cobbles, moist	9–10	30–35			
	11–12	40	EOH (B)		
	13				

NOTES: ALL WELLS ARE IN SEPARATE HOLES

(B) DEEPEST BOREHOLE CONTINUOUSLY SAMPLED

WELL TYPE, SEE CONSTRUCTION DETAILS (end of Appendix)

morrison beatty limited

OW17-30

CLIENT LAIDLAW WASTE SYSTEMS FILE NO. 400-841

PROJECT LANDFILL STUDY LOCATION LOT 20, CON 3 SER, WARWICK TOWNSHIP

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.-MARCH 1984

DESCRIPTION	DEPTH m	DEPTH ft
SEE LAST WELL LOG FOR STRATIGRAPHIC DETAIL (fold out sheet)		
TILL (SOUTHERN) brown, silt with some clay, weathered, damp, root network	3	10
TILL (SOUTHERN) grey, clay with some silt, massive, moist cohesive	6	20
CLAY silty, grey, (moist), occasional fine sand laminae (saturated)	9	30
SAND med-coarse, dark grey to black, saturated	12	40
TILL (RANNOCH) olive grey, silt with trace clay, pebbles, occasional cobbles, moist	15	50
SAND mixture fine-coarse sand, gravel, dark grey to black, saturated	18	60
TILL (RANNOCH) olive grey, silt with trace clay, pebbles, occasional cobbles, moist	21	70
SAND mixture fine-coarse sand, gravel, dark grey to black, saturated	24	80
SHALE black, minor weathering	27	90
	30	100
	33	110
	36	120
	39	

WELL DETAIL: 17-30 — EOH (E)

GAMMA RAY LOG: Seconds / 200 counts — 10, 20

Penetration Test: Blows / ft — 25, 50, 75

NOTES · ALL WELLS ARE IN SEPARATE HOLES
(B) DEEPEST BOREHOLE CONTINUOUSLY SAMPLED
WELL TYPE, SEE CONSTRUCTION DETAILS (end of Appendix)

BOREHOLE NO. OW 19-29

PROJECT NAME: WARWICK LANDFILL SITE | **PROJECT NO.:** 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. | **DATE:** MARCH 2 TO 4, 1998

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER | **GEOLOGIST:** JDF / JMP

GROUND ELEVATION: 241.0 m ASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
20											
	CLAYEY SILT (CON'T): MEDIUM GREEN GREY, GRADING TO GREY, CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND GRAVEL, FINE SANDY SILT FROM 21.3 m TO 21.5 m, HARD TO VERY STIFF AT 10.2 m, BECOMING HARD AT 16.6 m, RANGING BETWEEN DTPL AND APL. (RANNOCH TILL)			29SS	35	13	–				RECOVERY NOT MEASURED. P.L. = 15.1 L.L = 30.1
				30CC	–	–	100				
				31SS	>50	14	50		>50		
22				32CC	–	–	100				
				33SS	59	11	67		>50		
				34CC	–	–	100				P.L. = 14.0 L.L = 30.4
24				35SS	>50	10	100		>50		
				36CC	–	–	100				
26				37SS	>50	7	70		>50		
	27.3										
	27.6 SILT: MEDIUM GREEN GREY TO GREY, SILT, SOME CLAY AND SAND, SHALE FRAGMENTS, HARD, DTPL.			38SS	>50	9	50		>50		
28				39CC	–	–	90				
	28.8 SHALE: BLACK, SHALE, CLAYEY SILT INFILLED FRACTURES, FISSILE, SATURATED.										
30	BOREHOLE TERMINATED AT 28.80 m IN SHALE.										
32											
34											
36											
38											
40											

BOREHOLE NO. OW 19-29

PROJECT NAME: WARWICK LANDFILL SITE | **PROJECT NO.:** 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. | **DATE:** MARCH 2 TO 4, 1998

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER | **GEOLOGIST:** JDF / JMP

GROUND ELEVATION: 241.0 m ASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0									10 20 30	10 20 30	
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN TO 4.4 m, BECOMING GREY, CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND AND GRAVEL, FINE SAND LENS (<10 mm) AT 3.4 m, FINE TO MEDIUM SAND LENS (<10 mm) AT 6.8 m, DISCOLOURED FRACTURES TO 4.6 m, SMALL VESICLES 6.7 m TO 7.3 m, HARD TO STIFF AT 4.6 m, BECOMING HARD AT 6.8 m, DTPL GRADING TO WTPL. (SOUTHERN TILL)			1CC	–	–	67				BOREHOLE CONTINUOUSTLY SAMPLED, SHELBY TUBE SOIL DESCRIPTIONS COMPLETED BY LABORATORY.
2				2SS	40	19	67		40		
				3CC	–	–	100				
				4SS	45	21	85		45		
4				5CC	–	–	100				
	4.4										
	4.6			6SS	12	22	–				RECOVERY NOT MEASURED.
				7CC	–	–	100				
6											
				8SS	11	21	75				
				9SS	49	22	100		49		P.L. = 18.2 L.L = 33.8
				10ST	–	30	92				
8				11CC	–	–	50				
	8.4										
	CLAYEY SILT: MEDIUM GREEN GREY, GRADING TO GREY, CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND GRAVEL, FINE SANDY SILT FROM 21.3 m TO 21.5 m, HARD TO VERY STIFF AT 10.2 m, BECOMING HARD AT 16.6 m, RANGING BETWEEN DTPL AND APL. (RANNOCH TILL)			12CC	–	15	100				P.L. = 17.3 L.L = 34.0
				13SS	40	13	83		40		
10				14CC	–	14	50				
				15SS	24	15	100				
				16CC	–	–	60				
12											
				17SS	20	16	100				
				18ST	–	18	92				
				19CC	–	–	87				
14				20SS	16	17	100				
				21CC	–	–	80				
				22SS	18	17	–				RECOVERY NOT MEASURED.
16				23CC	–	–	92				
				24SS	26	16	–				RECOVERY NOT MEASURED.
				25CC	–	–	60				
18											
				26SS	36	17	100				NO RECOVERY. STONE BLOCKING SAMPLER.
				27CC	–	–	0				
20				28SS	38	13	90				

BOREHOLE - DW22A-10

PROJECT NAME: WARWICK LANDFILL SITE PROJECT NO.: 2970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION DATE: MARCH 15, 2004

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 243.86 m A.S.L. GEOLOGIST: BJL REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0											
	CLAYEY SILT TO SILTY CLAY:										
	CLAYEY SILT TO SILTY CLAY; LIGHT BROWN; DISSEMINATED FINE SAND AND FINE TO MEDIUM GRAVEL; WTPL BECOMING DTPL AT 0.3 m; STIFF; NO ODOURS OR VISIBLE STAINING.										
2											
3.7											
	WASTE:										
4											
	WASTE; DRY BECOMING SATURATED AT 6.1 m.										
6											
	CLAYEY SILT TO SILTY CLAY:										
	CLAYEY SILT TO SILTY CLAY; DARK GREY BECOMING MEDIUM GREY AT 8.5 m; DISSEMINATED FINE SAND AND FINE TO MEDIUM GRAVEL; WTPL; STIFF; DECAY ODOUR AND STAINING TO 8.5 m.			1SS	10		30				
8											
8.4				2SS	8		25				
8.7				3SS	12		30				
	BOREHOLE TERMINATED AT 8.7 m IN CLAYEY SILT TO SILTY CLAY.										
10											
12											
14											
16											
18											
20											

JAGGER HIMS LIMITED

RWDI
4510 RHODES DRIVE, UNIT 530
WINDSOR, ONTARIO N8W 5K5

BOREHOLE LOG OW39A-26

CLIENT Waste Management of Canada
PROJECT NAME OW39 Nest Drilling
PROJECT NUMBER 1701237
PROJECT LOCATION Twin Creeks Landfill, Watford, ON.
DATE STARTED 17-APR-17 **COMPLETED** 18-APR-17
GROUND ELEVATION 234.9 mASL **HOLE SIZE** 101.6 mm
DRILLING CONTRACTOR DIRECT ENVIRONMENTAL DRILLING INC.
DRILLING METHOD HOLLOW STEM AUGER
LOGGED BY HF **CHECKED BY** -
NOTES

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
2			Stratigraphy amended from original OW39-26 borehole log by Jagger Hims Limited (1998)		**TOPSOIL** Dark brown, roolets, moist. **CLAYEY SILT TO SILTY CLAY (Southern Till)** Mottled brown and grey to 1.4 m. Brown becoming grey at 4.3, clayey silt to silty clay, trace disseminated fine sand and gravel, silty fine sand layers at 1.5 m to 1.6 m and 1.9 m to 2.0 m. Sand layer from 2.7 m to 4.0 m, roolets to 1.4 m, discoloured fractures to 4.3 m, very stiff at 5.3 m, WTPL becoming APL at 3.0 m.	Monitor constructed of 51 mm ID PVC screen with steel protective casing.
4						
6						
8					7.3 227.6 **CLAYEY SILT TO SILTY CLAY** Grey, clayey silt to silty clay with sand pockets, WTPL. 8.2 226.7	
10					**CLAYEY SILT TO SILTY CLAY (Southern Till)** Grey, clayey silt to silty clay, trace disseminated fine sand and gravel, very stiff WTPL grading to DTPL.	Seal: Hydrated bentonite chips.
12					12.5 222.4	
14					**CLAYEY SILT (Rannoch Till)** Grey to green-grey, grading to grey, clayey silt, trace disseminated fine sand and gravel, trace vessicles from 23.8m to 24. m, very stiff to hard about 17.0 m. Ranging from DTPL to APL.	
16						
18						
20						

RWDI
4510 RHODES DRIVE, UNIT 530
WINDSOR, ONTARIO N8W 5K5

BOREHOLE LOG OW39A-26

CLIENT Waste Management of Canada
PROJECT NAME OW39 Nest Drilling
PROJECT NUMBER 1701237
PROJECT LOCATION Twin Creeks Landfill, Watford, ON.
DATE STARTED 17-APR-17 **COMPLETED** 18-APR-17
GROUND ELEVATION 234.9 mASL **HOLE SIZE** 101.6 mm
DRILLING CONTRACTOR DIRECT ENVIRONMENTAL DRILLING INC.
DRILLING METHOD HOLLOW STEM AUGER
LOGGED BY HF **CHECKED BY** -
NOTES

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
20						
22			Stratigraphy amended from original OW39-26 borehole log by Jagger Hims Limited (1998)		**CLAYEY SILT (Rannoch Till) (con't)** Grey to green-grey, grading to grey, clayey silt, trace disseminated fine sand and gravel, trace vessicles from 23.8m to 24. m, very stiff to hard about 17.0 m. Ranging from DTPL to APL.	Seal: Hydrated bentonite chips.
24					24.4 (210.5) Brown-grey clayey sand to sandy clay with disseminated sand with trace gravel, very soft/loose. Saturated, very wet, runny.	Borehole Seal Filter pack: #2 sand.
26					25.4 (209.5) 25.6 (209.3) Grey silty clay to clayey silt, some disseminated fine sand, gravel and shale fragments. Broken shale and fissile located at 25.5 m. Refusal at ~ 25.6 m depth.	
28						
30						

WELL OW40D-4

RWDI AIR Inc.
650 Woodlawn Road West
Guelph, ON

CLIENT Waste Management of Canada Corporation
PROJECT NAME OW40D-4 Relocation
PROJECT NUMBER 1401007.5
PROJECT LOCATION Twin Creeks Landfill
DATE STARTED 10/1/14 **COMPLETED** 10/1/14
GROUND ELEVATION 238.13 m **HOLE SIZE** 152 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 165 mm Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY PEJ/HF **CHECKED BY** BJL
AT END OF DRILLING ---
NOTES Depth is compensated for well angle.
AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
1				**Silty Clay to Clayey Silt** Mottled brown-grey silty clay to clayey silt with disseminated fine sand, trace rootlets, rusty to grey fractures, some dissminated very fine gravel, APL, stiff becoming firm at 2.7 m.	Borehole inclined at 45 degrees Hole plug
2					Baked native clay
3					Sand pack: No. 2 silica sand
4	CC 1	100		4.31	51 mm diameter well constructed of PVC with steel protective casing with well screen slot size 10. 235.08

Refusal at 4.31 meters.
Borehole terminated at 4.3 meter depth.

BOREHOLE NO. OW40A-7

PROJECT NAME: TWIN CREEKS / WARWICK LANDFILL

PROJECT NO.: 02-970051.20

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION

DATE COMPLETED: Oct 10, 2008

BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER

SUPERVISOR: BJL

GROUND ELEVATION: 239.2 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	UTM CO-ORDINATES / REMARKS
0.0											UTM Zone: 17 NAD: 83 Easting: 428873 Northing: 4757002
0.3	TOPSOIL: DARK BROWN, SILTY CLAY TO CLAYEY SILT TOPSOIL, TRACE MEDIUM GRAVEL AND ROOTLETS, HOMOGENOUS STRUCTURE, DAMP, FIRM.										
1.0	SILTY CLAY TO CLAYEY SILT: MOTTLE BROWN-GREY SILTY CLAY TO CLAYEY SILT, BECOMING BROWN AT 2.2 m THEN GREY AT 3.8 m, WITH DISSEMINATED FINE SAND, RUSTY TO GREY FRACTURES TO 3.2 m, SOME VERY FINE TO DISSEMINATED SAND AND GRAVEL, APL, STIFF BECOMING FIRM AT 4.4 m (SOUTHERN TILL, ACTIVE AQUITARD).										
2.0											
3.0											
4.0											
5.0											WATER LEVEL NOTED AT 4.9 m BELOW GROUND SURFACE UPON COMPLETION
6.0											CLAY BACKFILL WAS USED TO SEAL ABOVE THE FILTER PACK.
6.5				SS1	17		88		●		
6.9	SILTY CLAY TO CLAYEY SILT: GREY SILTY CLAY TO CLAYEY SILT WITH LAMINATED FINE SILTY SAND LAYERS, WITHIN THE SILTY CLAY: TRACE FINE GRAVEL, MASSIVE, APL, VERY STIFF; WITHIN THE SILTY SAND: VERY FINE, MOIST, COMPACT (INTERBEDDED SILT AND CLAY).										BOREHOLE TERMINATED AT 6.9 m IN SILTY CLAY TO CLAYEY SILT.
7.0	BOREHOLE TERMINATED AT 6.9 m IN SILTY CLAY TO CLAYEY SILT.										
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

JHL GEOLOGIC B/W (METRIC) WITH UTM 2-97005120 BH 0W40A.GPJ JAGGER HIMS BASIC.GDT 12/19/08

Jagger Hims Limited

BOREHOLE NO. OW40A-28

PROJECT NAME: TWIN CREEKS / WARWICK LANDFILL
PROJECT NO.: 02-970051.20
CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION
DATE COMPLETED: Oct 10, 2008
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: BJL
GROUND ELEVATION: 238.2 mASL
REVIEWER: PEJ

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 428874
Northing: 4756999

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.3	TOPSOIL: DARK BROWN, SILTY CLAY TO CLAYEY SILT TOPSOIL, TRACE MEDIUM GRAVEL AND ROOTLETS, HOMOGENOUS STRUCTURE, DAMP, FIRM.			SS1	6		63				
1.0	SILTY CLAY TO CLAYEY SILT: MOTTLE BROWN-GREY SILTY CLAY TO CLAYEY SILT, BECOMING BROWN AT 2.2 m THEN GREY AT 3.8 m, WITH DISSEMINATED FINE SAND, RUSTY TO GREY FRACTURES TO 3.2 m, SOME VERY FINE TO DISSEMINATED SAND AND GRAVEL, APL, STIFF BECOMING FIRM AT 4.4 m (SOUTHERN TILL, ACTIVE AQUITARD).			SS2	12		63				
2.0				SS3	15		100				
				SS4	16		100				
3.0				SS5	14		100				WATER LEVEL NOTED AT 3.5 m BELOW GROUND SURFACE UPON COMPLETION
4.0				SS6	8		46				
5.0				SS7	6		100				
6.0				SS8	5		100				
6.5				SS9	19		100				
6.8	SILTY CLAY TO CLAYEY SILT: GREY SILTY CLAY TO CLAYEY SILT WITH LAMINATED FINE SILTY SAND LAYERS, WITHIN THE SILTY CLAY: TRACE FINE GRAVEL, MASSIVE, APL, VERY STIFF; WITHIN THE SILTY SAND: VERY FINE, MOIST, COMPACT (INTERBEDDED SILT AND CLAY).			SS10	16		63				
7.0	SILTY CLAY TO CLAYEY SILT: GREY SILTY CLAY TO CLAYEY SILT WITH OCCASIONAL VERY FINE GRAVEL BECOMING TRACE MEDIUM GRAVEL AT 7.6 m, THEN TRACE COARSE GRAVEL AT 9.8 m, MASSIVE, APL BECOMING DTPL AT 12.9 m, THEN APL AT 13.6 m, VERY STIFF BECOMING STIFF AT 7.6 m.			SS11	12		100				
8.0				SS12	8		100				
9.0				SS13	11		92				
10.0				SS14	9		100				
11.0				SS15	8		100				
12.0				SS16	10		100				
				SS17	11		100				
13.0				SS18	13		100				
14.0				SS19	9		100				
15.0				SS20	5		100				

JHL GEOLOGIC B/W (METRIC) WITH UTM 2-97005120 BH 0W40A.GPJ JAGGER HIMS BASIC.GDT 12/19/08

BOREHOLE NO. OW40A-28

PROJECT NAME: TWIN CREEKS / WARWICK LANDFILL
PROJECT NO.: 02-970051.20
CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION
DATE COMPLETED: Oct 10, 2008
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: BJL
GROUND ELEVATION: 238.2 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
15.0											UTM CO-ORDINATES UTM Zone: 17 NAD: 83 Easting: 428874 Northing: 4756999
	SILTY CLAY TO CLAYEY SILT: CONTINUED.										
16.0				SS21	6		100				
17.0				SS22	10		88				
17.0	SILTY CLAY TO CLAYEY SILT: DARK GREY TO OLIVE GREEN SILTY CLAY TO CLAYEY SILT WITH TRACE TO SOME VERY FINE TO COARSE SAND AND GRAVEL, HOMOGENOUS, APL TO DTPL, STIFF BECOMING VERY STIFF AT 17.4 m, THEN BECOMING STIFF AT 21.3 m, VERY STIFF AT 22.9 m, AND HARD AT 25.9 m.			SS23	16		100				
18.0				SS24	20		79				
19.0											
20.0				SS25	15		100				
21.0											
22.0				SS26	13		100				
23.0				SS27	26		100				
24.0											
25.0				SS28	21		100				
26.0				SS29	34		100				
27.0											CLAY BACKFILL WAS USED TO SEAL ABOVE THE FILTER PACK
27.7				SS30			21				
28.0	SHALE: BLACK, LAMINATED DARK AND LIGHT LAYERS, FRACTURED/WEATHERED, SATURATED, SOFT ROCK (INTERFACE AQUIFER). BOREHOLE TERMINATED AT 28.0 m IN SHALE.										
29.0											
30.0											

JHL GEOLOGIC B/W (METRIC) WITH UTM 2-97005120 BH OW40A.GPJ JAGGER HIMS BASIC.GDT 12/19/08

OW46-7

CLIENT: Laidlaw Waste Systems FILE NO. 24729-016

PROJECT: Warwick Landfill LOCATION: Warwick Township, Lot 20, Conc.3

GEOLOGIST/ENGINEER: KPK DATE COMPLETED: November 6, 1990

STRATIGRAPHIC DESCRIPTION:

GROUND ELEVATION 239.8 masl

SOUTHERN TILL: Clayey silt brown-grey, weathered, not cohesive, dry at top, increasing dampness with depth, vertical to sub-horizontal fractures with grey coating, rootlets.

SOUTHERN TILL: Clayey silt with trace sand, laminated grey-brown, stones, pebbles, moist, cohesive, unweathered, moderately plastic, -5.53 to -5.56 sand, silty, fine.

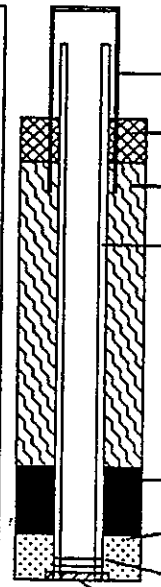
INTERSTADIAL CLAY: Minor silt, grey to red-brown, laminated, cohesive, plastic.

INTERSTADIAL SAND: Silty, fine to medium grained, grey with black grains, saturated.

RANNOCH TILL: Clay silt olive green-brown, laminated, stones & pebbles, moist.

End of hole 6.55 mbgl.

DEPTH (m)	SAMPLE No.	Type	"N"
	1	SS	31
	2	SS	42
	3	SS	29
	4	SS	27
	5	SS	19
	6	SS	21
	7	SS	19
	8	SS	10
	9	SS	18
	10	SS	20



WELL DETAIL

REMARKS

Lockable steel casing

Concrete seal

Bentonite grout

50mm Flush joint PVC casing

Bentonite seal

Grade #2 silica sand

50mm # 10 slot Flush joint PVC screen

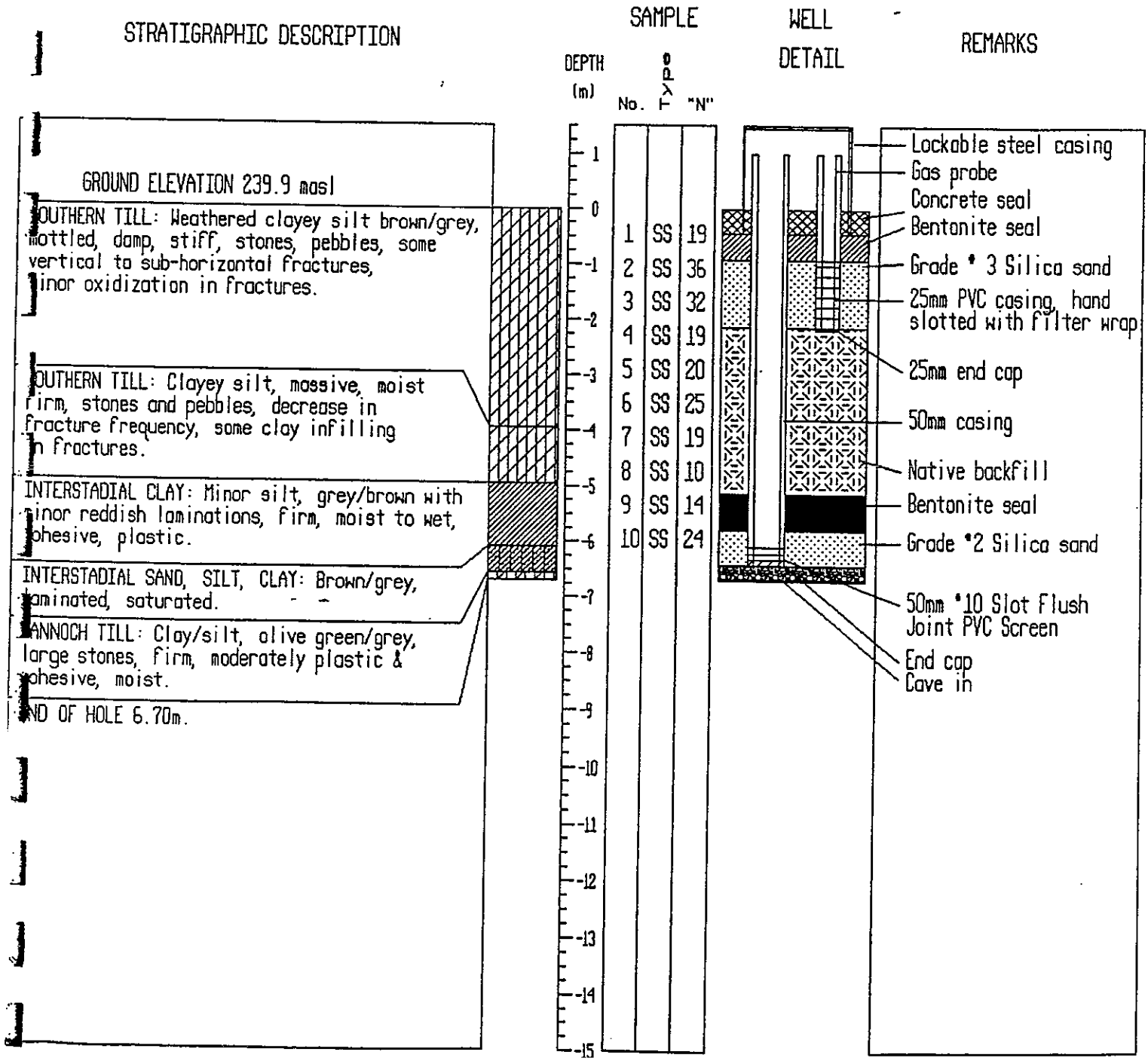
50mm friction fit end cap

OW47-6, GP

CLIENT: Laidlaw Waste Systems FILE NO. 24729-016

PROJECT: Warwick Landfill LOCATION: Warwick Township, Lot 20, Conc. 3

GEOLOGIST/ENGINEER: KPK DATE COMPLETED: NOVEMBER 7, 1990



BOREHOLE NO. OW49-29

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 13, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 242.4 mASL

REVIEWER: PEJ

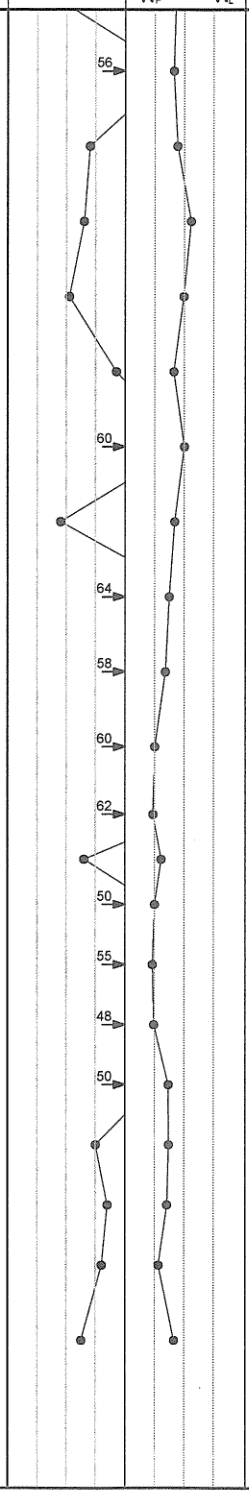
DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	AGGREGATE FILL: SURFICIAL LAYER OF CRUSHED AGGREGATE FILL.										
0.1	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, TRACE MEDIUM GRAVEL, DAMP, FIRM, TRACE ROOTLETS.			SS1	8	18.2	93				
1.0				SS2	14	18.8	93				
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES FROM 1.1 m THEN BROWN AT 2.3 m BECOMING GREY AT 5.3 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND FINE TO MEDIUM GRAVEL, GREY FRACTURES FROM 1.5 TO 4.6 m, DTPL BECOMING WTPL AT 3.0 m, THEN DTPL AT 3.8 m BECOMING WTPL AT 5.3 m, STIFF BECOMING HARD AT 1.5 m THEN VERY STIFF AT 3.8 m BECOMING STIFF AT 4.6 m TRACE ROOTLETS.			SS3	32	16.8	97				
2.0				SS4	45	18.6	93		45		
3.0				SS5	54	22.6	60		54		
				SS9	11	22.2	12				
4.0				SS6	27	21.9	93				
5.0				SS7	12	25.4	93				
6.0				SS8	7	21	93				
7.0				SS10	14	26.2	97				
8.0				SS11	8	19.9	97				
9.0				SS12	13	19.5	90				
9.1	SILT: BROWN SILT, MOIST, DENSE.										
9.4	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL AND SILT NODULES (2 cm IN DIAMETER) FROM 10.1 TO 10.3 m, DTPL BECOMING APL AT 13.0 m.			SS13	49	12.1	93		49		
10.0				SS14	36	12.6	87				
11.0				SS15	36	12.8	93				
12.0				SS16	40	15.3	97				
13.0				SS17	18	18.9	100				
				SS18	15	16.9	100				
14.0				SS19	19	14.6	107				
15.0				SS20	15	16.9	100				

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/4/09

BOREHOLE NO. OW49-29

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.13
CLIENT: WASTE MANAGEMENT OF CANADA CORP.
DATE COMPLETED: Mar 13, 2009
BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER
SUPERVISOR: MEQ
GROUND ELEVATION: 242.4 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	REMARKS
15.0	CLAYEY SILT TO SILTY CLAY:CONTINUED.	SS21	56	16.2	113		
		SS22	28	17.4	113		
17.1	SAND: GREY FINE SAND, WELL SORTED, WET, COMPACT.	SS23	26	21.9	107		
		SS24	21	19.5	107		
		SS25	37	16.2	107		
		SS26	60	19.7	100		
20.1	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL WITH SOME SATURATED SILT NODULES (3 cm IN DIAMETER) FROM 21.3 TO 21.6 m, WITH COARSE SHALE CLASTS FROM 22.9 TO 25.0 m, APL BECOMING DTPL AT 22.1 m, THEN APL AT 25.6 m, HARD BECOMING VERY STIFF AT 23.5 m THEN HARD AT 23.8 m.	SS27	18	16.5	93		
		SS28	64	14.7	97		
		SS29	58	13.4	100		
		SS30	60	9.9	100		
		SS31	62	9.3	83		
		SS32	26	12	108		
		SS33	50	9.8	92		
		SS34	55	9.1	83		
		SS35	48	9.6	92		
		SS36	50	14.4	100		
		SS37	30	14.5	104		
		SS38	34	13.9	100		NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
27.7	SAND: GREY FINE TO COARSE SAND, SUBROUNDED, POORLY SORTED, SATURATED, DENSE.	SS39	32	11.1	100		
28.5		SS40	25	16.2	104		
28.7	SHALE: SHALE, WEATHERED, FRACTURED, FISSILE. BOREHOLE TERMINATED AT 28.7 m IN SHALE.						
30.0							



JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/4/09

BOREHOLE NO. OW51A-15

PROJECT NAME: WARWICK WELL REHABILITATION | **PROJECT NO.:** 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION | **DATE:** SEPTEMBER 7, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS | **SUPERVISOR:** MOL

GROUND ELEVATION: 249.58 m ASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0									10 20 30	10 20 30	
	CLAYEY SILT TO SILTY CLAY: BROWN, CLAYEY SILT TO SILTY CLAY CAP TO 1.8 m, DTPL.										
1.8											
	WASTE: WASTE TO 15.2 m, SATURATED AT 13.7 m.										
				SS1	32		20				
				SS2	–		–				
				SS3	34		35				
				SS4	37		50				
				SS5	>50		50		>50		
				SS6	–		–				
				SS7	13		<5				
				SS8	7		<5				
15.2	CLAYEY SILT TO SILTY CLAY: GREY, CLAYEY SILT TO SILTY CLAY, APL TO WTPL, STIFF, MASSIVE, ORGANIC ODOUR, NO VISIBLE STAINING.			SS8	10		95				
15.8	BOREHOLE TERMINATED AT 15.8 m IN CLAYEY SILT TO SILTY CLAY.										
20											

Revision 2/ Aug 2003

JAGGER HIMS LIMITED

BOREHOLE NO. OW54A-4

PROJECT NAME: TWIN CREEKS/WARWICK LANDFILL

PROJECT NO.: 02-970051.20

CLIENT: WASTE MANAGEMENT CORPORATION OF CANADA

DATE COMPLETED: May 02, 2008

BOREHOLE TYPE: 110 mm GEOPROBE

SUPERVISOR: MOL

GROUND ELEVATION: 242.1 mASL

REVIEWER: BJL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	UTM CO-ORDINATES UTM Zone: 17 NAD: 83 Easting: 429482 Northing: 4758435 / REMARKS
0.0	SILTY CLAY TO CLAYEY SILT: MOTTLED BROWN-GREY BECOMING BROWN AT 1.5 m, THEN WITH GREY FRACTURES AT 3.0 m, SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, TRACE ORGANIC NODULES FROM 1.5 m TO 3.0 m, FRACTURED, BLOCKY, APL, STIFF.			SS1							
1.0											
2.0				SS2							
3.0											
4.0				SS3							
5.0				SS4							
5.0	BOREHOLE TERMINATED AT 5.0 m IN SILTY CLAY TO CLAYEY SILT.										DRY AT THE TIME OF COMPLETION
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

JHL GEOLOGIC B/W (METRIC) WITH UTM 2-97005120 BH 0W54 AND 70.GPJ JAGGER HIMS BASIC.GDT 12/19/08

BOREHOLE NO. OW54-10

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 13, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 242.4 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH (10 20 30)	WATER CONTENT % (10 20 30; W_P W_L)	REMARKS
0.0											
0.9	FILL: BROWN AND GREY CLAYEY SILT TO SILTY CLAY FILL WITH ORGANIC TOPSOIL NODULES (1 TO 3 cm IN DIAMETER), TRACE ROOTLETS, DISSEMINATED FINE SAND AND GRAVEL, BLOCKY, TRACE COARSE GRAVEL, DTPL TO APL, VERY STIFF TO STIFF.			SS1	18	16.9	93				
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES TO 2.3 m THEN BROWN WITH SATURATED SILT NODULES (1 TO 3 cm IN DIAMETER) FROM 4.0 TO 4.1 m BECOMING GREY AT 5.3 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 5.3 m, THEN WTPL AT 6.0 m AND APL AT 9.0 m, VERY STIFF BECOMING STIFF AT 5.3 m THEN VERY STIFF AT 7.6 m BECOMING STIFF AT 8.4 m.			SS2	15	16.6	93				
				SS3	29	18.4	87				
				SS4	27	20.5	93				
				SS5	24	20.5	97				
				SS6	18	23.4	93				
				SS7	20	24.1	97				
				SS8	8	24.5	67				
				SS9	11	25	90				
				SS10	11	17.9	93				
				SS11	20	18.5	97				
				SS12	10	21.3	93				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
9.4	SAND: BROWN, FINE SILTY SAND, POORLY SORTED, SATURATED, COMPACT.			SS13	12	19.6	90				
10.1	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, APL, VERY STIFF.			SS14	25	15.4	87				BOREHOLE WAS OVERDRILLED AND SUBSEQUENTLY BACKFILLED WITH NATIVE CLAY SOIL BACKFILL FOR WELL INSTALLATION.
10.7	BOREHOLE TERMINATED AT 10.7 m IN CLAYEY SILT TO SILTY CLAY.										
15.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/4/09

BOREHOLE - OW56-4

PROJECT NAME: WARWICK LANDFILL SITE | PROJECT NO.: 297051.04

CLIENT: CANADIAN WASTE SERVICES INC. | DATE: JANUARY 15, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 240.0 m A.S.L. | GEOLOGIST: TKC | REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0											
2	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND; GREY FRACTURES; MASSIVE; APL; VERY STIFF. (SOUTHERN TILL)										BOREHOLE CONTINUOUSLY CORED FROM 2.9 m TO 3.9 m. BOREHOLE INCLINED AT 45 DEGREES. DEPTHS PROVIDED ARE VERTICAL DEPTHS. PUSHED STONE TO 2.9 m.
4				1CC			100				
3.9	BOREHOLE TERMINATED AT 3.9 m IN CLAYEY SILT TO SILTY CLAY.										
6											
8											
10											
12											
14											
16											
18											
20											

BOREHOLE - OW57-15, OW57-4

PROJECT NAME: WARWICK LANDFILL SITE | PROJECT NO.: 297051.04

CLIENT: CANADIAN WASTE SERVICES INC. | DATE: JAN 14/MAR 30, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 240.8 m A.S.L. | GEOLOGIST: TKC | REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P, W_L)	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY AT 3.5 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND AND GRAVEL; MASSIVE TO BLOCKY; ROOTLETS TO 2.1 m; DISCOLOURED FRACTURES TO 4.3 m; DTPL TO APL; VERY STIFF TO STIFF. (SOUTHERN TILL)			1CC			100				BOREHOLE CONTINUOUSLY CORED. MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES. SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
2				1SS	22		100				
				2CC			60				
4				2SS	10		79				
				3CC			100				
	4.8										
	5.3 SILT: MEDIUM GREY: SILT; UNIFORM; SATURATED; LOOSE.			3SS	9		100				
6				4CC			80				
	CLAYEY SILT: GREY TO GREY GREEN; CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND SHALE FRAGMENTS, SILT AT 8.2 m TO 8.5 m; MASSIVE; DTPL TO WTPL; FIRM TO VERY STIFF. (RANNOCH TILL)			4SS	7		100				
				5CC			70				
8				5SS	17		100				
				6CC			60				
				6SS	12		80				
10				7CC			60				
	10.7										
	SILT: MEDIUM GREY: SILT; UNIFORM; SATURATED; COMPACT.			7SS	13		80				
				8CC			50				
12	12.0										
	CLAYEY SILT: MEDIUM GREY; CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND GRAVEL; MASSIVE; DTPL TO WTPL; STIFF TO VERY STIFF. (RANNOCH TILL)			8SS	13		0				NO RECOVERY
				9CC			50				
14				9SS	18		80				
	14.9			10CC			85				
	BOREHOLE TERMINATED AT 14.9 m IN CLAYEY SILT.										
16											
18											
20											

BOREHOLE - OW58-14, OW58-4

PROJECT NAME: WARWICK LANDFILL SITE | PROJECT NO.: 297051.04

CLIENT: CANADIAN WASTE SERVICES INC. | DATE: JAN 13/MAR 31, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 241.2 m A.S.L. | GEOLOGIST: TKC | REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P, W_L)	REMARKS
0				1CC			60				BOREHOLE CONTINUOUSLY CORED.
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY, TO GREY AT 3.5 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND AND GRAVEL, SILT TO SANDY SILT AT 6.1 m TO 6.2 m; ROOTLETS TO 1.7 m; DISCOLOURED FRACTURES TO 4.7 m; MASSIVE; DTPL TO WTPL; VERY STIFF TO FIRM. (SOUTHERN TILL)										
2				1SS	25		88				MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES.
				2CC			70				
				2SS	19		100				SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
				3CC			57				
4											
				3SS	10		5				
				4CC			70				
6											
				4SS	7		10				
				5CC			70				
7.6											
8	SILT: GREY; SANDY SILT TO SILT; MASSIVE; SATURATED; COMPACT.			5SS	18		85				
				6CC			75				
8.8											
	CLAYEY SILT: GREY; CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND GRAVEL, SILT AT 12.6 m TO 12.8 m; FISSILE SHALE FRAGMENTS; MASSIVE; DTPL TO APL; VERY STIFF TO STIFF. (RANNOCH TILL)			6SS	21		80				
10				7CC			33				
				7SS	14		100				
				8CC			40				
12											
				8SS	9		100				
				9CC			55				
13.6											
14	SILT: GREY; SANDY TO CLAYEY SILT; COMPACT.										
14.3				10CC			50				
	BOREHOLE TERMINATED AT 14.3 m IN SILT.										
16											
18											
20											

BOREHOLE NO. OW58-6

PROJECT NAME: WARWICK WELL REHABILITATION **PROJECT NO.:** 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION **DATE:** SEPTEMBER 8, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS **SUPERVISOR:** AAP

GROUND ELEVATION: 241.15 m ASL **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MEDIUM TO LIGHT BROWN, CLAYEY SILT TO SILTY CLAY, DISSEMINATED FINE SAND, OCCASIONAL MEDIUM TO FINE GRAVEL, LIGHT GREY FRACTURES, DTPL, STIFF, TRACE ROOTLETS, NO ODOUR.										BOREHOLE INCLINED AT 45°. STRATIGRAPHIC DESCRIPTION BASED ON AUGER CUTTINGS AND CONTINUOUS CORE.
2											
	– 3.0 m MEDIUM TO DARK BROWN, DTPL TO APL.										
4											
	– 5.0 m MEDIUM GREY WITH MEDIUM BROWN FRACTURES TO 5.3 m, APL, MASSIVE.			CC			100				
6	6.0										
	BOREHOLE TERMINATED AT 6.0 m IN CLAYEY SILT TO SILTY CLAY.										
8											
10											
12											
14											
16											
18											
20											

Revision 2/ Aug 2003

JAGGER HIMS LIMITED

RWDI AIR Inc.
4510 Rhodes Drive, Unit 520
Windsor, Ontario N8W 5K5

WELL OW58-17

CLIENT Waste Management of Canada
PROJECT NAME Twin Creeks Landfill
PROJECT NUMBER 1401007
PROJECT LOCATION Watford, ON
DATE STARTED 4/18/14 **COMPLETED** 4/18/14
GROUND ELEVATION _____ **HOLE SIZE** 203 mm
DRILLING CONTRACTOR Henderson Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY HF **CHECKED BY** BJL
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
			2.13 Brown clayey silt to silty clay with trace sand, blocky, massive, DTP, stiff. Grey faced weathered fractures with black minal nodules ranging < 2mm. No odour, no visible staining.	Monitor constructed of 51mm (2") PVC No.10 screen with steel protective casing.
			Blue-grey sandy clayey sand to sandy clay, homogenous, APL, soft, no odour, no visible staining.	
5				Seal: Bentonite grout.
			8.15 8.20 Blue-grey silty sand to sand silt, saturated, loose, no ocour, no staining.	
			8.50 Blue-grey sandy clayey sand to sandy clay, homogenous, APL, soft, no odour, no visible staining.	
			8.89 9.14 Brown sandy clay with trace gravel, homogenous, DTPL, stiff, no odour or visible staining.	
10			Brown sandy clay with trace gravel, homogenous, DTPL, stiff, no odour or visible staining.	
			Blue-grey clayey sand to sandy clay, trace of fine to coarse gravel, homogenous, APL, soft to firm, no odour or visible staining.	Seal: Clay
15			15.70	Sand Pack: No. 2 silica sand.
			16.20 Brown silty sand to sandy silt, homogenous, moist, loose to compact, no ocour, no visible staining.	
			16.46 Brown sandy clay with trace gravel, homogenous, DTPL, stiff, no odour or visible staining.	

Borehole terminated at 16.5 meter depth.

BOREHOLE - DW59-10, DW59-4

PROJECT NAME: WARWICK LANDFILL SITE | PROJECT NO.: 297051.04

CLIENT: CANADIAN WASTE SERVICES INC. | DATE: JAN 13/MAR 31, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 241.1 m A.S.L. | GEOLOGIST: TKC | REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P, W_L)	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY, TO GREY AT 3.5 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED SAND AND GRAVEL, SAND LAMINAE (< 2 mm THICK) AT 4.0 m, SILT AT 6.8 m TO 7.0 m; ROOTLETS TO 1.8 m; DISCOLOURED FRACTURES TO 4.4 m; MASSIVE; DTPL TO APL, BECOMING WTPL WITH DEPTH; HARD TO FIRM. (SOUTHERN TILL)			1CC			100				BOREHOLE CONTINUOUSLY CORED. MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES. SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
2				1SS	33		100				
				2CC			50				
				2SS	17		100				
4				3CC			67				
				3SS	10		100				
				4CC			75				
6				4SS	8		100				
				5CC			100				
	7.6										
8	SILT: GREY; SILT, TRACE FINE SAND AND CLAY; MASSIVE; SATURATED; COMPACT.			5SS	13		100				
	8.7			6CC			50				
	CLAYEY SILT: GREY; CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND GRAVEL; MASSIVE; DTPL; VERY STIFF. (RANNOCH TILL)			6SS	22		100				
10	9.8										
	BOREHOLE TERMINATED AT 9.8 m IN CLAYEY SILT.										
12											
14											
16											
18											
20											

BOREHOLE NO. OW59-6

PROJECT NAME: WARWICK WELL REHABILITATION **PROJECT NO.:** 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION **DATE:** SEPTEMBER 9, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS **SUPERVISOR:** AAP

GROUND ELEVATION: 241.14 m ASL **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MEDIUM BROWN BECOMING DARK BROWN–GREY BY 5.0 m, CLAYEY SILT TO SILTY CLAY, DISSEMINATED FINE SAND, OCCASIONAL FINE TO MEDIUM GRAVEL, DTPL BECOMING APL BY 5.0 m, GREY FRACTURES, ROOTLETS TO 5.0 m, NO ODOURS OR VISIBLE STAINING.										BOREHOLE INCLINED AT 45°. STRATIGRAPHIC DESCRIPTION BASED ON AUGER CUTTINGS AND CONTINUOUS CORE.
2											
4											
6	– 5.0 m DARK GREY WITH LIGHT GREY FRACTURES, MASSIVE, SOFT, APL, NO ROOTLETS, NO ODOURS.			CC			100				
6.0	BOREHOLE TERMINATED AT 6.0 m IN CLAYEY SILT TO SILTY CLAY.										
8											
10											
12											
14											
16											
18											
20											

BOREHOLE - DW60-25, DW60-8, DW60-4

PROJECT NAME: WARWICK LANDFILL SITE PROJECT NO.: 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. DATE: JANUARY 12 TO 13, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 234.6 m A.S.L. GEOLOGIST: JDF REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P, W_L)	REMARKS
0									10 20 30	10 20 30	
0.1	TOPSOIL: DARK BROWN; ROOTLETS; MOIST.			1CC			100				BOREHOLE CONTINUOUSLY SAMPLED.
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, GREY AT 3.8 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND; DISCOLOURED FRACTURES TO 4.1 m; MASSIVE; FIRM TO VERY STIFF; DTPL TO WTPL. (SOUTHERN TILL)			1SS	7	23.4	29				MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES.
2				2CC			100				
				2SS	20	21.6	58				SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
4				3CC			100				
				3SS	15	18.3	58				PL = 15.1 LL = 30.7
				4CC			100				
6				4SS	24	17.3	80				
				5CC			100				PL = 15.9 LL = 26.8
6.9											
7.9	SILT: GREY; SANDY SILT TO SILT; VERY DENSE.			5SS	61	14.3	50		61		PARTICLE SIZE DISTRIBUTION AT 7.0 m SAND - <1 % SILT - 78 % CLAY - 22 %
8				6CC			100				
	CLAYEY SILT: GREY TO GREY GREEN, TURNING GREY CLAYEY SILT, TRACE DISSEMINATED FINE TO MEDIUM SAND, GRAVEL, AND FISSILE SHALE FRAGMENTS; MASSIVE; VERY STIFF TO HARD; DTPL TO APL. (RANNOCH TILL)			6SS	21	17.0	80				
				7CC			100				
10				7SS	28	18.0	54				
				8CC			100				
12				8SS	31	15.0	75				
				9CC			100				
14				9SS	36	15.3	58				
				10CC			100				
				10SS	27	16.0	71				PL = 15.9 LL = 29.0
16				11CC			100				
				11SS	36	13.7	58				
				12CC			100				
18				12SS	25	16.1	80				
				13CC			100				
20				13SS	26	14.5	63				

BOREHOLE - OW60-25, OW60-8, OW60-4

PROJECT NAME: WARWICK LANDFILL SITE — PROJECT NO.: 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. — DATE: JANUARY 12 TO 13, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 234.6 m A.S.L. — GEOLOGIST: JDF — REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
20											
	CLAYEY SILT:			14CC			100				BOREHOLE CONTINUOUSLY SAMPLED.
	GREY; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND, GRAVEL, AND FISSILE SHALE FRAGMENTS; HARD TO VERY STIFF; APL TO WTPL. (RANNOCH TILL)			14SS	36	18.4	63				
22				15CC			80				
				15SS	26	24.1	67				
	SILTY SAND:			16CC			10				
23.5	GREY; SILTY FINE TO COARSE SAND WITH SHALE FRAGMENTS; COMPACT; SATURATED. (BASAL SAND)										HEAVING SAND – NO SPLIT SPOON SAMPLE RECOVERED.
24 24.2				16SS	NA	NA	NA				
	SHALE: FISSILE SHALE; FRACTURED.			17CC			100				PARTICLE SIZE DISTRIBUTION AT 23.6 m SAND – 71 % SILT – 18 % CLAY – 11 %
25.0	BOREHOLE TERMINATED AT 25.0 m IN SHALE BEDROCK.										
26											
28											
30											
32											
34											
36											
38											
40											

BOREHOLE - OW61-26, OW61-6, OW61-4

PROJECT NAME: WARWICK LANDFILL SITE — PROJECT NO.: 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. — DATE: JANUARY 7 TO 8, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 232.9 m A.S.L. — GEOLOGIST: JDF — REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
20									10 20 30	10 20 30	
	CLAYEY SILT:			13SS	25	17.0	79				BOREHOLE CONTINUOUSLY SAMPLED.
	GREY; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND, GRAVEL, AND FISSILE SHALE FRAGMENTS; VERY STIFF; APL. (RANNOCH TILL)			14CC			100				
22				14SS	40	15.4	62				
				15CC			100				
				15SS		13.4					'N' VALUE NOT MEASURED.
24				16CC			100				
	SAND:			16SS	18	19.3	50				PARTICLE SIZE DISTRIBUTION AT 26 m GRAVEL – 3 % SAND – 87 % SILT – 6 % CLAY – 4 %
	GREY; FINE TO COARSE SAND, TRACE SILT AND CLAY, TRACE SHALE FRAGMENTS; COMPACT; SATURATED. (BASAL SAND)			17CC			100				
25.6											
26											
26.3				17SS	95	14.5	100		95		
	BOREHOLE TERMINATED AT 26.3 m IN SILTY SAND WITH SHALE FRAGMENTS.										AUGER REFUSAL AT 26.3 m.
28											
30											
32											
34											
36											
38											
40											

BOREHOLE - OW61-26, OW61-6, OW61-4

PROJECT NAME: WARWICK LANDFILL SITE — PROJECT NO.: 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. — DATE: JANUARY 7 TO 8, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 232.9 m A.S.L. — GEOLOGIST: JDF — REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P, W_L)	REMARKS
0									10 20 30	10 20 30	
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, GREY AT 3.6 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND; 2 mm SILTY FINE SAND LAMINATION AT 4.6 m; BLOCKY TO MASSIVE; VERY STIFF; DTPL TO WTPL. (SOUTHERN TILL)			1CC			0				BOREHOLE CONTINUOUSLY SAMPLED. ICE BLOCKED 1CS.
2				1SS	29	17.9	33				MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES. SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
				2CC			84				
3.6				2SS	29	17.1	50				
4				3CC			88				PL = 15.8 LL = 28.0
				3SS	23	17.3	67				
				4CC			100				
6	6.1										
	6.4 CLAEYEY SILT: GREY; CLAYEY SILT; SATURATED; DENSE.			4SS	33	17.8	50				PL = 13.0 LL = 22.9
				5CC			85				
	CLAYEY SILT: GREY TO GREY GREEN, TURNING GREY CLAYEY SILT, TRACE DISSEMINATED FINE TO MEDIUM SAND, GRAVEL, AND FISSILE SHALE FRAGMENTS; MASSIVE; STIFF TO VERY STIFF; APL. (RANNOCH TILL)			5SS	14	22.0	50				PARTICLE SIZE DISTRIBUTION AT 6.2 m. SAND - 3 % SILT - 60 % CLAY - 37 %
8				6CC			100				
				6SS	8	23.0	83				
10				7CC			100				
				7SS	22	16.3	50				
				8CC			100				
12				8SS	26	16.3	83				
				9CC			100				
14				9SS	96	14.2	66		96		STONE
				10CC			100				
	15.5										PL > NON COHESIVE SOIL LL
16	FINE TO MEDIUM SAND: GREY; ALTERNATING LAYERS OF CLAYEY SILT, TRACE DISSEMINATED SAND AND GRAVEL WITH FINE TO MEDIUM SAND; BECOMING FINE TO MEDIUM SAND, TRACE TO SOME SILT; COMPACT; SATURATED.			10SS	35	14.8	58				UPPER CONTACT IS INFERRED.
				11CC			50				
				11SS	14	16.2	0				
	17.5			12CC			100				
18	CLAYEY SILT: GREY TO GREY GREEN, TURNING GREY CLAYEY SILT, TRACE DISSEMINATED FINE TO MEDIUM SAND, GRAVEL, AND FISSILE SHALE FRAGMENTS; MASSIVE; VERY STIFF; APL TO WTPL. (RANNOCH TILL)			12SS	21	16.2	66				
				13CC			100				
20											

BOREHOLE - OW62-30, OW62-7, OW62-4

PROJECT NAME: WARWICK LANDFILL SITE — PROJECT NO.: 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. — DATE: JANUARY 6 TO 8, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 240.1 m A.S.L. — GEOLOGIST: JDF — REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	REMARKS
20									
	CLAYEY SILT: GREY TO GREY GREEN; TURNING GREY CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND, GRAVEL, AND FISSILE SHALE FRAGMENTS; VERY STIFF TO HARD; DTPL TO WTPL. (RANNOCH TILL)			14CC			40		BOREHOLE CONTINUOUSLY SAMPLED.
				14SS	31	16.3	58		
22				15CC			50		
				15SS	35	18.9	62		
				16CC			5		SAMPLER PLUGGED BY STONE
24				16SS	25	13.7	67		
				17CC			10		
				17SS	31	16.0	62		SAMPLER PLUGGED BY STONE
26				18CC			<10		
				18SS	27	18.4	67		
28	28.1			19CC			100		
	SILTY SAND: GREY; SILTY SAND, CLY, WITH SHALE FRAGMENTS; COMPACT; SATURATED. (BASAL SAND)			19SS	21	16.7	45		PARTICLE SIZE DISTRIBUTION - 28.3 m SAND - 9 % SILT - 51 % CLAY - 40 %
30	26.3			20CC			90		
	BOREHOLE TERMINATED AT 30.0 m IN SILTY SAND WITH SHALE FRAGMENTS.								
32									
34									
36									
38									
40									

CONE PENETRATION "N" VALUE (10 20 30) — SHEAR STRENGTH

WATER CONTENT % (10 20 30) — W_P W_L

BOREHOLE - OW62-30, OW62-7, OW62-4

PROJECT NAME: WARWICK LANDFILL SITE | PROJECT NO.: 297051.01

CLIENT: CANADIAN WASTE SERVICES INC. | DATE: JANUARY 6 TO 8, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 240.1 m A.S.L. | GEOLOGIST: JDF | REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P, W_L)	REMARKS
0											
	CLAYEY SILT TO SILTY CLAY: MEDIUM BROWN TURNING GREY AT 3.4 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND; ROOTLETS TO 2.6 m; DISCOLOURED FRACTURES TO 4.1 m; MASSIVE; HARD TO STIFF; DTPL TO WTPL. (SOUTHERN TILL)			1CC			100				BOREHOLE CONTINUOUSLY SAMPLED.
				1SS	16	16.3	61				MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES.
2				2CC			100				
				2SS	19	20.6	71				SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
				3CC			100				
4											
				3SS	12	21.5	58				PL = 17.1 LL = 33.1
				4CC			100				
6											
6.2											PL = 19.6 LL = 39.3
	CLAYEY SILT: GREY; CLAYEY SILT, TRACE FINE SAND; LOOSE; SATURATED.			4SS	9	26.7	67				
6.7				5CC			100				PARTICLE SIZE DISTRIBUTION AT 6.6 m SAND - 3 % SILT - 64 % CLAY - 33 %
				5SS	20	19.4	71				
8	CLAYEY SILT: GREY TO GREY GREEN, TURNING GREY; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND, GRAVEL, AND FISSILE SHALE FRAGMENTS; SAND LAMINAE (<2 mm THICK) AT 7 m; MASSIVE; VERY STIFF TO STIFF; DTPL TO WTPL. (RANNOCH TILL)			6CC			100				
				6SS	19	17.9	50				
				7CC			100				
10											
				7SS	20	17.7	78				
				8CC			100				
12											
				8SS	18	18.7	58				
				9CC			100				
				9SS	22	18.1	80				
14				10CC			100				
				10SS	10	21.2	50				
				11CC			50				
16											
				11SS	19	14.1	70				PL = 18.5 LL = 35.0
				12CC			<2				
18											SAMPLER PLUGGED BY STONE.
				12SS	18	16.4	75				PL = 15.4 LL = 27.7
				13CC			5				
											SAMPLER PLUGGED BY STONE.
20				13SS	30	16.3	58				

BOREHOLE NO. OW62-5

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 2-970051.13
CLIENT: WASTE MANAGEMENT OF CANADA CORP.
DATE COMPLETED: Jan 20, 2011
BOREHOLE TYPE: 168 mm GEOPROBE WITH CONTINUOUS SAMPLING
SUPERVISOR: JLM
GROUND ELEVATION: 240.3 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0.0											
0.1	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, FIRM, TRACE ROOTLETS.										BOREHOLE INCLINED AT 45 DEGREES
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN AT 3.2 m BECOMING GREY AT 5.2 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 5.0 m.										
1.0											
2.0											
3.0											
4.0											
5.0											
6.0											
6.0	BOREHOLE TERMINATED AT 6.0 m IN CLAYEY SILT TO SILTY CLAY.										
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOLOGIC B/W (METRIC) BH62-5 AND 71A-5.GPJ JAGGER HIMS BASIC.GDT 6/30/11

BOREHOLE - OW67-11, OW67-4

PROJECT NAME: WARWICK LANDFILL SITE | PROJECT NO.: 297051.04

CLIENT: CANADIAN WASTE SERVICES INC. | DATE: JUNE 4, 1999

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

GROUND ELEVATION: 242.6 m A.S.L. | GEOLOGIST: JDF | REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY, BECOMING GREY AT 4.3 m; CLAYEY SILT, TRACE FINE DISSEMINATED SAND AND GRAVEL; ROOTLETS TO 2.4 m; MASSIVE; DISCOLOURED FRACTURES TO 5.0 m; DTPL TO APL, BECOMING WTPL AT ABOUT 5.0 m; HARD TO STIFF. (SOUTHERN TILL)			1CC			100		BOREHOLE CONTINUOUSLY CORED.
2				1SS	27		50		MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES.
				2CC			100		
				2SS	32		67		SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
4				3CC			100		
				3SS	20		75		
				4CC			100		
6				4SS	10		60		
				5CC			100		
8				5SS	12		83		
				6CC			100		
8.8	SILT: GREY; SILT, CLAYEY SILT AT 8.8 m TO 9.1 m; LAMINATED SILT AND CLAYEY SILT AT 9.1 m TO 9.8 m, CLAYEY SILT TO SILT AT 9.8 m TO 10.2 m.								
10				7CC			100		
10.2									
10.7	SAND: DARK GREY TO BLACK; SILTY SAND TO MEDIUM SAND; SATURATED; LOOSE TO COMPACT.			8CC			100		
11.0	CLAYEY SILT: MEDIUM GREY TO GREEN GREY; CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND GRAVEL; MASSIVE; APL. (RANNOCH TILL)			6SS	18		100		
12	BOREHOLE TERMINATED AT 11.0 m IN CLAYEY SILT.								
14									
16									
18									
20									

CONE PENETRATION "N" VALUE 10 20 30 — SHEAR STRENGTH

WATER CONTENT % 10 20 30 — W_P W_L

BOREHOLE NO. OW68-5

PROJECT NAME: WARWICK LANDFILL SITE | **PROJECT NO.:** 2970051.04

CLIENT: CANADIAN WASTE SERVICES INC. | **DATE:** JANUARY 9, 2002

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS | **GEOLOGIST:** JPB

GROUND ELEVATION: 240.91 mASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0									10 20 30	10 20 30	
0.3	TOPSOIL										BOREHOLE CONTINUOUSLY CORED
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN, GREY, AND ORANGE, BECOMING BROWN WITH DEPTH; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE GRAVEL; ROOTLETS TO ABOUT 3.0 m; DISCOLOURED FRACTURES TO 4.0 m; DTPL TO WTPL.			1CC			100				
2				2CC			60				
				3CC			100				
4 4.0											
	SILTY SAND: BROWN; SILTY SAND, TRACE DISSEMINATED MEDIUM TO COARSE GRAVEL; SATURATED.			4CC			90				
5.0	BOREHOLE TERMINATED AT 5.0 m IN SILTY SAND.										
6											
8											
10											
12											
14											
16											
18											
20											

BOREHOLE NO. OW69-5A

PROJECT NAME: WARWICK LANDFILL SITE | **PROJECT NO.:** 2970051.04

CLIENT: CANADIAN WASTE SERVICES INC. | **DATE:** JANUARY 9, 2002

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS | **GEOLOGIST:** JPB

GROUND ELEVATION: 240.11 mASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0									10 20 30	10 20 30	
2	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN, GREY, AND ORANGE, BECOMING GREY AT 3.6 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE TO MEDIUM GRAVEL; ROOTLETS TO 2.0 m; DISCOLOURED FRACTURES TO 5.0 m; DTPL TO WTPL.			1GS							BOREHOLE CONTINUOUSLY CORED
				2CC			50				BOREHOLE INCLINED AT 45 DEGREES
4				3CC			60				
				4CC			90				
5.0				5CC			90				
6	BOREHOLE TERMINATED AT 5.0 m IN CLAYEY SILT TO SILTY CLAY.										
8											
10											
12											
14											
16											
18											
20											

BOREHOLE NO. OW70B-5

PROJECT NAME: TWIN CREEKS/WARWICK LANDFILL
PROJECT NO.: 02-970051.20
CLIENT: WASTE MANAGEMENT CORPORATION OF CANADA
DATE COMPLETED: May 16, 2008
BOREHOLE TYPE: 168 mm GEOPROBE
SUPERVISOR: MOL
GROUND ELEVATION: 242.0 mASL
REVIEWER: BJL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	SILTY CLAY TO CLAYEY SILT: MOTTLED BROWN-GREY BECOMING BROWN AT 1.5 m, THEN GREY TO OLIVE GREEN AT 3.0 m, SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, FRACTURED WITH BLACK AND ORANGE MINERALIZATION FROM 3.0 m TO 4.5 m, GREY, FINE SILTY SAND LENSES AT 4.9 m, DTPL BECOMING APL AT 3.0 m, VERY STIFF BECOMING STIFF AT 3.0 m.			SS1	25						
2.0											CLAY BACKFILL WAS USED TO SEAL ABOVE THE FILTER PACK
3.0				SS2	21						
4.0											
5.0				SS3	13						
5.2	BOREHOLE TERMINATED AT 5.2 m IN SILTY CLAY TO CLAYEY SILT.										DRY AT THE TIME OF COMPLETION
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting:
Northing:

JHL GEOLOGIC B/W (METRIC) WITH UTM 2-97005120 BH 0W54 AND 70.GPJ JAGGER HIMS BASIC.GDT 12/19/08

BOREHOLE NO. OW71A-5

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 2-970051.13
CLIENT: WASTE MANAGEMENT OF CANADA CORP.
DATE COMPLETED: Jan 20, 2011
BOREHOLE TYPE: 168 mm GEOPROBE WITH CONTINUOUS SAMPLING
SUPERVISOR: JLM
GROUND ELEVATION: 242.3 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, FIRM, TRACE ROOTLETS.										BOREHOLE INCLINED AT 45 DEGREES
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN-GREY BECOMING BROWN AT 1.4 m, THEN GREY AT 3.3 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 3.3 m.										
1.0											
2.0											
3.0											
4.0											
5.0											
5.4	BOREHOLE TERMINATED AT 5.4 m IN CLAYEY SILT TO SILTY CLAY.										
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOLOGIC B/W (METRIC) BH62-5 AND 71A-5.GPJ JAGGER HIMS BASIC.GDT 6/30/11

GENIVAR

BOREHOLE NO. OW72-6

PROJECT NAME: WARWICK WELL REHABILITATION
PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION
DATE: SEPTEMBER 8, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS
SUPERVISOR: AAP

GROUND ELEVATION: 241.15 m ASL
REVIEWER: JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY, CLAYEY SILT TO SILTY CLAY, DISSEMINATED FINE SAND, FRACTURES, DTPL BECOMING APL AT 3.9 m, STIFF, NO ODOUR OR VISIBLE STAINING.										BOREHOLE INCLINED AT 45°. STRATIGRAPHIC DESCRIPTION BASED ON AUGER CUTTINGS AND CONTINUOUS CORE.
2											
4											
6	– 5.0 m APL, SOFT, MASSIVE, NO FRACTURES BELOW 5.4 m.			CC			100				
6.0	BOREHOLE TERMINATED AT 6.0 m IN CLAYEY SILT TO SILTY CLAY.										
8											
10											
12											
14											
16											
18											
20											

Revision 2/ Aug 2003

BOREHOLE NO. OW72-10

PROJECT NAME: WARWICK WELL REHABILITATION | **PROJECT NO.:** 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION | **DATE:** SEPTEMBER 7, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS | **SUPERVISOR:** MOL

GROUND ELEVATION: 242.12 m ASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0	CLAYEY SILT TO SILTY CLAY: GREY, CLAYEY SILT TO SILTY CLAY, DISSEMINATED FINE TO MEDIUM SAND, RUST COLOURED FRACTURES TO 4.4 m, DTPL BECOMING APL BY 4.6 WITH A LAYER WTPL FROM 7.3 m TO 8.0 m, VERY STIFF BECOMING FIRM AT 5.3 m, MASSIVE, SOME RED STAINING VISIBLE FROM 8.7 m TO 8.8 m, NO ODOURS.			SS1	17		50				
2				SS2	22		70				
				SS3	25		90				
4				SS4	20		95				
				SS5	9		95				
				SS6	8		95				
6				SS7	9		95				
				SS8	8		95				
8				SS9	6		95				
	SIITY SAND TO SANDY SILT: GREYISH BROWN, SILTY SAND TO SANDY SILT, DISSEMINATED COARSE SAND AND FINE GRAVEL, TRACE CLAYEY SILT NODULES, VERY LOOSE, SATURATED, NO VISIBLE STAINING, NO ODOURS.			SS10	10		90				
9.1											
9.2	CLAYEY SILT TO SILTY CLAY (TILL): GREY TO GREYISH GREEN, CLAYEY SILT TO SILTY CLAY, TRACE FINE GRAVEL, DTPL,			SS11	31		–				
10											
10.4	HARD, NO VISIBLE STAINING, NO ODOURS.			SS12	31		–				
	BOREHOLE TERMINATED AT 10.4 m IN CLAYEY SILT TO SILTY CLAY (TILL).										
12											
14											
16											
18											
20											

Revision 2/ Aug 2003

BOREHOLE NO. OW73-6

PROJECT NAME: WARWICK WELL REHABILITATION **PROJECT NO.:** 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION **DATE:** SEPTEMBER 8, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS **SUPERVISOR:** AAP

GROUND ELEVATION: 241.78 m ASL **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY, CLAYEY SILT TO SILTY CLAY, DISSEMINATED FINE SAND, OCCASIONAL FINE GRAVEL TO 5.0 m, FRACTURES, DTPL BECOMING DTPL TO APL AT 4.1 m, STIFF BECOMING SOFT BY 5.0 m, NO ODOUR OR VISIBLE STAINING.										BOREHOLE INCLINED AT 45°. STRATIGRAPHIC DESCRIPTION BASED ON AUGER CUTTINGS AND CONTINUOUS CORE.
2											
4											
6	– 5.0 m MEDIUM TO DARK GREY WITH LIGHT GREY FRACTURES AND SOME YELLOW BROWN MOTTLES AT 5.1 m, MASSIVE, SOFT.			CC			75				
6.0	BOREHOLE TERMINATED AT 6.0 m IN CLAYEY SILT TO SILTY CLAY.										
8											
10											
12											
14											
16											
18											
20											

Revision 2/ Aug 2003

BOREHOLE NO. OW73-9

PROJECT NAME: WARWICK WELL REHABILITATION | **PROJECT NO.:** 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION | **DATE:** SEPTEMBER 6, 2005

BOREHOLE TYPE: 108 mm I.D. HOLLOW STEM AUGERS | **SUPERVISOR:** MOL

GROUND ELEVATION: 241.83 m ASL | **REVIEWER:** JTB

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0	CLAYEY SILT TO SILTY CLAY: BROWN BECOMING GREY AT 3.0 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND, OCCASIONAL COARSE GRAVEL, VERY STIFF BECOMING FIRM BY 4.6 m, DTPL BECOMING APL BY 5.5 m, FRACTURES UP TO 4.4 m, MASIVE, NO ODOURS OR VISIBLE STAINING.			SS1	23		30				MONITORING WELL INSTALLED IN BOREHOLE 1 m TO THE NORTH.
2				SS2	34		70				
				SS3	37		80				
4				SS4	26		80				
				SS5	11		80				
				SS6	11		90				
6				SS7	10		95				
7.6	SILTY SAND TO SANDY SILT: GREY, SILTY SAND TO SANDY SILT, LOOSE, SATURATED, NO VISIBLE STAINING, NO ODOURS.			SS8	8		95				
7.8	CLAYEY SILT TO SILTY CLAY			SS9	5		95				
8											
8.7	SILTY SAND TO SANDY SILT: GREYISH BROWN, SILTY SAND TO SANDY SILT, TRACE FINE SAND AND CLAYEY SILT NODULES, LOOSE, SATURATED, NO VISIBLE STAINING, NO ODOURS.			SS10	14		70				
8.8											
				SS11	23		80				
10	CLAYEY SILT TO SILTY CLAY (TILL): GREY TO GREYISH GREEN, CLAYEY SILT TO SILTY CLAY, TRACE FINE GRAVEL, DTPL, VERY STIFF, NO VISIBLE STAINING, NO ODOURS.			SS12	19		80				
				SS13	18		80				
12				SS14	15		90				
12.0	BOREHOLE TERMINATED AT 12.0 m IN CLAYEY SILT TO SILTY CLAY (TILL).										
14											
16											
18											
20											

Revision 2/ Aug 2003

JAGGER HIMS LIMITED

BOREHOLE NO. OW75-3

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: LMS

GROUND ELEVATION: 235.3 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT, TRACE ROOTLETS.										BOREHOLE INCLINED AT 45 DEGREES.
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, BECOMING BROWN FROM 1.5 m, WITH GREY FRACTURING TO 2.4 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE TO MEDIUM SAND AND GRAVEL, APL BECOMING DTPL AT 0.6 m, THEN DTPL AT 0.9 m, STIFF BECOMING VERY STIFF AT 0.7 m, TRACE ROOTLETS.										NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
2.0											
3.0											
3.2	BOREHOLE TERMINATED AT 3.2 m IN CLAYEY SILT TO SILTY CLAY.										
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

BOREHOLE NO. OW75-7

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 16, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 234.7 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (Wp, WL)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT, TRACE ROOTLETS.			SS1	12	17.8	93				
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, BECOMING BROWN FROM 1.5 m WITH GREY FRACTURING TO 2.4 m, THEN GREY AT 3.4 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE TO MEDIUM SAND AND GRAVEL, APL BECOMING DTPL AT 0.6 m, THEN DTPL AT 0.9 m BECOMING APL AT 4.0 m AND WTPL AT 7.3 m, STIFF BECOMING VERY STIFF AT 0.7 m, THEN STIFF AT 3.8 m BECOMING VERY STIFF AT 6.0 m, TRACE ROOTLETS.			SS2	17	19.8	97				
2.0				SS3	25	17.8	100				
3.0				SS4	19	17.3	50				
4.0				SS5	16	17.5	57				
5.0				SS6	14	17.4	97				
6.0				SS7	12	18.2	97				
6.6				SS8	10	15.8	93				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
6.9	SAND: GREY, FINE SILTY SAND, SATURATED, COMPACT.			SS9	16	23.7	97				
7.0	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, APL, STIFF.			SS10	9	24.3	83				BOREHOLE WAS OVERDRILLED AND SUBSEQUENTLY BACKFILLED WITH NATIVE CLAYEY SOIL FOR WELL INSTALLATION.
7.6	BOREHOLE TERMINATED AT 7.6 m IN CLAYEY SILT TO SILTY CLAY.										
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS CONT.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. OW76-5

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 25, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MOL/LMS

GROUND ELEVATION: 237.5 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, MOIST, FIRM.										BOREHOLE INCLINED AT 45 DEGREES.
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY AND RUSTY FRACTURES, THEN GREY FROM 3.7 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, TRACE COARSE SAND, DTPL TO APL, STIFF TO VERY STIFF, TRACE ROOTLETS.										
2.0											
3.0											
4.0											NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
4.7											
5.0	SILT: GREY SILT, WET, COMPACT.			CC1		17.9	100				
5.4	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, OCCASIONAL MEDIUM GRAVEL, WTPL, STIFF.										
6.0	BOREHOLE TERMINATED AT 5.4 m IN CLAYEY SILT TO SILTY CLAY.										
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. OW77-4

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: LMS

GROUND ELEVATION: 241.6 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, MOIST, FIRM.										BOREHOLE INCLINED AT 45 DEGREES.
1.0	CLAYEY SILT TO SILTY CLAY: BROWN WITH GREY FRACTURES BECOMING GREY FROM 3.7 m, CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 3.7 m, VERY STIFF BECOMING STIFF, TRACE ROOTLETS.										
2.0											
3.0											NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
4.0				CC1			92				
4.3	BOREHOLE TERMINATED AT 4.3 m IN CLAYEY SILT TO SILTY CLAY.										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. OW78-4

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 02, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 239.5 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT, TRACE ROOTLETS.										BOREHOLE INCLINED AT 45 DEGREES.
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, BECOMING BROWN WITH GREY FRACTURES FROM 1.1 m, THEN BROWN FROM 1.7 m, CLAYEY SILT TO SILTY CLAY, APL BECOMING DTPL AT 0.8 m, STIFF BECOMING VERY STIFF AT 0.8 m TO HARD AT 2.3 m, THEN VERY STIFF AT 3.0 m, TRACE ROOTLETS.										
2.0											
3.0				CC1		17.6	100				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
3.9	BOREHOLE TERMINATED AT 3.9 m IN CLAYEY SILT TO SILTY CLAY.										
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. OW78-6

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 16, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 239.4 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT, TRACE ROOTLETS.										
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, BECOMING BROWN WITH GREY FRACTURES FROM 1.1 m, THEN BROWN AT 1.7 m BECOMING GREY FROM 4.9 m, CLAYEY SILT TO SILTY CLAY, WITH INCREASED SILT CONTENT FROM 4.3 TO 5.3 m, APL BECOMING DTPL AT 0.8 m, THEN APL AT 4.6 m, STIFF BECOMING VERY STIFF AT 0.8 m TO HARD AT 2.3 m, THEN VERY STIFF AT 3.0 m, THEN STIFF AT 4.6 m BECOMING VERY STIFF AT 5.3 m.			SS1	12	24.6	77				
1.0				SS2	21	18.8	100				
2.0				SS3	25	21.5	97				
3.0				SS4	50	21.2	57		50		
4.0				SS5	20	22.9	100				
5.0				SS6	17	21	107				
5.5				SS7	13	23.1	107				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
5.6	SAND: BROWN, FINE TO MEDIUM SAND, SUBROUNDED, POORLY SORTED, SATURATED, COMPACT.			SS8	23	19	93				
6.3	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, APL, STIFF.										
6.2	BOREHOLE TERMINATED AT 6.2 m IN CLAYEY SILT TO SILTY CLAY.										
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS CONT.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. OW79-5

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 02, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 237.9 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / Wp Wl	REMARKS
0.0											
0.1	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL WITH ROOTLETS, DAMP, FIRM.										BOREHOLE INCLINED AT 45 DEGREES.
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES FROM 1.5 m, THEN BROWN FROM 2.7 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 3.0 m, STIFF BECOMING VERY STIFF AT 0.6 m THEN STIFF AT 1.8 m, TRACE ROOTLETS.										NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
4.1	SILT: BROWN SILT, MOIST, VERY DENSE.			CC1		24.8	100			●	
4.7											
4.9	CLAYEY SILT TO SILTY CLAY: BROWN SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL, STIFF.										
	BOREHOLE TERMINATED AT 4.9 m IN CLAYEY SILT TO SILTY CLAY.										

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. OW79-7

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 25, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 237.8 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / Wp Wl	REMARKS
0.0											
0.1	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL WITH ROOTLETS, DAMP, FIRM.										
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES FROM 1.5 m, THEN BROWN AT 2.7 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 3.0 m, STIFF BECOMING VERY STIFF AT 0.6 m THEN STIFF AT 1.8 m, TRACE ROOTLETS.			SS1	5	20.8	27				
				SS2	15	19.8	32				
				SS3	7	18.3	38				
4.1	SILT: BROWN SILT, MOIST, VERY DENSE.										
4.7	CLAYEY SILT TO SILTY CLAY: BROWN SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, FINE BROWN SILT NODULES (5 cm IN DIAMETER) FROM 6.1 TO 6.7 m, DTPL TO WTPL AT 5.5 m, THEN APL AT 6.0 m, STIFF BECOMING VERY STIFF AT 6.0 m.			SS4	5	25.9	42				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
				SS5	6	20.7	50				
6.7 / 6.8	SAND: BROWN MEDIUM TO COARSE SAND, POORLY SORTED, SATURATED, COMPACT.			SS6	17	18.1	50				
7.4	CLAYEY SILT TO SILTY CLAY: GREY SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE TO MEDIUM SAND AND GRAVEL, APL, STIFF.										
	BOREHOLE TERMINATED AT 7.4 m IN CLAYEY SILT TO SILTY CLAY.										

BOREHOLE NO. OW79-26

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.13
CLIENT: WASTE MANAGEMENT OF CANADA CORP.
DATE COMPLETED: Feb 20, 2009
BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER
SUPERVISOR: MEQ
GROUND ELEVATION: 237.9 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL WITH ROOTLETS, DAMP, FIRM.			SS1	5		46				
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES TO 1.5 m, THEN BROWN AT 2.7 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 3.0 m, STIFF BECOMING VERY STIFF AT 0.6 m THEN STIFF AT 1.8 m, TRACE ROOTLETS.			SS2	23		42				
1.0				SS3	17		102				
2.0				SS4	9		79				
				SS5	13		60				
3.0				SS6	12		71				
4.0				SS7	9		113				
4.1	SILT: BROWN SILT, MOIST, VERY DENSE.			SS8	8		54				
4.7	CLAYEY SILT TO SILTY CLAY: BROWN SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, FINE BROWN SILT NODULES (5 cm IN DIAMETER) FROM 6.1 TO 6.7 m, DTPL TO WTPL AT 5.5 m, THEN APL AT 6.0 m, STIFF BECOMING VERY STIFF AT 6.0 m.			SS9	10		48				
5.0				SS10	12		58				
6.0				SS11	20		65				
6.7											
6.8	SAND: BROWN MEDIUM TO COARSE SAND, WET, COMPACT.			SS12	16		69				
7.0	CLAYEY SILT TO SILTY CLAY: GREY SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE TO MEDIUM SAND AND GRAVEL, APL BECOING WTPL AT 10.7 m, THEN APL AT 24.7 m, DISSEMINATED COARSE SAND AND MEDIUM GRAVEL AT 25.0 m WITH SOME SHALE ROCK FRAGMENTS, STIFF BECOMING VERY STIFF AT 9.1 m, THEN FIRM TO STIFF AT 11.0 m BECOMING VERY STIFF AT 18.3 m, THEN HARD FROM 18.9 TO 19.5 m BECOMING VERY STIFF AT 19.5 m TO HARD AT 24.4 m.			SS13	14		63				
				SS14	13		63				
8.0				SS15	12		65				
9.0				SS16	16						
10.0				SS17	18	18.4	67				
				SS18	16	18.4	58				
11.0				SS19	6	21.7	69				
12.0				SS20	9	16.7	75				
				SS21	4	17.2	58				
13.0				SS22	12	20.9	67				
				SS23	8	25	75				
14.0				SS24	16	24	46				
15.0				SS25	7	27.6	108				

BOREHOLE NO. OW79-26

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.13
CLIENT: WASTE MANAGEMENT OF CANADA CORP.
DATE COMPLETED: Feb 20, 2009
BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER
SUPERVISOR: MEQ
GROUND ELEVATION: 237.9 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
15.0	CLAYEY SILT TO SILTY CLAY: CONTINUED.			SS26	5	21.4	108				
16.0				SS27	11	13.8	75				
17.0				SS28	12	15	88				
				SS29	14	17.9	63				
18.0				SS30	15	14.2	50				
				SS31	19	14.9	83				
19.0				SS32	36	15.3	50				
20.0				SS33	20	17.2	96				
21.0				SS34	20	15.5	83				
				SS35	18	15.1	100				
22.0				SS36	21	15.7	108				
				SS37	24	16.8	108				
23.0				SS38	26	19.2	108				
24.0				SS39	17	16	104				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
				SS40	40	17.7	100				
25.0				SS41	60	11.9	42		60		
26.0				SS42	106	8.6	100		106		
26.2	SHALE:										BOREHOLE CAVED TO 26.2 m DURING WELL INSTALLATION.
26.4	SHALE, WEATHERED, FRACTURED, FISSILE.										
	BOREHOLE TERMINATED AT 26.4 m IN SHALE.										
27.0											
28.0											
29.0											
30.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. OW80-3

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 03, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 235.4 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.3	TOPSOIL: BROWN TO BROWN/GREY, CLAYEY SILT TO SILTY CLAY TOPSOIL, SOME COARSE SAND, SOME FINE GRAVEL, MOIST, FIRM, WITH ROOTLETS.										BOREHOLE INCLINED AT 45 DEGREES.
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN FROM 1.4 m, WITH GREY AND RUSTY FRACTURING, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL, STIFF, VERY STIFF FROM 1.8 m TO 2.4 m, TRACE ROOTLETS.										
2.0											NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
3.0				CC1		21.3	100				
3.5	BOREHOLE TERMINATED AT 3.5 m IN CLAYEY SILT TO SILTY CLAY.										
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

BOREHOLE NO. OW80-6

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 09, 2006

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 235.5 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.3	TOPSOIL: BROWN TO BROWN/GREY, CLAYEY SILT TO SILTY CLAY TOPSOIL, SOME COARSE SAND, SOME FINE GRAVEL, MOIST, FIRM, WITH ROOTLETS.			SS1	12	22.1	100				
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN FROM 1.4 m, WITH GREY AND RUSTY FRACTURING, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL, STIFF, VERY STIFF FROM 1.8 m TO 2.4 m, TRACE ROOTLETS.										
2.0				SS2	27	20.5	100				
3.0											
4.0				SS3	17	19.4	100				
4.6											
4.7	SAND: BROWN COARSE SAND WITH MEDIUM GRAVEL, POORLY SORTED, WET, COMPACT.			SS4	12	28.7	50				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
5.0											
5.8	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL, VERY STIFF.			SS5	40	26.7	67				
6.0	BOREHOLE TERMINATED AT 5.8 m IN CLAYEY SILT TO SILTY CLAY.										
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

BOREHOLE NO. OW80-27

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 06, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ/LMD

GROUND ELEVATION: 236.6 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (Wp, WL)	REMARKS
0.0											
0.3	TOPSOIL: BROWN TO BROWN/GREY, CLAYEY SILT TO SILTY CLAY TOPSOIL, SOME COARSE SAND, SOME FINE GRAVEL, MOIST, FIRM, WITH ROOTLETS.			SS1	6	26.4	88				
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN FROM 1.4 m WITH GREY AND RUSTY FRACTURES, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL, STIFF, VERY STIFF FROM 1.8 m TO 2.4 m, TRACE ROOTLETS.			SS2	7	18.4	83				
				SS3	12	17.2	92				
2.0				SS4	17	22.5	100				
				SS5	13	21.9	50				
3.0				SS6	10	19.8	92				
				SS7	11	21.1	100				
4.0				SS8	10	14	100				
4.6											
4.7	SAND: BROWN COARSE SAND, POORLY SORTED, WITH MEDIUM GRAVEL, WET, COMPACT.			SS9	18	17	104				
5.0	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 6.1 m, APL FROM 12.2 TO 13.4 m WITH GREY WET SILT NODULES (2 TO 6 cm IN DIAMETER), THEN WTPL BECOMING APL AT 14.0 m, THEN WTPL AT 15.8 m BECOMING APL AT 22.2 m, BECOMING DTPL AT 23.5 m, BECOMING WTPL AT 24.7 m WITH SHALE ROCK FRAGMENTS AT 26.2 m, VARYING STIFF TO VERY STIFF TO DEPTH.			SS10	18	13.6	100				
6.0				SS11	13	14.4	104				
				SS12	12	16.2	54				
7.0				SS13	12	19.5	50				
8.0				SS14	13	18.1	104				
9.0				SS15	12	17.8	104				
				SS16	10	18.2	104				
10.0				SS17	11	16.7	104				
				SS18	12	16.6	71				
11.0				SS19	11	17.5	100				
12.0				SS20	10	15.7	92				
				SS21	15	17.2	104				
13.0				SS22	25	14.3	71				
				SS23	20	18.4	104				
14.0				SS24	14	21.3	104				
15.0				SS25	12	21.1	104				

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS CONT.GPJ JAGGER HIMS BASIC.GDT 5/4/09

BOREHOLE NO. OW80-27

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.13
CLIENT: WASTE MANAGEMENT OF CANADA CORP.
DATE COMPLETED: Mar 06, 2009
BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER
SUPERVISOR: MEQ/LMD
GROUND ELEVATION: 236.6 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
15.0	CLAYEY SILT TO SILTY CLAY: CONTINUED.			SS26	10	18.1	104				
16.0				SS27	9	14.7	100				
				SS28	15	17	104				
17.0				SS29	25	19.8	42				
18.0				SS31	18	14.3	79				
				SS32	17	16.3	83				
19.0				SS33	20	16.1	71				
				SS34	24	13.4	92				
20.0				SS35	22	13.4	33				
21.0				SS36	16	16.5	83				
				SS37	11	19.1	92				
22.0				SS38	19	13.4	100				
				SS39	27	17.6	63				
23.0				SS40	26	15.9	100				
24.0				SS41	28	16	100				
				SS42	21	18	113				
25.0				SS43	38	21.8	83				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
26.0				SS44	8	16.3	104				
				SS45	22	8.9	100				
27.0	26.8 / 26.9 SHALE: BLACK SHALE ROCK, WEAHTERED, FRACTURED, FISSILE.			SS46		13.7	33				
	BOREHOLE TERMINATED AT 26.9 m IN SHALE.										
28.0											
29.0											
30.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS CONT.GPJ JAGGER HIMS BASIC.GDT 5/4/09

RWDI
600 Southgate Drive, Guelph, ON N1G 4P6
Tel: 519.823.1311 Fax: 519.823.1316

MONITORING WELL OW81-5

E: 428,284.0 **N:** 4,758,335.0

PROJECT NAME: OW81 and GP8 Drilling Program
PROJECT NO.: 1902909
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill Site
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger - Continuous Sampling
BOREHOLE DIAMETER: 203 mm
DATE STARTED: 07/3/19 **COMPLETED:** 07/3/19
GROUND ELEVATION: 235.31 mASL
LOGGED BY: YL **CHECKED BY:** PEJ

SAMPLE							SUBSURFACE PROFILE			
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	"N" VALUE	RECOVERY (%)	RQD	REMARKS		DEPTH [mbgs]	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0 235					Stratigraphy from surface to 4.3 m inferred from OW81-27.				**CLAYEY SILT TO SILTY CLAY** Brown clayey silt to silty clay, some sand, trace gravel, orange to dark brown mottling to 2.3 m, becoming brown to grey at bottom, APL to WTPL, firm to very firm.	Monitoring well constructed using 51 mm inside diameter schedule 40 flush joint PVC casing, with a 0.7 m stick up.
1 234										Seal: bentonite plug from 0 to 3.3 m depth.
2 233									- Trace light to dark brown silt inclusions at 2.3 to 2.9 m.	
3 232										Seal: baked clay from 3.3 to 3.6 m depth.
4 231									- Sandy silt to silty sand lenses encountered at 4.6 m and 5.1 m, less than 0.1 m in thickness.	Filter pack: No. 2 silica sand.
										#10 slot PVC well screen.
5 230	CC 1	N/A	100	N/A			5.4		Borehole terminated at 5.4 m depth.	Weep hole drilled in well point.
										Cave: native soil.

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MONITORING WELL OW81-7

E: 428,285.0 **N:** 4,758,342.0

PROJECT NAME: OW81 and GP8 Drilling Program
PROJECT NO.: 1902909
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill Site
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger - Split Spoon Sampling
BOREHOLE DIAMETER: 203 mm
DATE STARTED: 06/25/19 **COMPLETED:** 06/25/19
GROUND ELEVATION: 235.84 mASL
LOGGED BY: YL **CHECKED BY:** PEJ

SAMPLE							SUBSURFACE PROFILE			
DEPTH [mbgs] / ELEV. [mASL]	SAMPLE TYPE	NUMBER	"N" VALUE	RECOVERY (%)	RQD	REMARKS	DEPTH [mbgs]	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0 / 235						Augered to 5.3 m depth without sampling.	0.0		**CLAYEY SILT TO SILTY CLAY** Brown to grey clayey silt to silty clay, some disseminated fine sand, trace fine gravel, mottling to 2.3 m, becoming brown then grey at bottom, APL to WTPL, firm to very stiff.	Monitoring well constructed from 51 mm inside diameter schedule 40 flush joint PVC casing, with a stick up of 0.7 m.
1 / 234						Stratigraphy from surface to 5.3 m inferred from OW81-27.				
2 / 233									- Trace light to dark brown silt inclusion at 2.3 to 2.9 m.	Seal: hydrated bentonite chips from 0 to 5.8 m.
3 / 232										
4 / 231									- Sandy silt to silty sand lenses encountered at 4.6 m and 5.1 m, less than 0.1 m in thickness. - Fine sandy silt laminations encountered between 5.3 and 5.5 m.	
5 / 230		SS 1	7	104						
6 / 229		SS 2	15	113					- Fine to medium sand lens encountered between 6.5 and 6.7 m, wet to saturated, compact. - DTPL starting at 6.9 m.	Seal: timed-release bentonite pellets from 5.8 to 6.1 m. #10 slot PVC well screen. Filter pack: No. 2 silica sand.
7		SS 3	20	104			7.5		- Fine to medium sand lens encountered at 7.4 m, less than 0.1 m in thickness. Borehole terminated at 7.5 m.	Weep hole drilled in well point.

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MONITORING WELL OW81-27

E: 428,283.0 **N:** 4,758,339.0

PROJECT NAME: OW81 and GP8 Drilling Program
PROJECT NO.: 1902909
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill Site
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger - Split Spoon Sampling
BOREHOLE DIAMETER: 203 mm
DATE STARTED: 06/24/19 **COMPLETED:** 06/25/19
GROUND ELEVATION: 235.77 mASL
LOGGED BY: YL **CHECKED BY:** PEJ

SAMPLE							SUBSURFACE PROFILE			
DEPTH [mbgs] / ELEV. [mASL]	SAMPLE TYPE	NUMBER	"N" VALUE	RECOVERY (%)	RQD	REMARKS	DEPTH [mbgs]	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0 / 235	SS	1	5	108			0.4		**CLAYEY SILT TO SILTY CLAY TOPSOIL**	Seal: hydrated bentonite chips from 0 to 0.9 m depth
1	SS	2	12	100					**CLAYEY SILT TO SILTY CLAY** Brown to grey clayey silt to silty clay, some sand, trace gravel, orange to dark brown mottling to 2.3 m, becoming brown then grey at 6.7 m, APL to DTPL, firm to very stiff.	
2 / 234	SS	3	14	117						
	SS	4	11	100					- Trace light to dark brown silt inclusions at 2.3 to 2.9 m.	
3 / 233	SS	5	10	125						Monitoring well constructed using 51 mm inside diameter schedule 40 flush joint PVC casing, with a 0.7 m stick up.
4 / 232	SS	6	8	125						
5 / 231	SS	7	N/A	100					- Sandy silt to silty sand lenses encountered at 4.6 m and 5.1 m, less than 0.1 m in thickness.	
	SS	8	N/A	100					- Silty sand to sandy silt laminations encountered between 6.1 to 6.7 m, moist to wet. - Clayey silt lens encountered at 6.3 m, less than 0.1 m in thickness, soft. - Sand lenses encountered at 6.5, 6.6 and 6.9 m, less than 0.1 m in thickness, moist to wet.	
6 / 230	SS	9	15	136						
7 / 229	SS	10	17	100						
8 / 228	SS	11	17	100						
9 / 227	SS	12	18	100						
	SS	13	19	96						
10 / 226	SS	14	12	54						
11 / 225	SS	15	14	100						
	SS	16	17	83						
12 / 224	SS	17	14	125						
13 / 223	SS	18	16	117						Seal: high solids bentonite grout from 0.91 to 25.3 m depth.
14 / 222	SS	19	14	88						

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MONITORING WELL OW81-27

E: 428,283.0 **N:** 4,758,339.0

PROJECT NAME: OW81 and GP8 Drilling Program
PROJECT NO.: 1902909
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill Site
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger - Split Spoon Sampling
BOREHOLE DIAMETER: 203 mm
DATE STARTED: 06/24/19 **COMPLETED:** 06/25/19
GROUND ELEVATION: 235.77 mASL
LOGGED BY: YL **CHECKED BY:** PEJ

SAMPLE							SUBSURFACE PROFILE			
DEPTH [mbgs] / ELEV. [mASL]	SAMPLE TYPE	NUMBER	"N" VALUE	RECOVERY (%)	RQD	REMARKS	DEPTH [mbgs]	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
15 / 221	SS	20	10	117			15.9		**CLAYEY SILT** Grey clayey silt, trace fine sand and gravel, APL to DTPL, stiff to hard.	
16 / 220	SS	21	N/A	117						
17 / 219	SS	22	17	0						
18 / 218										
19 / 217	SS	23	21	100						
20 / 216	SS	24	12	117						
21 / 215										
22 / 214	SS	25	20	54						
23 / 213	SS	26	21	121			23.5		**SANDY CLAY SILT** Brown to grey sandy clay silt, some sandy clay, some fine to medium rounded gravel, trace silt, APL to WTPL, firm to stiff.	
24 / 212										
25 / 211	SS	27	87	0						
26 / 210									- Grey weathered shale encountered at 26.0 m and at 26.5 m. - Auger refusal at 27.4 m at shale bedrock.	
27 / 209	SS	28	32	92			27.4		Borehole terminated at 27.4 m depth.	

Seal: timed-release bentonite pellets from 25.3 to 25.6 m depth.

#10 slot PVC well screen.

Filter pack: No. 2

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MONITORING WELL OW82-5

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 7/7/22 **COMPLETED** 7/7/22
GROUND ELEVATION 236.13 mASL **HOLE SIZE** 152 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 6" Solid Stem Auger - Direct Push
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 6.1 m inferred from OW82-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
2			45° Inclined well.		**FILL** Light olive brown with yellowish brown mottled with strong brown silty clay, trace fine to medium sand, homogeneous, DTPL, stiff to very stiff. Presence of organic material and rootlets.	Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
					2.30 233.83	
					SILTY CLAY Grey laminated with olive brown mottled with strong brown silty clay, trace fine to medium sand, thinly laminated, DTPL, stiff to very stiff. Presence of rootlets.	
4					Becoming olive brown laminated with grey silty clay, trace gravel, thinly laminated, DTPL, stiff to very stiff at 3.1 metres.	Hole Plug: Bentonite Hole Plug from 0 to 5.6 m depth.
6	MC 1	84			Becoming dark grey with light olive brown silty clay, trace subangular gravel, thinly laminated, APL, soft to very soft at 6.2 metres.	Coated Bentonite from 5.6 to 6.1 m depth. Geotextile fabric. No. 2 Silica Sand.
					Laminations of dark grey clayey silt from 7.3 to 7.6 metres.	#10 Slot PVC Well Screen.
					7.62 228.51	
					Borehole terminated at 7.62 metre depth.	

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MONITORING WELL OW82-14

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/28/22 **COMPLETED** 6/29/22
GROUND ELEVATION 236.18 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 11.6 m inferred from OW82-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION		WELL DIAGRAM
					FILL Light olive brown with yellowish brown mottled with strong brown silty clay, trace fine to medium sand, homogeneous, DTPL, stiff to very stiff. Presence of organic material and rootlets.		Surface Seal: Bentonite Chips.
					1.70	234.48	
2					**SILTY CLAY** Grey laminated with olive brown mottled with strong brown silty clay, trace fine to medium sand, thinly laminated, DTPL, stiff to very stiff. Presence of rootlets.		Hole Plug: Grout
					Becoming olive brown laminated with grey silty clay, trace gravel, thinly laminated, DTPL, stiff to very stiff at 2.2 metres depth.		
4					Becoming dark grey with light olive brown silty clay, trace subangular gravel, thinly laminated, APL, soft at 3.7 metres depth.		
					Laminations of light olive silty sand, trace fine sand, wet, loose from 5.0 to 6.7 metres depth.		
6							
					Lamination of olive brown silty sand to sandy silt, some fine sand, homogeneous, wet, soft at 7.2 metres.		
8					Becoming greyish brown laminated with dark greyish brown silty clay, thinly laminated, APL to WTPL at 7.3 metres.		
					8.10	228.08	
					SOUTHERN TILL Dark greyish brown silty clay, some medium to coarse gravel, thinly laminated, APL to DTPL, stiff.		Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
					Becoming grey to dark grey, DTPL at 9.4 metres.		
10							
12	SS 1	100	3-5-6-7 (11)				
	SS 2	110	1-4-5-6 (9)				Coated Bentonite.
	SS 3	110	7-4-4-3 (8)		13.40	222.78	No. 2 Silica Sand.
14	SS 4	125	7-8-7-7 (15)		Laminations of silty sand, homogeneous, wet to moist, loose from 13.1 to 13.4 metres.		
					13.60	222.58	
					14.00	222.18	#10 Slot PVC Well Screen.
					SAND Dark grey medium to coarse sand, homogeneous, moist to wet, medium dense.		
					RANNOCH TILL Dark grey to grey silty clay to clay, some medium to coarse subangular gravel, thinly laminated, DTPL, stiff.		

Borehole terminated at 14.02 metre depth.

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MONITORING WELL OW82-28

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/27/22 **COMPLETED** 6/28/22
GROUND ELEVATION 236.25 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	SS 1	62	4-3-4-5 (7)		**FILL** Light olive brown with yellowish brown mottled with strong brown silty clay, trace fine to medium sand, homogeneous, DTPL, stiff to very stiff. Presence of organic material and rootlets.	Surface Seal: Bentonite Chips.
	SS 2	59	4-4-5-4 (9)			
	SS 3	95	3-3-4-4 (7)		1.70 234.55	
2	SS 4	92	4-4-7-8 (11)		**SILTY CLAY** Grey laminated with olive brown mottled with strong brown silty clay, trace fine to medium sand, thinly laminated, DTPL, stiff to very stiff. Presence of rootlets. Becoming olive brown laminated with grey silty clay, trace gravel, thinly laminated, DTPL, stiff to very stiff at 2.2 metres depth.	
	SS 5	100	9-4-7-8 (11)			
	SS 6	100	3-4-5-6 (9)			
4	SS 7	108	3-5-6-7 (11)		Becoming dark grey with light olive brown silty clay, trace subangular gravel, thinly laminated, APL, soft.	
	SS 8	67	13-12-50-12 (62)			
	SS 9	84	6-7-12-14 (19)		Laminations of light olive silty sand, trace fine sand, wet, loose from 5.0 to 6.7 metres depth.	Hole Plug: Grout
6	SS 10	75	6-7-7-6 (14)			
	SS 11	75	3-9-12-7 (21)			
	SS 12	108	5-6-7-10 (13)			
	SS 13	108	3-4-4-7 (8)		Lamination of olive brown silty sand to sandy silt, some fine sand, homogeneous, wet, soft at 7.2 metres.	
8	SS 14	108	5-9-9-10 (18)		8.10 Becoming greyish brown laminated with dark greyish brown silty clay, thinly laminated, APL to WTPL at 7.3 metres. 228.15	
	SS 15	125	4-6-9-10 (15)		**SOUTHERN TILL** Dark greyish brown silty clay, some medium to coarse gravel, thinly laminated, APL to DTPL, stiff.	
	SS 16	125	3-5-7-8 (12)		becoming grey to dark grey, DTPL at 9.4 metres.	
10	SS 17	125	5-4-6-7 (10)			
	SS 18	125	5-5-8-9 (13)			
	SS 19	125	4-5-8-10 (13)			
12	SS 20	125	4-4-6-9 (10)		laminations of reddish brown with strong brown fine to medium sand, dry, loose from 11.6 to 12.2.	
	SS 21	125	3-5-6-4 (11)		12.80 223.45	
	SS 22	125	4-6-6-8 (12)		13.10 **SAND** 223.15 Dark grey medium to coarse sand, homogeneous, moist to wet, medium dense.	
14	SS 23	84	4-7-8-9 (15)		**RANNOCH TILL** Dark grey to grey silty clay to clay, some medium to coarse subangular gravel, thinly laminated, DTPL, stiff..	
	SS 24	113	1-1-4-2 (5)			
	SS 25	100	2-6-7-4 (13)		Becoming dark grey laminated with olive brown at 15.2 metres.	
16					Laminations of light olive brown silt, trace fine sand, DTPL, stiff at 15.7	

(Continued Next Page)

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MONITORING WELL OW82-28

CLIENT Waste Management of Canada Corporation

PROJECT NAME T.C.E.C Monitoring Well Installation

PROJECT NUMBER 2202274

PROJECT LOCATION Watford, Ontario

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
					metres.	
	SS 26	125	2-4-6-9 (10)		Becoming greenish grey laminated with dark grey silty clay, trace fine sand, thinly laminated, some medium to coarse gravel, APL to DTPL, very stiff to hard.	
18						
	SS 27	108	3-4-6-8 (10)			Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
20	SS 28	108	35-16-15-16 (31)			
	SS 29	113	7-15-14-13 (29)		Laminations of silty sand to sandy silt, trace gravel dry, dense at 21.5 metres.	
22						
	SS 30	125	5-5-9-10 (14)		Becoming dark grey silty clay, some fine sand, and coarse gravel, DTPL to APL, stiff to very stiff at 22.9 metres.	
24						
	SS 31	108	6-11-20-27 (31)			
26						
	SS 32	108	8-10-17-8 (27)		Lenses of silty sand, some medium to coarse gravel, dry, dense from 26.0 to 26.4 metres depth.	Coated Bentonite.
						No. 2 Silica Sand.
28	SS 33	79	26-27-50 (77)		27.90 Presence of shale fragments, weathered bedrock at 27.8 metres. 28.04	208.35 208.21 #10 Slot PVC Well Screen.
					KETTLE POINT FORMATION Greenish grey weathered shale at 27.9 metres..	
					Borehole terminated at 28.04 metre depth.	

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MONITORING WELL OW83-5

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 7/7/22 **COMPLETED** 7/7/22
GROUND ELEVATION 240.01 mASL **HOLE SIZE** 152 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 6" Solid Stem Auger - Direct Push
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 6.1 m inferred from OW83-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
			45° Inclined well.		**FILL** Dark brown mottled with strong brown silty clay, some fine sand, trace medium gravel, homogeneous, DTPL, stiff. Presence of organic material and rootlets.	Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
					1.80 238.21 **SILTY CLAY** Grey with olive brown mottled with strong brown silty clay, trace fine sand, trace medium to coarse gravel, thinly laminated, DTPL, stiff. Presence of rootlets.	
2						
4					Trace dark grey with olive brown silt lenses from 4.3 to 4.7 metres depth. Becoming very dark greyish brown at 4.9 metres depth.	Hole Plug: Bentonite Hole Plug from 0 to 5.6 m depth.
6	MC 1	100			Becoming APL at 6.6 metres depth..	Coated Bentonite from 5.6 to 6.0 m depth. Geotextile fabric. No. 2 Silica Sand. #10 Slot PVC Well Screen.
					7.60 232.41 Laminations of light olive silty sand to sandy silt, trace fine sand, wet to saturated, loose encountered at 7.4 metres depth.. Borehole terminated at 7.62 metre depth.	

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MONITORING WELL OW83-9

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/24/22 **COMPLETED** 6/24/22
GROUND ELEVATION 240.17 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 7.6 m inferred from OW83-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
					FILL Dark brown mottled with strong brown silty clay, some fine sand, trace medium gravel, homogeneous, DTPL, stiff. Presence of organic material and rootlets.	
					1.30 (238.87)	Surface Seal: Bentonite Chips.
2					**SILTY CLAY** Grey with olive brown mottled with strong brown silty clay, trace fine sand, trace medium to coarse gravel, thinly laminated, DTPL, stiff. Presence of rootlets.	Hole Plug: Grout
					Trace dark grey with olive brown silt lenses from 3.0 to 3.4 metres depth. Becoming very dark greyish brown at 3.5 metres depth.	
4						
					Becoming APL at 4.9 metres depth. Lenses of yellowish brown silty sand, moist to saturated, loose encountered at 4.9, 5.3, and 5.6 metres depth.	Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
6					Laminations of light olive silty sand, trace fine sand, wet to saturated, loose encountered at 6.2, 6.4, 6.6, 7.3, 7.7, and 7.9 metres depth.	
	SS 1	87	4-4-5-4 (9)		Laminations of light olive silty sand, trace fine sand, wet to saturated, loose encountered at 7.5 metres depth.	
8	SS 2	84	2-9-29-38 (38)		Becoming WTPL at 8.1 metres depth.	Coated Bentonite.
					8.50 (231.67)	
	SS 3	100	6-6-15-17 (21)		**SAND** Dark grey medium to coarse sand, homogeneous, moist to wet, loose.	No. 2 Silica Sand.
					9.30 (230.87)	
					9.45 (230.72)	#10 Slot PVC Well Screen.
					RANNOCH TILL Olive grey silty clay to clay, trace fine to medium sand, some medium to coarse subangular gravel, thinly laminated to massive, DTPL, stiff to very stiff.	
					Borehole terminated at 9.45 metre depth.	

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MONITORING WELL OW83-29

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/22/22 **COMPLETED** 6/23/22
GROUND ELEVATION 240.15 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	SS 1	79	4-3-4-5 (7)		**FILL** Dark brown mottled with strong brown silty clay, some fine sand, trace medium gravel, homogeneous, DTPL, stiff. Presence of organic material and rootlets.	Surface Seal: Bentonite Chips.
	SS 2	87	4-4-6-8 (10)		1.30 238.85	
	SS 3	100	5-8-10-10 (18)		**SILTY CLAY** Grey with olive brown mottled with strong brown silty clay, trace fine sand, trace medium to coarse gravel, thinly laminated, DTPL, stiff. Presence of rootlets.	
2	SS 4	100	5-7-10-12 (17)			
	SS 5	100	6-7-9-11 (16)			
	SS 6	100	4-7-9-15 (16)		Trace dark grey with olive brown silt lenses from 3.0 to 3.4 metres depth. Becoming very dark greyish brown at 3.5 metres depth.	
4	SS 7	100	4-4-7-7 (11)			
	SS 8	100	4-4-5-4 (9)			
	SS 9	100	4-7-11-5 (18)		Becoming APL at 4.9 metres depth. Lenses of yellowish brown silty sand, moist to saturated, loose encountered at 4.9, 5.3, and 5.6 metres depth.	Hole Plug: Grout
6	SS 10	100	3-8-4-5 (12)			
	SS 11	100	2-3-6-6 (9)		Laminations of light olive silty sand, trace fine sand, wet to saturated, loose encountered at 6.2, 6.4, 6.6, 7.3, 7.7, and 7.9 metres depth.	
	SS 12	100	2-3-4-5 (7)			
	SS 13	100	4-4-9-10 (13)		Laminations of light olive silty sand, trace fine sand, wet to saturated, loose encountered at 7.5 metres depth.	
8	SS 14	100	4-6-9-5 (15)			
	SS 15	59	1-1-10-14 (11)		9.10 231.05	
	SS 16	100	6-16-18-16 (34)		9.50 230.65 **SAND** Dark grey medium to coarse sand, homogeneous, moist to wet, loose.	
10	SS 17	84	5-11-20-29 (31)		**RANNOCH TILL** Dark grey to olive grey silty clay to clay, trace fine to medium sand, some medium to coarse subangular gravel, thinly laminated to massive, DTPL, stiff to very stiff.	
	SS 18	95	7-12-24-20 (36)			
12						
	SS 19	87	11-14-17-13 (31)			
14	SS 20	100	1-5-8-10 (13)		Laminations of light olive brown silt, trace fine sand, DTPL, stiff at 13.9 metres depth.	
	SS 21	100	4-5-8-10 (13)			
16						

(Continued Next Page)

RWDI AIR Inc.
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Tel: (519) 823-1311

MONITORING WELL OW83-29

CLIENT Waste Management of Canada Corporation

PROJECT NAME T.C.E.C Monitoring Well Installation

PROJECT NUMBER 2202274

PROJECT LOCATION Watford, Ontario

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	SS 22	100	16-12-15-16 (27)		Shale fragments encountered at 17.0 metres depth.	
18	SS 23	100	5-70-10-12 (80)		Becoming APL at 18.3 metres depth.	Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
20	SS 24	100	3-5-8-10 (13)			
	SS 25	100	14-5-9-13 (14)			
22	SS 26	100	7-11-19-25 (30)			
24	SS 27	100	6-10-19-20 (29)			
26	SS 28	100	9-11-14-19 (25)		Shale fragments encountered at 24.4, 26.5, 29.1, and 29.2 metres depth.	
28	SS 29	100	12-22-30-38 (52)			
	SS 30	62	7-7-8-50 (15)		29.50 29.50 **BEDROCK KETTLE POINT FORMATION** Greenish grey with black weathered shale. Borehole terminated at 29.60 metre depth.	210.65 210.59 Coated Bentonite. No. 2 Silica Sand. #10 Slot PVC Well Screen.

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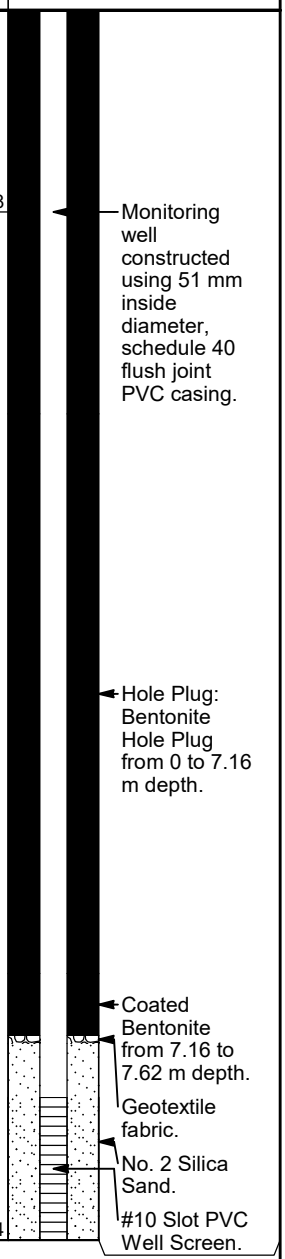
MONITORING WELL OW84-6

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 7/8/22 **COMPLETED** 7/8/22
GROUND ELEVATION 243.18 mASL **HOLE SIZE** 152 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 6" Solid Stem Auger - Direct Push
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 6.1 m inferred from OW84-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
					FILL Dark grey mottled with strong brown silty clay, trace fine sand, trace medium gravel, homogeneous, DTPL, soft to firm. Presence of organic material and rootlets.	
					1.50 — 241.68	
					SILTY CLAY Light grey with olive brown mottled with strong brown silty clay, trace fine sand, trace medium to coarse gravel, thinly laminated, DTPL to APL, stiff. Presence of rootlets..	
2						
4			45° Inclined well.			
6	MC 1	100			Becoming dark grey, APL, soft at 7.2 metres depth.	
8	MC 2	100			Becoming very soft at 8.5 metres depth. Laminations of dark grey eith olive brown silt (2 cm thick) encountered at 8.6 to 8.7 metres depth.	
					9.14 — 234.04	
					Borehole terminated at 9.14 metre depth.	



RWDI AIR Inc.
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MONITORING WELL OW84-11

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/22/22 **COMPLETED** 6/22/22
GROUND ELEVATION 243.34 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 9.14 m inferred from OW84-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
					FILL Dark grey mottled with strong brown silty clay, trace fine sand, trace medium gravel, homogeneous, DTPL, soft to firm. Presence of organic material and rootlets.	Surface Seal: Bentonite Chips.
					1.00 / 242.34 **SILTY CLAY** Light grey with olive brown mottled with strong brown silty clay, trace fine sand, trace medium to coarse gravel, thinly laminated, DTPL to APL, stiff. Presence of rootlets..	Hole Plug: Grout
2						
4					Becoming dark grey, APL, firm to stiff at 4.6 metres depth. Laminations of dark grey silt (2 cm thick) encountered at 4.9 metres depth.	
6					Becoming soft to firm at 6.1 metres depth.	Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
8						
	SS 1	100	6-5-4-5 (9)		Becoming WTPL, very soft at 9.1 metres depth.	
10	SS 2	100	2-2-3-5 (5)			Coated Bentonite.
	SS 3	100	2-4-6-13 (10)		10.70 / 232.64 Lenses of olive grey fine to medium sand encounter at 10.5 metres depth.	No. 3 Silica Sand.
	SS 4	100	8-12-14-16 (26)		11.00 / 232.34 **SAND** Dark grey fine to coarse sand, homogeneous, moist to wet, loose.	#10 Slot PVC Well Screen.
					11.60 / 231.74 **RANNOCH TILL** Dark grey to olive grey silty clay to clay, trace fine to medium sand, some medium to coarse subangular gravel, thinly to thickly laminated, DTPL, stiff to very stiff.	
					Borehole terminated at 11.60 metre depth.	

RWDI AIR Inc.
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MONITORING WELL OW84-31

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/20/22 **COMPLETED** 6/21/22
GROUND ELEVATION 243.26 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	SS 1	71	1-3-3-4 (6)		**FILL** Dark grey mottled with strong brown silty clay, trace fine sand, trace medium gravel, homogeneous, DTPL, soft to firm. Presence of organic material and rootlets.	Surface Seal: Bentonite Chips.
	SS 2	67	1-3-4-1 (7)		1.00 242.26	
	SS 3	100	3-3-6-7 (9)		**SILTY CLAY** Light grey with olive brown mottled with strong brown silty clay, trace fine sand, trace medium to coarse gravel, thinly laminated, DTPL to APL, stiff. Presence of rootlets..	
2	SS 4	100	4-8-9-12 (17)			
	SS 5	100	4-8-12-9 (20)			
	SS 6	100	4-7-10-13 (17)			
4	SS 7	100	3-7-8-13 (15)			
	SS 8	100	4-6-8-9 (14)		Becoming dark grey, APL, firm to stiff at 4.6 metres depth.	
	SS 9	100	4-7-11-12 (18)		Laminations of dark grey silt (2 cm thick) encountered at 4.9 metres depth.	Hole Plug: Grout
6	SS 10	100	2-4-5-5 (9)			
	SS 11	100	2-3-7-7 (10)		Becoming soft to firm at 6.1 metres depth.	
	SS 12	100	3-5-6-7 (11)			
	SS 13	100	4-4-7-8 (11)			
8	SS 14	100	2-4-5-6 (9)			
	SS 15	100	0-3-4-5 (7)			
	SS 16	100	1-3-3-3 (6)		Becoming WTPL, very soft at 9.1 metres depth.	
10	SS 17	100	0-3-3-3 (6)			
	SS 18	100	0-3-5-6 (8)		10.90 232.36	
	SS 19	100	8-9-12-15 (21)		11.00 232.26 **SAND** Dark grey fine to coarse sand, homogeneous, moist to wet, loose..	
12	SS 20	100	4-8-9-12 (17)		**RANNOCH TILL** Dark grey to olive grey silty clay to clay, trace fine to medium sand, some medium to coarse subangular gravel, thinly to thickly laminated , DTPL, stiff to very stiff..	
	SS 21	100	7-7-12-12 (19)			
	SS 22	79	4-6-12-14 (18)			
14	SS 23	100	6-7-14-15 (21)		Becoming APL, stiff at 13.7 metres.	
	SS 24	100	4-5-10-12 (15)			
16						

(Continued Next Page)

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MONITORING WELL OW84-31

CLIENT Waste Management of Canada Corporation

PROJECT NAME T.C.E.C Monitoring Well Installation

PROJECT NUMBER 2202274

PROJECT LOCATION Watford, Ontario

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	SS 25	100	3-4-14-14 (18)			
18	SS 26	100	6-9-15-18 (24)			
20	SS 27	100	6-10-13-17 (23)		Becoming DTPL, stiff to very stiff at 19.8 metres depth.	Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
22	SS 28	100	8-11-15-17 (26)			
	SS 29	100	6-9-12-16 (21)			
24	SS 30	41	46-25-31-26 (56)		Shale fragments encountered at 24.7 to 25.0 metres depth.	
26	SS 31	100	5-9-13-16 (22)		Becoming greyish brown, homogeneous, stiff to very stiff.	
28	SS 32	0	7-12-16-27 (28)			
	SS 33	100	10-16-26-30 (42)			Coated Bentonite.
30	SS 34	62	21-48-50 (98)		30.70 lenses of silty sand to sandy silt at 30.5 metres.. 212.56	No. 2 Silica Sand.
					31.09 **BEDROCK KETTLE POINT FORMATION** 212.17 Greenish grey with very dense black weathered shale at 30.6 metres. Borehole terminated at 31.09 metre depth.	#10 Slot PVC Well Screen.

BOREHOLE NO. OW85-5

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 02, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 240.0 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DRY, SOFT TO FIRM.										BOREHOLE INCLINED AT 45 DEGREES.
0.6											
1.0	CLAYEY SILT TO SILTY CLAY: BROWN/GREY BECOMING GREY FROM 4.5 m, CLAYEY SILT TO SILTY CLAY, SOME COARSE SAND, DTPL, STIFF, VERY STIFF FROM 1.8 m TO 2.4 m, FRACTURES WITH CALCIUM DEPOSITS FROM 0.6 m TO 2.4 m.										
2.0											
3.0											NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
4.0				CC1		20.5	100				
4.9											
5.0	BOREHOLE TERMINATED AT 4.9 m IN CLAYEY SILT TO SILTY CLAY.										
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

BOREHOLE NO. OW85-8

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 240.1 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT TO FIRM.			SS1	4	17.9	67				
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES FROM 1.2 m, THEN BROWN FROM 3.3 m, SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, TRACE COARSE SAND, DTPL BECOMING APL AT 3.7 m, FIRM TO STIFF, OCCASIONAL MINERALIZATION IN FRACTURES FROM 0.6 TO 2.4 m.			SS2	13	16.4	100				
1.0				SS3	15	19	92				
2.0				SS4	18	22.6	92				
				SS5	12	21.1	100				
3.0				SS6	11	19.1	104				
4.0				SS7	8	18.2	104				
4.1	SILT: BROWN BECOMING GREY AT 4.9 m, SILT WITH OCCASIONAL CLAY POCKETS, MOIST BECOMING WET AT 6.3 m, COMPACT.			SS8	14	16.4	108				
5.0				SS9	12	16.7	104				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
6.0				SS10	11	17.8	104				
				SS11	8	20.7	100				
6.9	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, APL TO 11.0 m BECOMING WTPL, STIFF BECOMING FIRM AT 12.8 m.			SS12	11	18.3	104				
7.0				SS13	10	16.7	104				
8.0				SS14	6	16.6	117				BOREHOLE WAS OVERDRILLED AND SUBSEQUENTLY BACKFILLED WITH NATIVE CLAYEY SOIL FOR WELL INSTALLATION.
				SS15	11	16.2	104				
9.0				SS16	10	17.1	104				
10.0				SS17	9	17.4	104				
				SS18	8	17.8	104				
11.0				SS19	8	22.5	104				
12.0				SS20	8	16.8	104				
				SS21	6	15.7	96				
13.0				SS22	7	16.8	104				
14.0				SS23	7	16.2	104				
14.0	BOREHOLE TERMINATED AT 14.0 m IN CLAYEY SILT TO SILTY CLAY.										
15.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 LOGS CONT.GPJ JAGGER HIMS BASIC.GDT 5/1/09

BOREHOLE NO. GP1A

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.32
CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION
DATE COMPLETED: Aug 21, 2009
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: MEQ
GROUND ELEVATION: 238.9 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	TOPSOIL: GREY/BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT.										GEOTEXTILE FABRIC SEPARATOR INSTALLED AT 0.44 m.
	CLAYEY SILT TO SILTY CLAY: MOTTLED GREY/BROWN, BECOMING BROWN WITH GREY FRACTURING AT 1.2 m, THEN GREY, MASSIVE AT 3.2 m CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE TO MEDIUM SAND AND GRAVEL, DTPL TO APL AT 4.6 m, SOFT BECOMING STIFF AT 0.6 m, THEN VERY STIFF AT 1.8 m BECOMING STIFF AT 3.7 m, RUSTY COLOURED FRACTURES AT 1.4 m, FINE SAND/SILT NODULES (APPROXIMATELY 2-3 mm IN DIAMETER) FROM 1.2 m TO 2.3 m.										GEOLOGIC INFORMATION OBTAINED FROM FORMER GAS PROBE GP1.
1.0											
2.0											
3.0											
4.0											
5.0											
5.2	BOREHOLE TERMINATED AT 5.2 m IN CLAYEY SILT TO SILTY CLAY.										
6.0											
7.0											
8.0											
9.0											
10.0											

JHL GEOLOGIC B/W (METRIC) 2-97005132 LOGS.GPJ JAGGER HIMS BASIC.GDT 9/23/09

BOREHOLE NO. GP2

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 25, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 237.9 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	TOPSOIL: BROWN/RUSTY BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT, SOME ROOTLETS.										
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES TO 1.2 m, THEN BROWN AT 2.3 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL, FIRM TO STIFF, SOME MINERALIZATION IN FRACTURES FROM 0.8 m TO 1.8 m, ROOTLETS FROM 1.8 m TO 2.3 m. INTERMITTENT NODULES (1 TO 2 cm IN DIAMETER) OF FINE SILTY SAND, MOIST TO WET FROM 3.0 m TO BOTTOM OF BOREHOLE.			SS1	3		53				GEOTEXTILE FILTER CLOTH PLACED BETWEEN BENTONITE SEAL AND SAND FILTER PACK
1.0				SS2	10		63				
2.0				SS3	14		70				
3.0				SS4	10	18.6	67				
4.0				SS5	10		90				
4.6	BOREHOLE TERMINATED AT 4.6 m IN CLAYEY SILT TO SILTY CLAY.			SS6	8	19.6	80				
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 GP LOGS.GPJ JAGGER HIMS BASIC.GDT 5/4/09

BOREHOLE NO. GP3

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 09, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 235.5 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN SILTY CLAY TO CLAYEY SILT TOPSOIL, WITH DISSEMINATED FINE SAND AND GRAVEL, WET, SOFT, SOME ROOTLETS.			SS1	10	19.8	50				GEOTEXTILE FILTER CLOTH PLACED BETWEEN BENTONITE SEAL AND SAND FILTER PACK
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES AND MINERALIZATION TO 1.3 m THEN BECOMING BROWN AT 2.6 m AND GREY AT 3.2 m, CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE TO MEDIUM SAND AND GRAVEL, DTPL BECOMING APL AT 3.2 m, STIFF BECOMING VERY STIFF AT 0.9 m, THEN STIFF AT 3.0 m, TRACE ROOTLETS FROM 1.5 m TO 1.7 m AND FROM 2.7 m TO 3.0 m.			SS2	16	17.6	63				
1.0											
2.0				SS3	18	19.2	73				
3.0				SS4	16	20.1	80				
4.0				SS5	12	19.5	83				
				SS6	13	24.2	111				
4.6	BOREHOLE TERMINATED AT 4.6 m IN CLAYEY SILT TO SILTY CLAY.										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 GP LOGS.GPJ JAGGER HIMS BASIC.GDT 5/4/09

BOREHOLE NO. GP4

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.32
CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION
DATE COMPLETED: Aug 21, 2009
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: MEQ
GROUND ELEVATION: 237.9 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0.0											
0.1	TOPSOIL: BROWN/GREY, CLAYEY SILT TO SILTY CLAY TOPSOIL, DRY, SOFT TO FIRM.										GEOTEXTILE FABRIC SEPARATOR INSTALLED AT 0.35 m.
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FACED FRACTURES AT 0.9 m THEN BROWN AT 2.2 m, BECOMING GREY AT 3.7 m, CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE TO COARSE SAND AND FINE GRAVEL, DTPL TO APL AT 3.7 m, STIFF AND VERY STIFF, BECOMING FIRM AT 3.8 m.			SS1	16	16.3	100				
1.0				SS2	14	18.5	100				
2.0				SS3	15	19.2	96				
3.0				SS4	16	19.6	100				
				SS5	14	20.2	100				
4.0				SS6	8	20.5	100				
5.0				SS7	5	21.2	111				
5.1	BOREHOLE TERMINATED AT 5.1 m IN CLAYEY SILT TO SILTY CLAY.										
6.0											
7.0											
8.0											
9.0											
10.0											

JHL GEOLOGIC B/W (METRIC) 2-97005132 LOGS.GPJ JAGGER HIMS BASIC.GDT 9/23/09

BOREHOLE NO. GP5

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.32

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION
DATE COMPLETED: Aug 21, 2009

BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: MEQ

GROUND ELEVATION: 241.1 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	TOPSOIL: BROWN/GREY, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT TO FIRM.			SS1	4	18.6	100				GEOTEXTILE FABRIC SEPARATOR INSTALLED AT 0.46 m.
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES AT 1.3 m THEN BROWN AT 2.1 m BECOMING GREY AT 3.7 m, CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE TO COARSE SAND AND FINE GRAVEL, DTPL TO APL AT 3.7 m, FIRM BECOMING STIFF AT 0.8 m, THEN VERY STIFF AT 1.5 m BECOMING STIFF AT 3.0 m, THEN FIRM AT 3.8 m.										
1.0				SS2	12	16.8	92				
2.0				SS3	19	23.8	92				
3.0				SS4	20	19.5	100				
4.0				SS5	12	21.8	96				
5.0				SS6	7	22.8	100				
5.2	BOREHOLE TERMINATED AT 5.2 m IN CLAYEY SILT TO SILTY CLAY.			SS7	6	24.6	92				
6.0											
7.0											
8.0											
9.0											
10.0											

JHL GEOLOGIC B/W (METRIC) 2-97005132 LOGS.GPJ JAGGER HIMS BASIC.GDT 9/23/09

BOREHOLE NO. GP6

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 27, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 241.5 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	TOPSOIL: BROWN/GREY, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT TO FIRM, SOME ROOTLETS.										
	CLAYEY SILT TO SILTY CLAY: MOTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES TO 1.1 m THEN BROWN AT 2.3 m BECOMING GREY AT 3.0 m, CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE TO COARSE SAND AND FINE GRAVEL, SILTY SAND LENS (10 cm THICK) AT 1.7 m, DTPL TO APL AT 3.8 m, FIRM TO STIFF.			SS1	4	17.3	67				GEOTEXTILE FILTER CLOTH PLACED BETWEEN BENTONITE SEAL AND SAND FILTER PACK
1.0				SS2	12	18.3	83				
2.0				SS3	12	18.7	80				
				SS4	10	18.1	80				
3.0				SS5	15	21.2	80				
4.0				SS6	9	22.1	73				
4.6	BOREHOLE TERMINATED AT 4.6 m IN CLAYEY SILT TO SILTY CLAY.			SS7	6	22.6	100				
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 GP LOGS.GPJ JAGGER HIMS BASIC.GDT 5/4/09

BOREHOLE NO. GP7

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 240.6 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0									10 20 30	10 20 30	
0.1	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, FIRM, SOME ROOTLETS.										
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, BECOMING BROWN WITH GREY FRACTURES FROM 0.8 TO 2.3 m, THEN GREY AT 3.7 m, CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE SAND AND GRAVEL, CLAYEY SILT FROM 2.3 m WITH SILT POCKETS FROM 2.8 m, DTPL TO APL, FIRM TO STIFF, TRACE ROOTLETS FROM 2.3 TO 3.0 m.			SS1	7	16.6	67				GEOTEXTILE FILTER CLOTH PLACED BETWEEN BENTONITE SEAL AND SAND FILTER PACK
1.0				SS2	13	20.3	77				
2.0				SS3	14	18.1	80				
3.0				SS4	12	23.5	87				
4.0				SS5	6	24	87				
				SS6	9	21.5	83				
4.6	BOREHOLE TERMINATED AT 4.6 m IN CLAYEY SILT TO SILTY CLAY.			SS7	6	24.3	167				
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

JHL GEOLOGIC B/W (METRIC) 2-97005113 GP LOGS.GPJ JAGGER HIMS BASIC.GDT 5/4/09

RWDI
600 Southgate Drive, Guelph, ON N1G 4P6
Tel: 519.823.1311 Fax: 519.823.1316

GAS PROBE GP8

E: 428,283.0 **N:** 4,758,343.0

PROJECT NAME: OW81 and GP8 Drilling Program
PROJECT NO.: 1902909
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill Site
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger - Split Spoon Sampling
BOREHOLE DIAMETER: 203 mm
DATE STARTED: 06/26/19 **COMPLETED:** 06/26/19
GROUND ELEVATION: 235.95 mASL
LOGGED BY: YL **CHECKED BY:** PEJ

SAMPLE							SUBSURFACE PROFILE			
DEPTH [mbgs] / ELEV. [mASL]	SAMPLE TYPE / NUMBER	"N" VALUE	RECOVERY (%)	RQD	REMARKS		DEPTH [mbgs]	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0 / 235	SS 1	14	96		Augered to 3.0 m depth without sampling. Stratigraphy from surface to 3.0 m inferred from OW81-D.		0		**CLAYEY SILT TO SILTY CLAY** Brown to grey clayey silt to silty clay, some sand, trace gravel, orange and dark brown mottling to 2.3 m, becoming brown then grey at 6.7 m, APL to DTPL, firm to very stiff.	Seal: bentonite chips from 0 to 0.6 m depth. Geotextile fabric installed between bentonite seal and filter pack. Gas probe constructed using 51 mm inside diameter schedule 40 flush joint PVC casing, with a stick up of 0.9 m.
1 / 234										
2 / 233									- Trace light to dark brown silt inclusion encountered between 2.3 to 2.9 m.	Filter pack: No. 2 silica sand
3 / 232	SS 2	11	96							#10 slot PVC well screen.
4 / 231	SS 3	9	96						- Sandy silt to silty fine sand laminations encountered between 4.6 to 5.0 m.	
5							5.2		Borehole terminated at 5.2 m depth.	Weep hole drilled in well point.

RWDI AIR Inc.
600 Southgate Dr.
Guelph, Ontario
N1G 4P6
Tel: (519) 823-1311

MONITORING WELL GP9

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/29/22 **COMPLETED** 6/29/22
GROUND ELEVATION 236.15 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 0.6 m inferred from OW82-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
					FILL Light olive brown with yellowish brown mottled with strong brown silty clay, trace fine to medium sand, homogeneous, DTPL, stiff to very stiff. Presence of organic material and rootlets.	Seal: Hole Plug from 0 to 0.4 m depth. Geotextile fabric.
1	SS 1	92	5-4-5-5 (9)		Becoming very dark grey. Lense of greenish grey silt, trace sand, encountered at 0.7 metres depth.	
					0.90 — 235.25 **SILTY CLAY** Olive grey mottled with yellowish brown silty clay, trace fine to medium sand, massive, DTPL to APL, soft to stiff.	
	SS 2	100	5-4-5-5 (9)			No. 2 Silica Sand.
2	SS 3	92	4-5-11-13 (16)		Becoming grey laminated with light olive brown silty clay, trace subangular gravel, thinly laminated, APL, soft. Presence of organics from 2.3 to 2.4 metres depth.	
	SS 4	100	4-6-9-11 (15)		Becoming light olive brown to olive brown silty clay, trace subangular gravel, thinly laminated, DTPL, soft at 2.4 metres depth.	
3	SS 5	100	4-5-7-8 (12)			Gas probe constructed using 51 mm inside diameter, schedule 40 flush joint PVC screen (slot 10), and casing.
4	SS 6	100	3-5-7-8 (12)		Becoming olive brown with dark greenish grey at 3.7 metres depth. Lenses of grey silt at 3.9 metres depth.	
	SS 7	100	2-4-5-6 (9)		4.50 — 231.65 Lamination of pale olive silty sand, some fine sand, massive, dry, loose encounter from 4.4 to 4.5 metres depth. **SILTY CLAY TO CLAYEY SILT** Grey silty clay to clayey silt, trace sand, thinly laminated, APL to WTPL, soft.	
5	SS 8	100	1-3-4-4 (7)		Lense of grey silt, massive, moist, soft encounter from 5.0 to 5.2 metres depth.	
					5.50 — 230.65	

Borehole terminated at 5.50 metre depth.

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Tel: (519) 823-1311

MONITORING WELL GP10

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2202274
PROJECT LOCATION Watford, Ontario
DATE STARTED 6/27/22 **COMPLETED** 6/27/22
GROUND ELEVATION 240.15 mASL **HOLE SIZE** 229 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
UTM COORDINATES
DRILLING METHOD 4 1/4" Hollow Stem Auger - Split Spoon Sampler
UTM ZONE:
LOGGED BY CEP **CHECKED BY** BJL
EASTING:
NOTES Stratigraphy from surface to 0.6 m inferred from OW83-D
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
1	SS 1	49	2-4-6-9 (10)		**FILL** Light olive brown with yellowish brown mottled with strong brown silty clay, trace fine to medium sand, homogeneous, DTPL, stiff to very stiff. Presence of organic material and rootlets.	Seal: Hole Plug from 0 to 0.4 m depth. Geotextile fabric.
	SS 2	100	5-9-9-12 (18)		Becoming dark brown with, some fine sand, trace gravel APL to DTPL firmm at 1.1 metres depth. Becoming dark brown with olive grey motthled with reddish brown at 1.2 metres depth.	
2	SS 3	100	5-8-10-12 (18)		1.70 238.45 **SILTY CLAY** light brownish grey laminated with yellowish brown silty clay, trace fine to medium sand, massive, DTPL, stiff.	No. 2 Silica Sand.
3	SS 4	100	4-7-8-10 (15)			
	SS 5	87	4-7-9-12 (16)		Becoming light olive brown, trace subangular gravel, thinly laminated, stiff to very stiff at 3.0 metres depth.	Gas probe constructed using 51 mm inside diameter, schedule 40 flush joint PVC screen (slot 10), and casing.
4	SS 6	100	4-5-5-7 (10)		Becoming greyish brown laminated with light olive brown clay, trace gravel, APL to DTPL soft to firm at 3.4 metres depth.	
	SS 7	84	3-3-3-5 (6)		4.70 235.45 **SILTY CLAY TO CLAYEY SILT** Dark grey with dark greyish brown silty clay to clayey silt, trace sand, thinly laminated, APL to WTPL, soft.	
5	SS 8	92	3-5-4-5 (9)		Lense of olive grey silt, massive, moist, soft encounter from 5.1 to 5.2 metres depth.	
					5.50 234.65 Borehole terminated at 5.50 metre depth.	

RWDI
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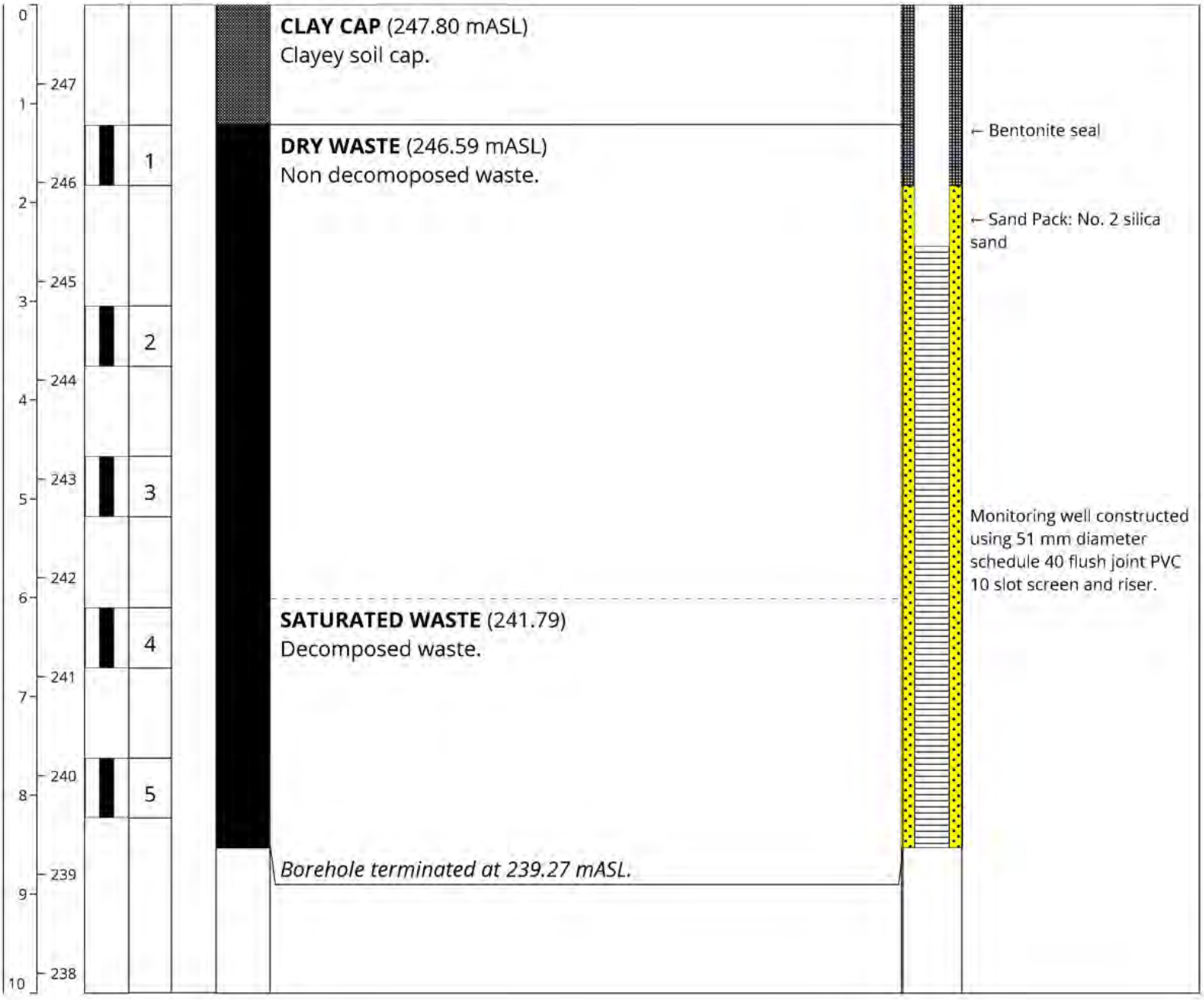
MONITORING WELL LW1

PROJECT NAME: Leachate Well Drilling
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 23, 2017 **COMPLETED:** Nov. 23, 2017
ELEVATION: Ground: 247.80 mASL, Top of Pipe: 248.55 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM



RWDI
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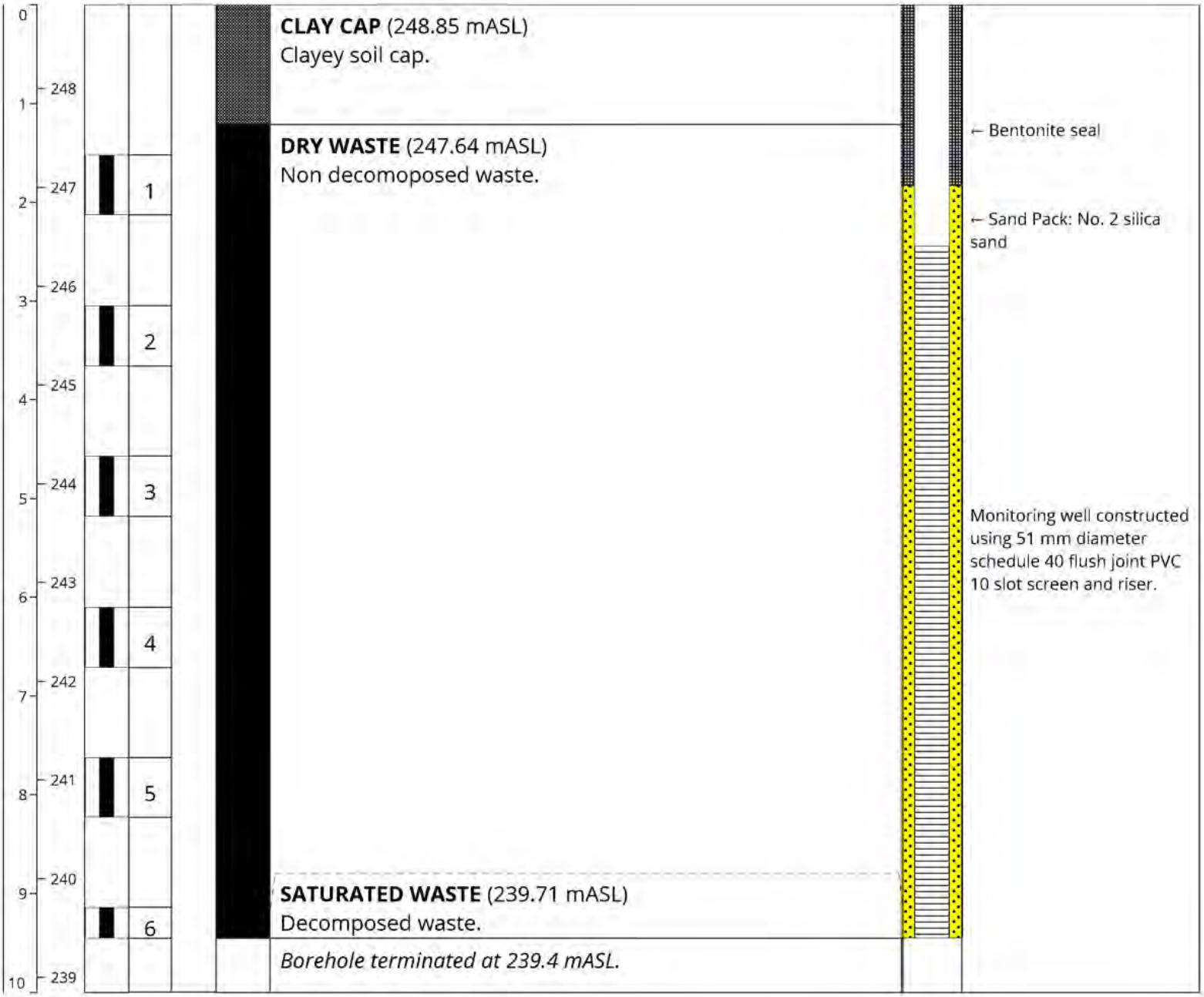
MONITORING WELL LW2

PROJECT NAME: Leachate Well Drilling
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 23, 2017 **COMPLETED:** Nov. 23, 2017
ELEVATION: Ground: 248.85 mASL, Top of Pipe: 249.01 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM



CLAY CAP (248.85 mASL)
Clayey soil cap.

DRY WASTE (247.64 mASL)
Non decomoposed waste.

SATURATED WASTE (239.71 mASL)
Decomposed waste.

Borehole terminated at 239.4 mASL.

← Bentonite seal

← Sand Pack: No. 2 silica sand

Monitoring well constructed using 51 mm diameter schedule 40 flush joint PVC 10 slot screen and riser.

RWDI
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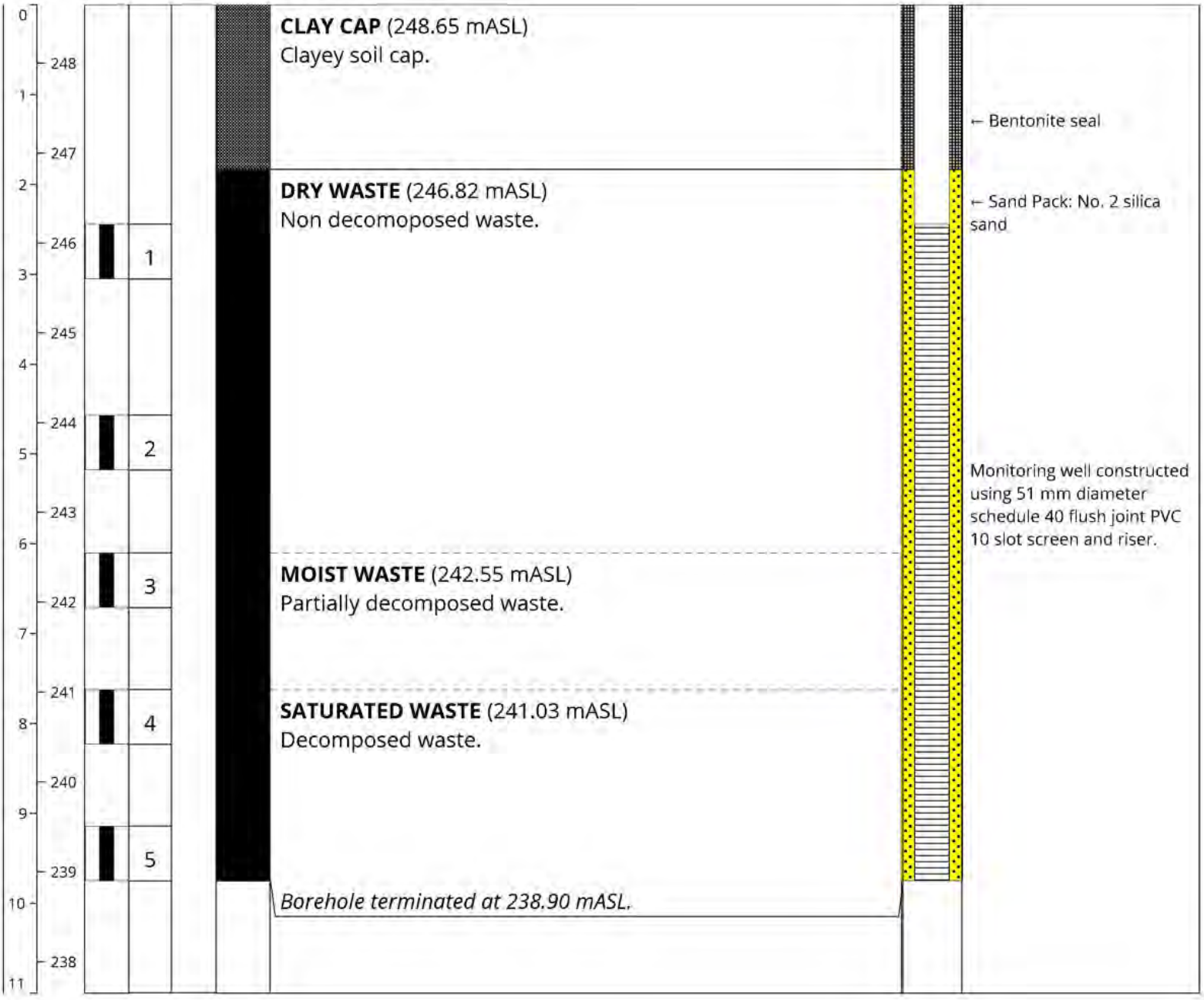
MONITORING WELL LW3

PROJECT NAME: Leachate Well Drilling
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 23, 2017 **COMPLETED:** Nov. 23, 2017
ELEVATION: Ground: 248.65 mASL, Top of Pipe: 249.41 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM



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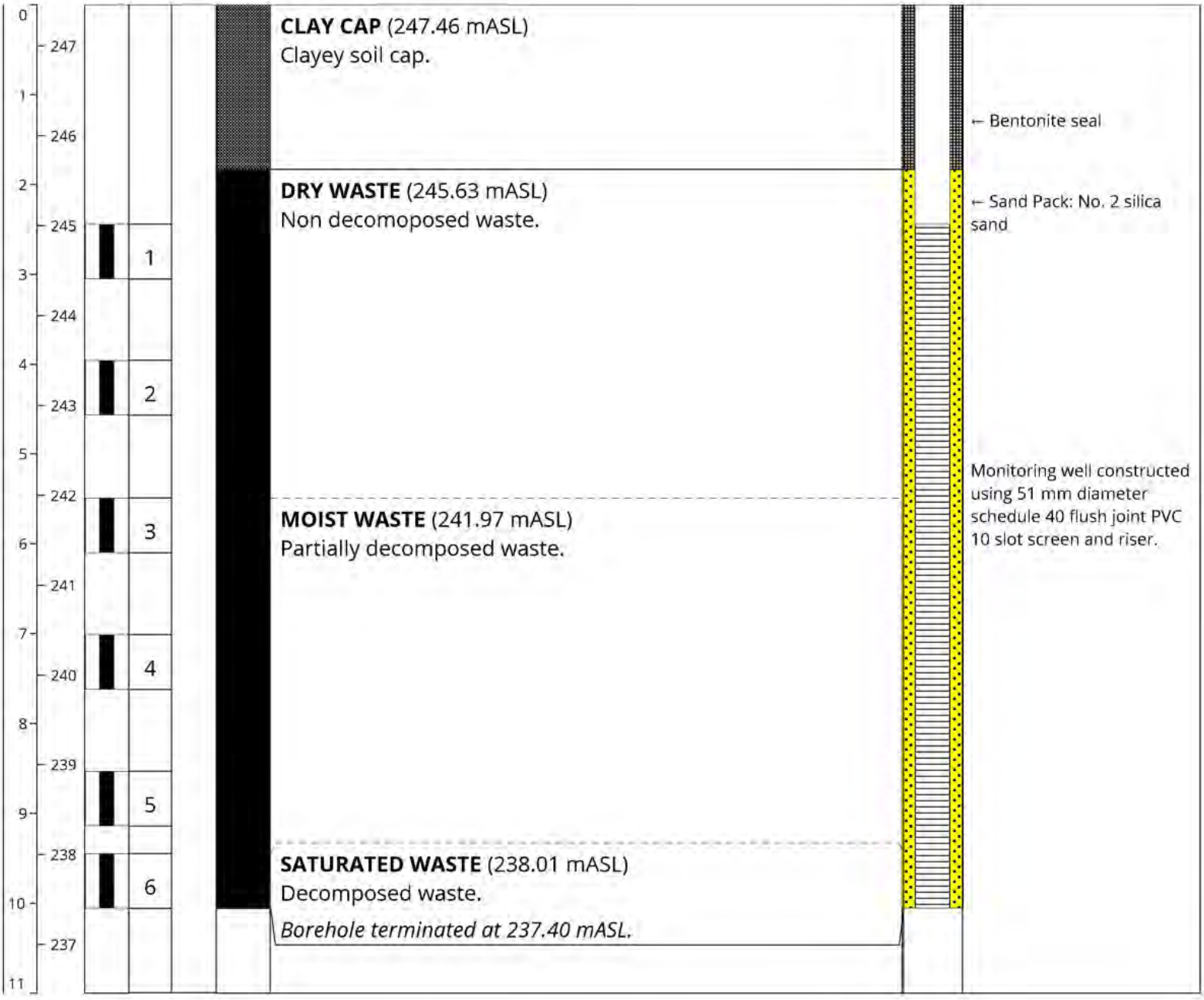
Tel: 519.823.1311 Fax: 519.823.1316

MONITORING WELL LW4

PROJECT NAME: Leachate Well Drilling
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 24, 2017 **COMPLETED:** Nov. 24, 2017
ELEVATION: Ground: 247.46 mASL, Top of Pipe: 248.24 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM



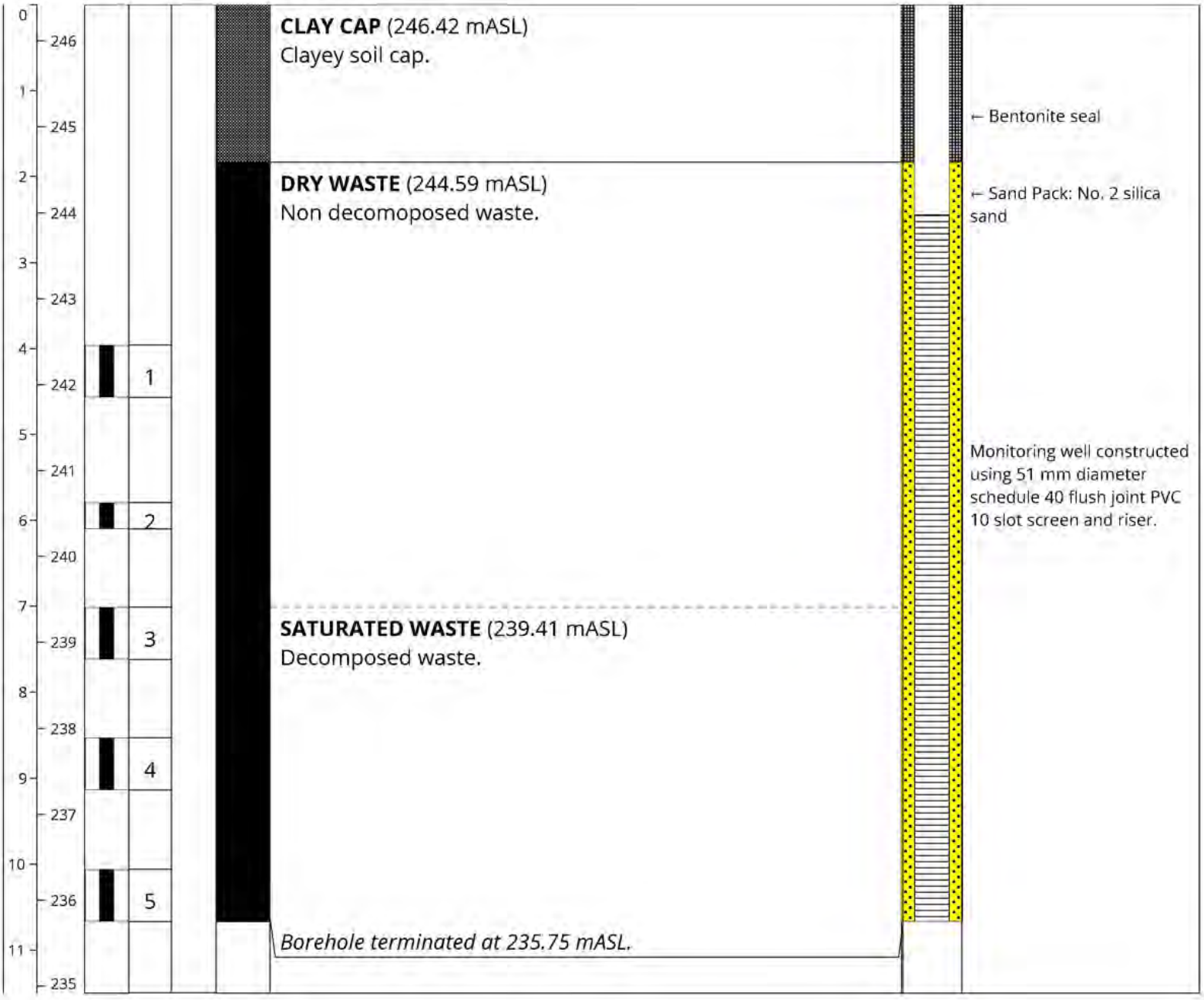
RWDI
530-4510 Rhodes Drive, Windsor, ON N8W 5K5
Tel: 519.823.1311 Fax: 519.823.1316

MONITORING WELL LW5

PROJECT NAME: Leachate Well Drilling
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 24, 2017 **COMPLETED:** Nov. 24, 2017
ELEVATION: Ground: 246.42 mASL, Top of Pipe: 247.22 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM



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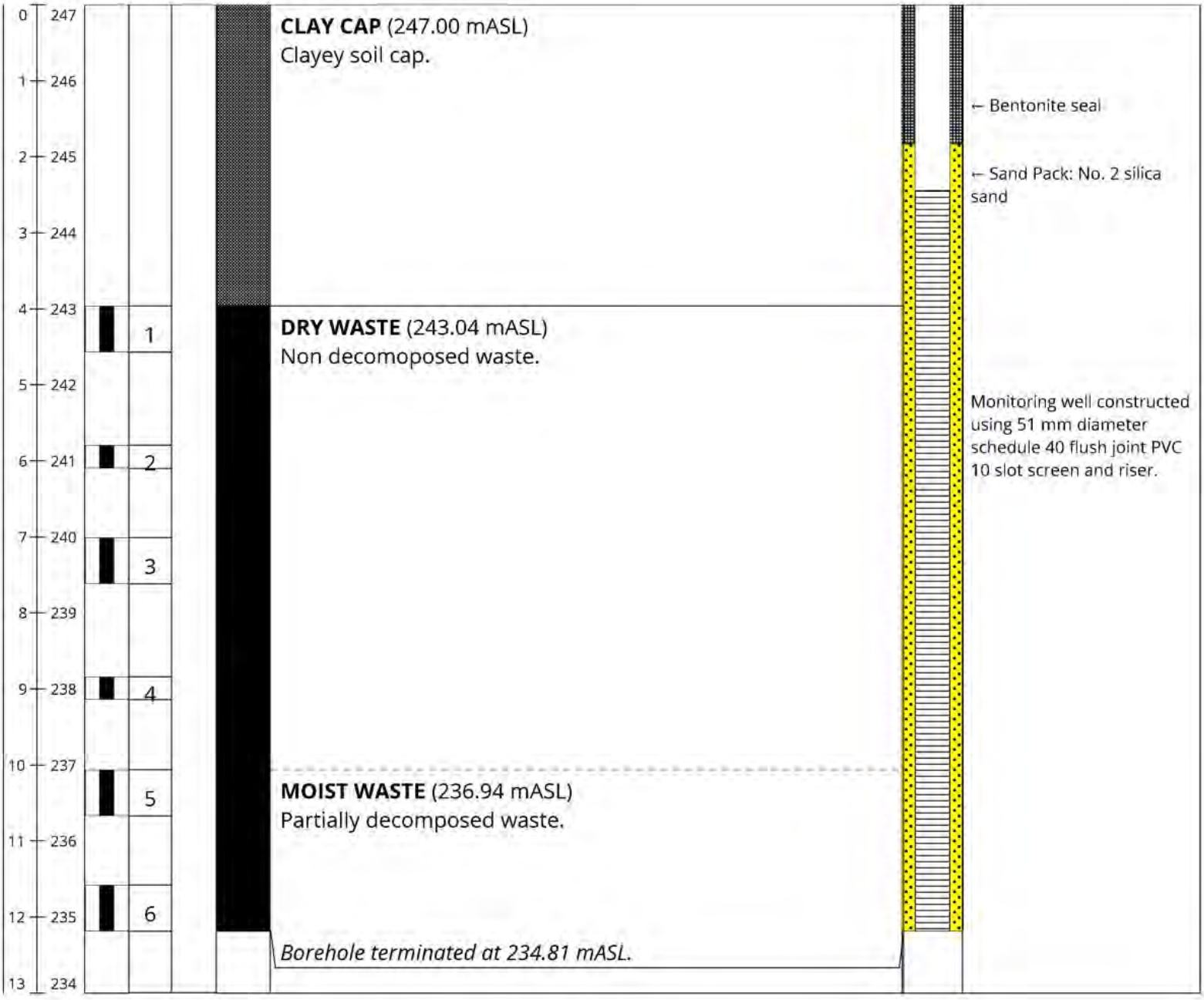
530-4510 Rhodes Drive, Windsor, ON N8W 5K5
Tel: 519.823.1311 Fax: 519.823.1316

MONITORING WELL LW6

PROJECT NAME: Leachate Well Drilling
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 24, 2017 **COMPLETED:** Nov. 24, 2017
ELEVATION: Ground: 247.00 mASL, Top of Pipe: 247.80 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM



RWDI
530-4510 Rhodes Drive, Windsor, ON N8W 5K5
Tel: 519.823.1311 Fax: 519.823.1316

PIEZOMETER P1

PROJECT NAME: Piezometer Installation
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 24, 2017 **COMPLETED:** Nov. 24, 2017
GROUND ELEVATION: 239.17 mASL
LOGGED BY: HF **CHECKED BY:** BJL

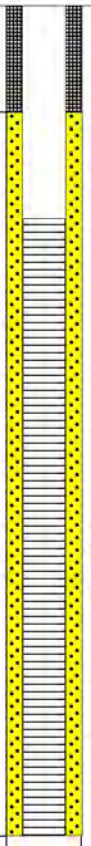
SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM

0 / 239 — **TOPSOIL** (239.17 mASL)

CLAYEY SILT TO SILTY CLAY (239.02 mASL)

1 / 238 — Borehole terminated at 238.00 mASL.

Notes:
(1) Clay auger cuttings were mounded around the base of the piezometer at ground surface;
(2) Top of pipe elevation: 240.38 mASL;
(3) mASL denotes metre above sea level.



← Bentonite seal
← Geotextile (above sand pack)
← Sand pack: No. 2 silica sand
← Piezometer constructed using 51 mm diameter schedule 40 flush joint PVC 10 slot screen and riser.

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PIEZOMETER P2

PROJECT NAME: Piezometer Installation
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 24, 2017 **COMPLETED:** Nov. 24, 2017
GROUND ELEVATION: 239.34 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM

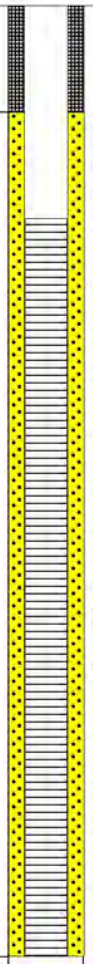
0
239
1
238

TOPSOIL (239.34 mASL)

CLAYEY SILT TO SILTY CLAY (239.19 mASL)

Borehole terminated at 238.00 mASL.

Notes:
(1) Clay auger cuttings were mounded around the base of the piezometer at ground surface;
(2) Top of pipe elevation: 240.58 mASL;
(3) mASL denotes metre above sea level.



← Bentonite seal
← Geotextile (above sand pack)
← Sand pack: No. 2 silica sand
← Piezometer constructed using 51 mm diameter schedule 40 flush joint PVC 10 slot screen and riser.

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PIEZOMETER P3

PROJECT NAME: Piezometer Installation
PROJECT NO.: 1702478
CLIENT: Waste Management of Canada Corporation
PROJECT LOCATION: Twin Creeks Landfill
DRILLING CONTRACTOR: Direct Environmental Drilling Inc.

DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 203 mm
DATE STARTED: Nov. 24, 2017 **COMPLETED:** Nov. 24, 2017
GROUND ELEVATION: 239.37 mASL
LOGGED BY: HF **CHECKED BY:** BJL

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				**TOPSOIL** (239.37 mASL)	← Bentonite seal
				CLAYEY SILT TO SILTY CLAY (239.22 mASL)	← Geotextile (above sand pack) ← Sand pack: No. 2 silica sand
239					
1					← Piezometer constructed using 51 mm diameter schedule 40 flush joint PVC 10 slot screen and riser.
238				Borehole terminated at 238.00 mASL.	

Notes:
(1) Clay auger cuttings were mounded around the base of the piezometer at ground surface;
(2) Top of pipe elevation: 240.62 mASL;
(3) mASL denotes metre above sea level.

The University of Western Ontario

Faculty of Engineering Science
London, Canada
N6A 5B9

Original report 1984 08 09
Corrected report 1984 11 06

Morrison Beatty Limited
Consulting Engineers and Hydrogeologists
4500 Dixie Road, Unit 12A
Mississauga, Ontario
L4W 1V7

Attention: Mr. B.W. Beatty, P.Eng.

Dear Sirs:

Re: Mineralogical and Pore Water Analyses
Southern Till and Glaciolacustrine Clay Samples
Warwick Landfill Study. Your File No. 400-841.

At the verbal request of your Messrs. Beatty and Clister, and in accordance with the terms in our letter to you dated 1984 May 8th, we have carried out preliminary mineralogical and chemical analyses on two soil samples from the Warwick Landfill site. This report supersedes our original report of 1984 August 9, which contained errors relating to the location of the test samples.

SOIL DESCRIPTIONS

The two block samples were supplied to us by Mr. W.E. Clister and arrived in plastic bags via our Mr. G. Lusk who visited the site on 1984 April 26th.

The samples represent two stratigraphic units known as the Southern Till and the Glaciolacustrine Clay and are important since they are believed to be representative of the natural soil barrier which normally

separates the landfill waste from an underlying, thin sand layer at the site.

Southern Till

This sample, from ~ 7 m depth, was obtained from a test pit near the Gatehouse and represents the lower, grey, unweathered portion of the Southern Till unit at the site. The soil is a remarkably massive, homogeneous, clayey silt or silty clay of medium brownish grey colour. Sand grains, thinly distributed through the clay-silt matrix, give the sample a slightly gritty feel. Pebbles and boulders are also thinly distributed in the clay-silt matrix. On drying, the sample turned light grey and became very hard.

Glaciolacustrine Clays and Silts

This sample, from ~ 5 m depth, was obtained from a trench near the south waste site and is believed to be representative of the Glaciolacustrine unit and separates the overlying Southern Till from the thin Interstadial Sand stratum. The clay layers in the block were greyish-brown and varied in thickness from 1 mm to 20 mm. The interlayered silts were lighter in colour and rarely thicker than 1 mm. On drying the sample became very hard and changed to a banded, light grey and light brownish grey colour. Wet and dry samples split easily along the silt partings.

TESTING PROGRAM

The following analyses were run on the two samples:

1. X-ray powder diffraction on air dried bulk samples pulverized to < 76 μm.
2. X-ray diffraction on oriented, natural, < 2 μm fines, water-wet (WET PO), air dried (ADPO) and glycolated (GPO).
3. X-ray diffraction on oriented, K^+ saturated fines, water-wet, air dried, glycolated, and heated to 550°C.
4. Carbonates by gasometric analysis.

5. Salinity of pore fluid by conductivity measurement.
6. Chlorinity and pH by direct measuring electrodes.
7. Sulphate by turbidity meter.
8. Pore water and exchange cations by atomic absorption and silver thiourea exchange methods.

RESULTS

X-Ray Diffraction

X-ray powder patterns for the two samples are presented on Figure 1. Both soils contain abundant quartz, calcite, dolomite, feldspar, chlorite and illite as noted on the traces. The jagged, broad nature of the 1.0 nm illite peaks suggests interlayering with a swelling phase.

Gasometric analyses (Table I) measured 28 and 32% carbonate in the Southern Till and Glaciolacustrine soils, respectively. Both the x-ray traces and the chemical analyses show calcite to be slightly more abundant than dolomite.

X-ray traces obtained on oriented, < 2 μm fines of both soils are presented on Figures 2 and 3. The natural soils (Figures 2a and 3a) contain abundant illite (1.0 nm peaks) and abundant chlorite (1.4 and 0.71 nm peaks). The strength of the 0.7 nm peak, when CuKα radiation is used, indicates the presence of iron-rich chlorite. A ragged background at low angles of 2θ, which shifts around on glycolation, suggests the presence of small amounts of smectite, some of it interlayered with illite and possibly chlorite.

The traces for the K^+ saturated clays are very similar to those for the natural clays indicating that there is little collapsible material such as vermiculite in these unweathered grey soils.

Heat treatment to 550°C for 30 minutes destroyed the 0.7 nm peaks of both K^+ saturated clays and left intact a small 1.4 nm chlorite peak. This

confirms the presence of chlorite in the soils although further tests would be required to see whether some of the 0.7 nm material is kaolinite.

Soil Chemistry

Selected chemical data on the two soils are presented in Tables I and II. Sulphates amount to about 0.2 g/L compared to a chloride content of only 0.1 g/L in the soil pore water. The pH is alkaline at 8.1 to 8.3 which is characteristic of these carbonate enriched soils. The soil salinity measurements of 2.0 and 1.3 g/L on the Till and Clay, respectively, are typical of soils in the area and the test method employed (resuspension of an air dry powder in distilled water).

The pore fluid cations measured on pore water squeezed from the soils at their saturation water content and expressed in meq/L are presented in Table I. Ca^{++} and Mg^{++} are the dominant dissolved cationic species although considerable Na^{+} is also present. Calculation of the sodium adsorption ratio (S.A.R.) for the two soils yielded values of 0.8 indicating that less than 1% of the exchange sites are occupied by Na^{+}.

Additional data on the cation chemistry of the soils are presented in Table II. The total cations represent both adsorbed and free pore fluid cations in the soil and were obtained after exchange with silver thiourea. If the pore fluid cations are subtracted from these total values, a rough measure is obtained of the easily exchangeable, adsorbed cations on the soils. Calcium is by far the dominant exchange cation with magnesium a distant second. Sodium comprises less than 1% of the adsorbed cations, confirming the predictions from the S.A.R. calculations.

The sum of the adsorbed cations (all expressed in meq/100 g of soil) yields an approximate value of the effective exchange capacity, which for the bulk Till and bulk Glaciolacustrine Clay, amounts to 27 and 28 meq/100 g, respectively.

We trust that these results adequately define the mineralogical and chemical nature of your barrier soils. Should further quantitative mineralogy or additional work on the brown, weathered surface soils be required, please contact us.

Yours truly,

R.M. Quigley, P.Eng.
Professor of
Geotechnical Engineering

RMQ:em
Attachs.

TABLE I. SOIL CHEMISTRY, WARWICK LANDFILL

Measurement		Southern Till	Glaciolacustrine Clay
ω_n	%	24.3	32.1
$\omega_{sat'n}$ (1)	%	38.6	35.7
$\omega_{(air\ dry)}$	%	1.4	1.5
Carbonate	%	28.4	31.8
pH (2)		8.1	8.3
Salinity (3)	g/L	2.0	1.3
Sulphates (4)	g/L	0.21	0.16
Chlorinity (5)	g/L	0.01 ?	0.01 ?
Pore Water Cations (6)			
Na^+	meq/L	1.37	1.30
K^+		0.24	0.18
Ca^{++}		2.06	2.50
Mg^{++}		3.85	3.40
S.A.R. (7)		0.80	0.76

Notes:
1) $\omega_{sat'n}$ = "saturation" water content = water content at which excess moisture glistens on sample surface.
2) pH run on bulk soil at 1:6, soil:water ratio.
3) Salinity by conductivity of suspension at soil:water ratio = 1:5.
4) Sulphates by turbidity meter on pore water squeezed from soil at "saturation" water content and corrected to ω_n.
5) Chlorinity by electrode on pore water squeezed from soil at $\omega_{sat'n}$ and corrected to ω_n.
6) By atomic absorption on pore water squeezed at $\omega_{sat'n}$.
7) S.A.R. = Sodium adsorption ratio = $\dfrac{Na^+}{\sqrt{0.5\ (Ca+Mg)}}$

TABLE II. EXCHANGE CATIONS,(1) WARWICK LANDFILL SOILS

	Southern Till	Glaciolacustrine Clay
Total Cations		
Na^+ meq/100 g	0.24	0.22
K^+ "	0.80	0.61
Ca^{++} "	23.85	23.85
Mg^{++} "	2.07	3.89
Pore Fluid Cations		
Na^+ meq/100 g	.05	.04
K^+ "	.01	.01
Ca^{++} "	.08	.09
Mg^{++} "	.15	.12
Adsorbed Cations		
Na^+ meq/100 g	0.19	0.18
K^+ "	0.79	0.60
Ca^{++} "	23.77	23.76
Mg^{++} "	1.92	3.77
Calculated C.E.C. meq/100 g	26.7	28.3

(1) By silver thiourea exchange and analysis by atomic absorption.

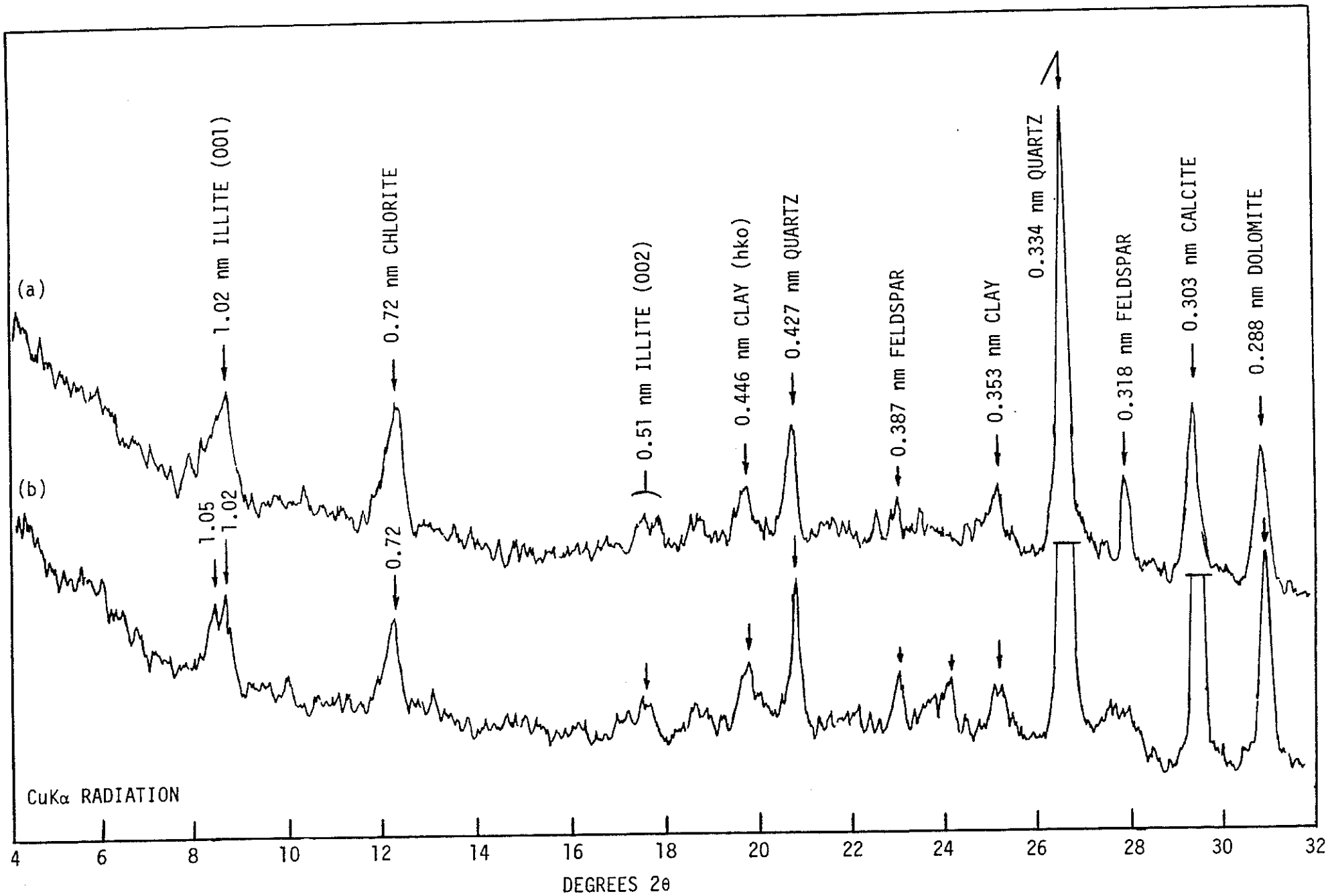

FIGURE 1. X-RAY POWDER PATTERNS OF (a) SOUTHERN TILL, AND (b) LACUSTRINE CLAY, WARWICK LANDFILL

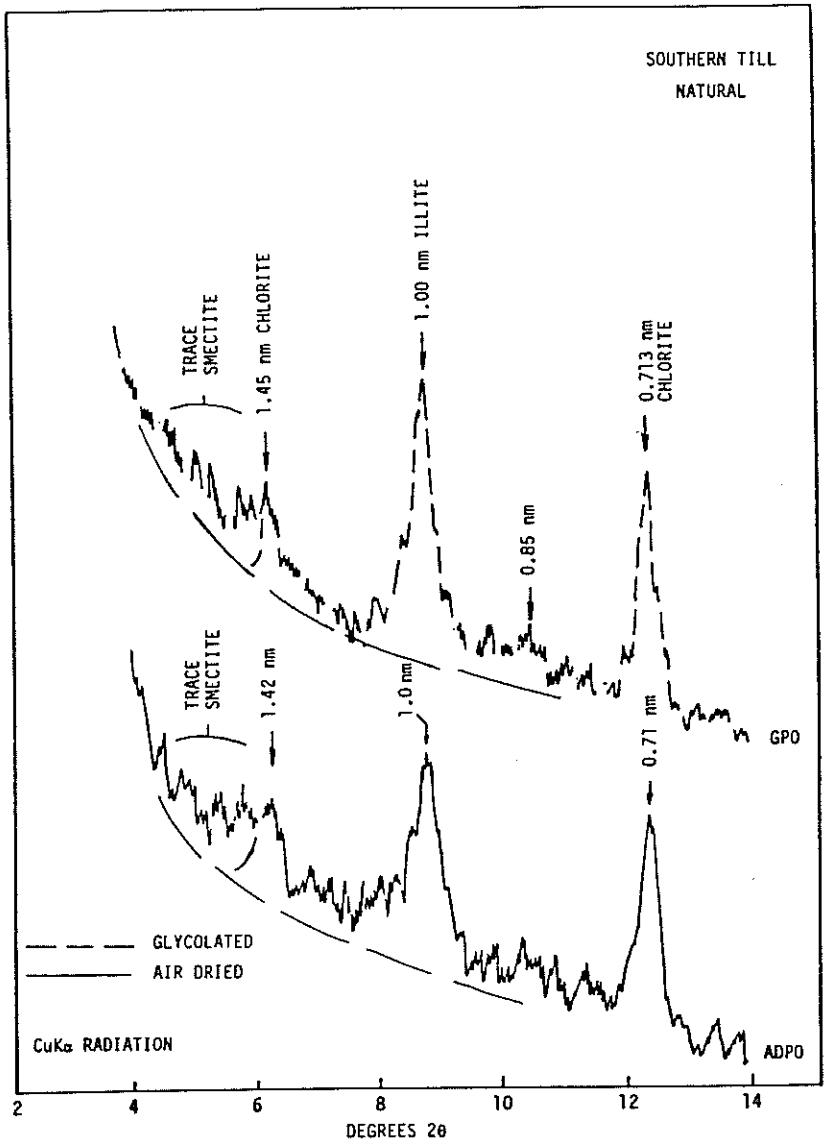

FIGURE 2a. X-RAY TRACES OF ORIENTED, < 2 μm FINES, NATURAL, GLYCOLATED AND AIR DRIED, SOUTHERN TILL

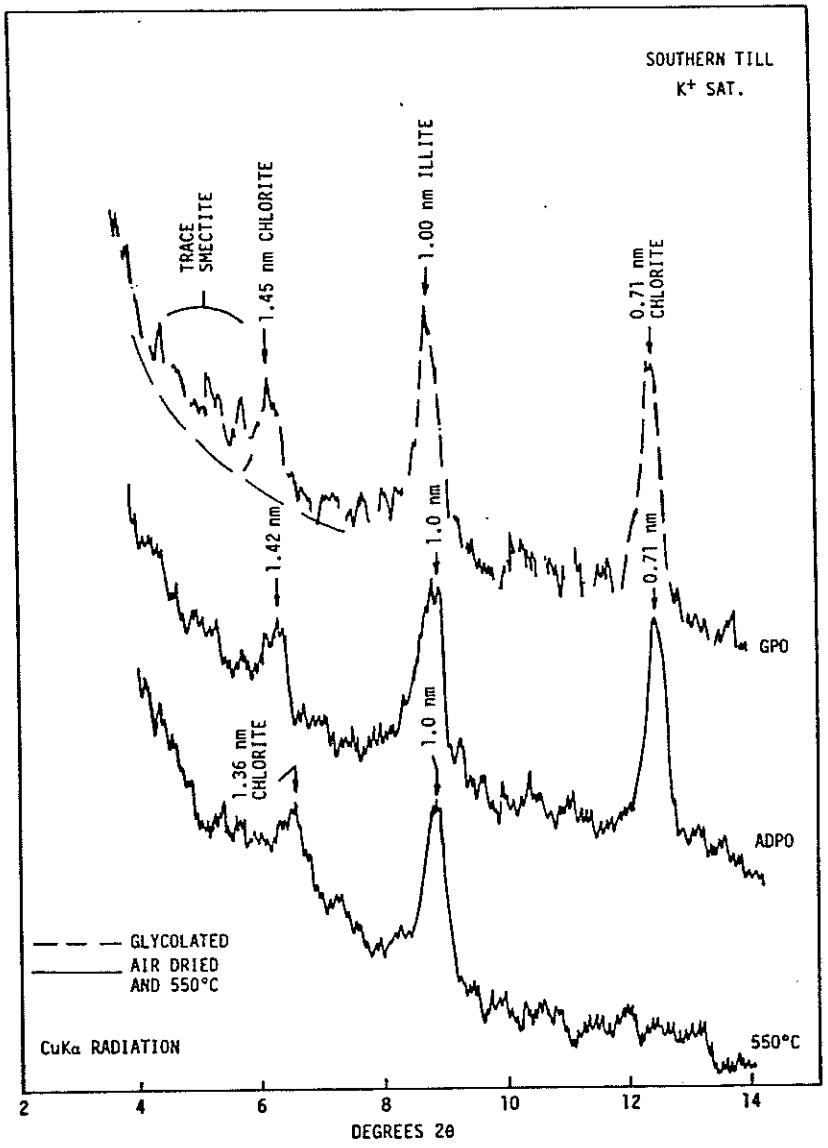

FIGURE 2b. X-RAY TRACES OF ORIENTED, < 2 μm FINES, K^+ SATURATED, AIR DRIED, GLYCOLATED AND HEATED TO 550°C, SOUTHERN TILL

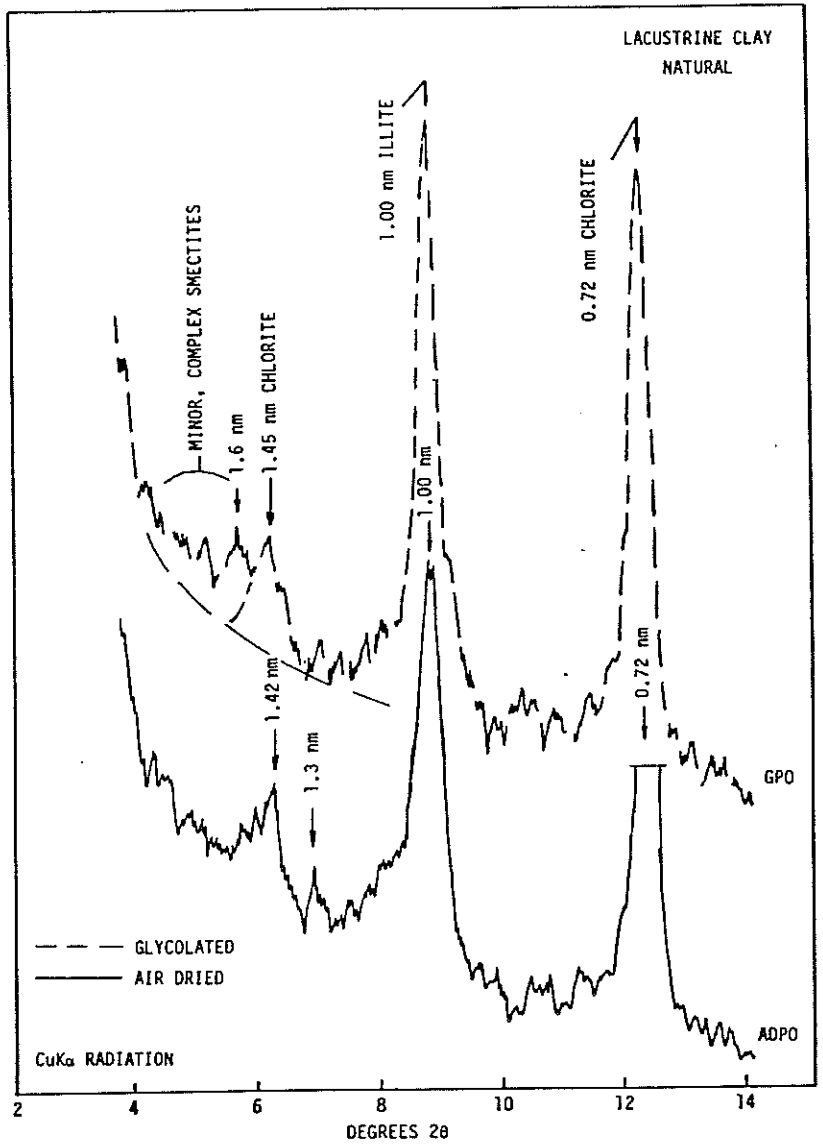

FIGURE 3a. X-RAY TRACES OF ORIENTED, < 2 μm FINES, NATURAL, GLYCOLATED AND AIR DRIED, GLACIOLACUSTRINE CLAY

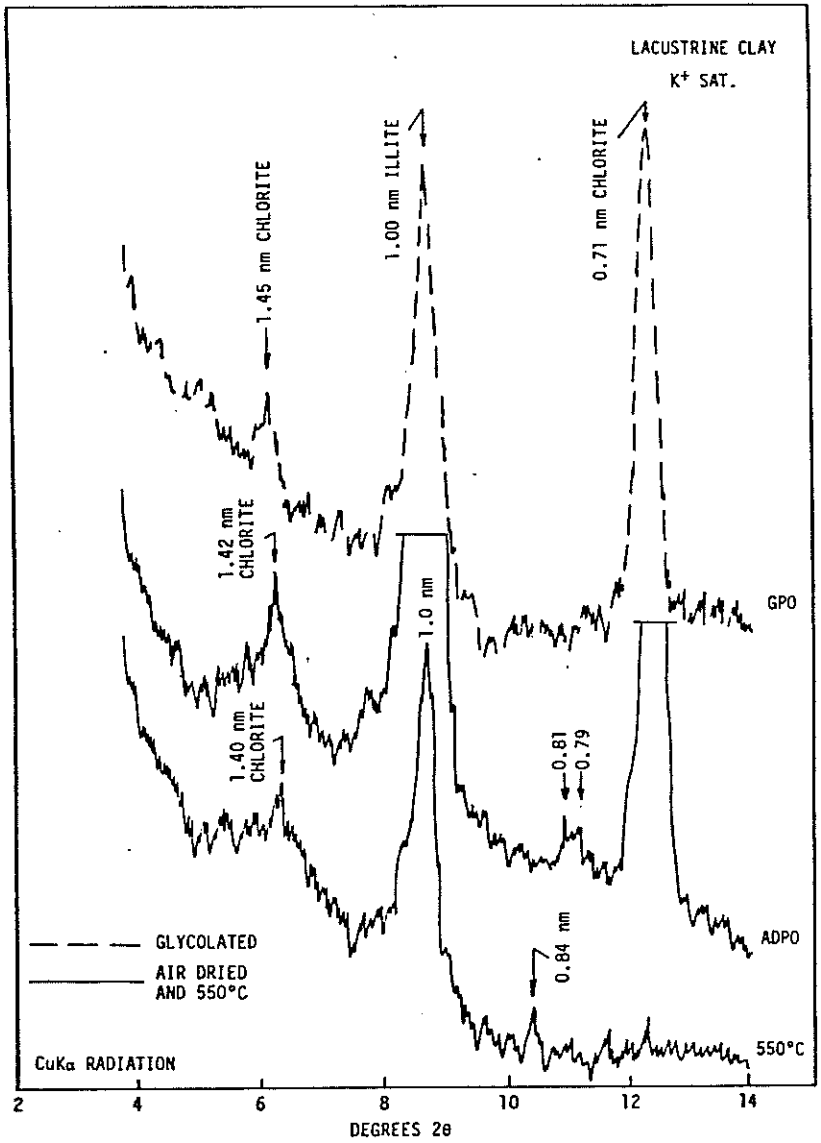

FIGURE 3b. X-RAY TRACES OF ORIENTED, < 2 μm FINES, K+ SATURATED, AIR DRIED, GLYCOLATED AND HEATED TO 550°C, GLACIOLACUSTRINE CLAY

The UNIVERSITY *of* WESTERN ONTARIO

GEOTECHNICAL RESEARCH CENTRE

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May 13, 1999

Jagger Hims Limited

2885 Lauzon Parkway, Unit 117

Windsor, Ontario

N8T 3H5

Attention: Mr. Jason T. Balsdon

Dear Sirs,

Report on Soil Mineralogy, Carbonate and Cation Exchange Capacity Analyses

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In accordance with your instructions, we have performed qualitative mineralogy, carbonate content and cation exchange capacity analyses of the two soil samples you sent us.

1. Soil Description

The samples, labelled BH60-I (46-48.5') and BH62-I (46-48.5), arrived in a moist state in two separate bags. They were semi-disturbed, extruded tube samples. The as-received gravimetric water contents averaged 14.3% for BH60-I and 21.8% for BH62-I. Both

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samples BH60-I and BH62-I were dark grey tills, contained occasional stones, and reacted vigorously with concentrated hydrochloric acid, suggesting the presence of carbonate minerals.

2. Testing Program

As per your instructions, the following mineralogical and physico-chemical analyses were performed:

1. Water content measurements on the as-received bulk soil.
2. X-ray diffraction analysis on air-dried, bulk or whole soil pulverized to <76 μm.
3. X-ray diffraction analysis on oriented, natural <2 μm fines of each soil, water-wet, air-dried, glycolated and heated to 550 °C for 30 minutes.
4. X-ray diffraction analysis on oriented, potassium (K^+)-saturated <2 μm fines of each soil, water-wet, air-dried, glycolated and heated to 550 °C for 30 minutes.
5. Carbonate content determination by gasometric analysis.
6. Pore water extraction at the as-received water content (BH62-I) and at the saturation water content (BH60-I) by squeezing at 10 MPa.
7. Cation exchange measurements using silver thiourea and potassium chloride ($KC\ell$) exchange solutions.

3. X-ray Diffraction Results

3.1 X-ray Random or Powder Diffraction

The x-ray powder patterns or diffractograms of the bulk or whole samples of soil BH60-I and BH62-I are presented in Figures 1 and 2. The two traces are essentially identical and display strong peaks of quartz, carbonates (calcite and dolomite), and feldspars.

3.2 X-ray diffraction of oriented <2 μm fines

Natural Soil: X-ray traces for the natural, <2 μm soil are shown in Figures 3 to 10 for soils BH60-I and BH62-I. The diffractograms do not indicate the presence of any swelling clay minerals in either soil, as there is no shift in the 1.40 nm peak on glycolation. Significant amounts of illite (strong 1.0 nm peaks) and chlorite (strong, stable 0.71 nm peaks) are present in both soils. The fact that the 0.71 nm peaks disappear on heating to 550 °C confirms the presence of chlorite (Figures 9 and 10). The 1.40 nm peak in BH62-I shifts slightly to 1.38 nm (Figure 10), suggesting that the chlorite present in BH62-I is iron-rich. There is no similar shift in BH60-I (Figure 9).

K^+-Saturated Soils: Figures 11 to 18 present x-ray diffractograms for the air-dried, water-wet, glycolated and heated K^+-saturated samples of BH60-I and BH62-I. A comparison of peak heights (1.40 to 1.00 nm) does not clearly indicate collapse of the 1.40 nm peak in all traces. The diffractograms for glycolated (Figures 7 and 15) and heated (Figures 9 and 17) samples of soil BH60-I show slight collapse of the 1.40 nm peak and strengthening of the 1.00 nm peak. These results suggest that trace amount of vermiculite may be present in BH60-I. The diffractograms for BH62-I do not show as much collapse. Illite and chlorite are essentially the dominant clay minerals present in both BH60-I and BH62-I. A trace of vermiculite may also be present. There are no swelling clay minerals in either BH60-I or BH62-I.

4. Chemical Test Results

The results of chemical tests performed on samples of BH60-I and BH62-I are shown in Table 1. Pore water was extracted from soil BH62-I by squeezing at 10 MPa. The water sample was then analyzed for sodium, potassium, calcium, and magnesium by atomic absorption spectrophotometry using appropriate standards. Since the as-received water content of soil BH60-I was only about 14%, it was not possible to extract sufficient quantities of pore water for chemical analysis. A saturation extract was therefore obtained by squeezing samples of soil BH60-I to which deionized, distilled water had been added

and mixed to obtain a saturation water content of 26%. This was the water content at which a paste of the soil sample produced a sheen on the surface during mixing with water, and was close to the liquid limit. The saturated sample was then squeezed at 10 MPa and the resulting pore water was analyzed for the four major cations as before. The analytical pore water concentrations were corrected to the as-received average water content of 14.3% to yield the data for BH60-I shown in Table 1.

The porewater chemistry of the as-received soil BH62-I is dominated by Ca (370 mg/L) and Mg (240 mg/L). The concentrations of Na and K are 184 and 19 mg/L, respectively. Cation concentrations are much higher in soil BH60-I, with Ca and Na reaching as high as 788 and 432 mg/L, respectively. As expected from these carbonate-rich soils, the adsorbed cation distribution is predominantly Ca^{2+} (10 meq/100g) and Mg^{2+} (3.5 meq/100g for soil BH62-I and 2.3 meq/100g for soil BH60-I). The calculated cation exchange capacity is 14 meq/100g for soil BH60-I and 15 meq/100 g for soil BH62-I.

5. Carbonate Content:

Soil carbonates were determined by gasometric method using the Chittick apparatus. The results of the analysis shown in Table 1 indicate similar carbonate content in the two soils. Calcite is present at about 20% in both soils, while dolomite is only slightly higher (11.5%) in BH62-I than in BH60-I (10%).

We trust this report meets your needs at the present time.

Yours sincerely,

GEOTECHNICAL RESEARCH CENTRE

Dr. E.K. Yanful
Associate Director

Attachments: Table 1 and Figures 1 to 18.

Table 1 Chemical Analysis on Whole Soil and Pore Water

Exchangeable Cations (meq/100g)	BH60-I	BH62-I
Na	0.652	0.609
K	0.959	1.807
Ca	2.304	3.497
Mg	9.974	9.974
Cation Exchange Capacity (meq/100g)	13.8	15.2
Carbonates:		
Calcite (%)	19.9	20.4
Dolomite (%)	10.3	11.5
Pore Water Concentrations (mg/L)		
Na	432	184
K	66	19
Ca	311	240
Mg	430	370

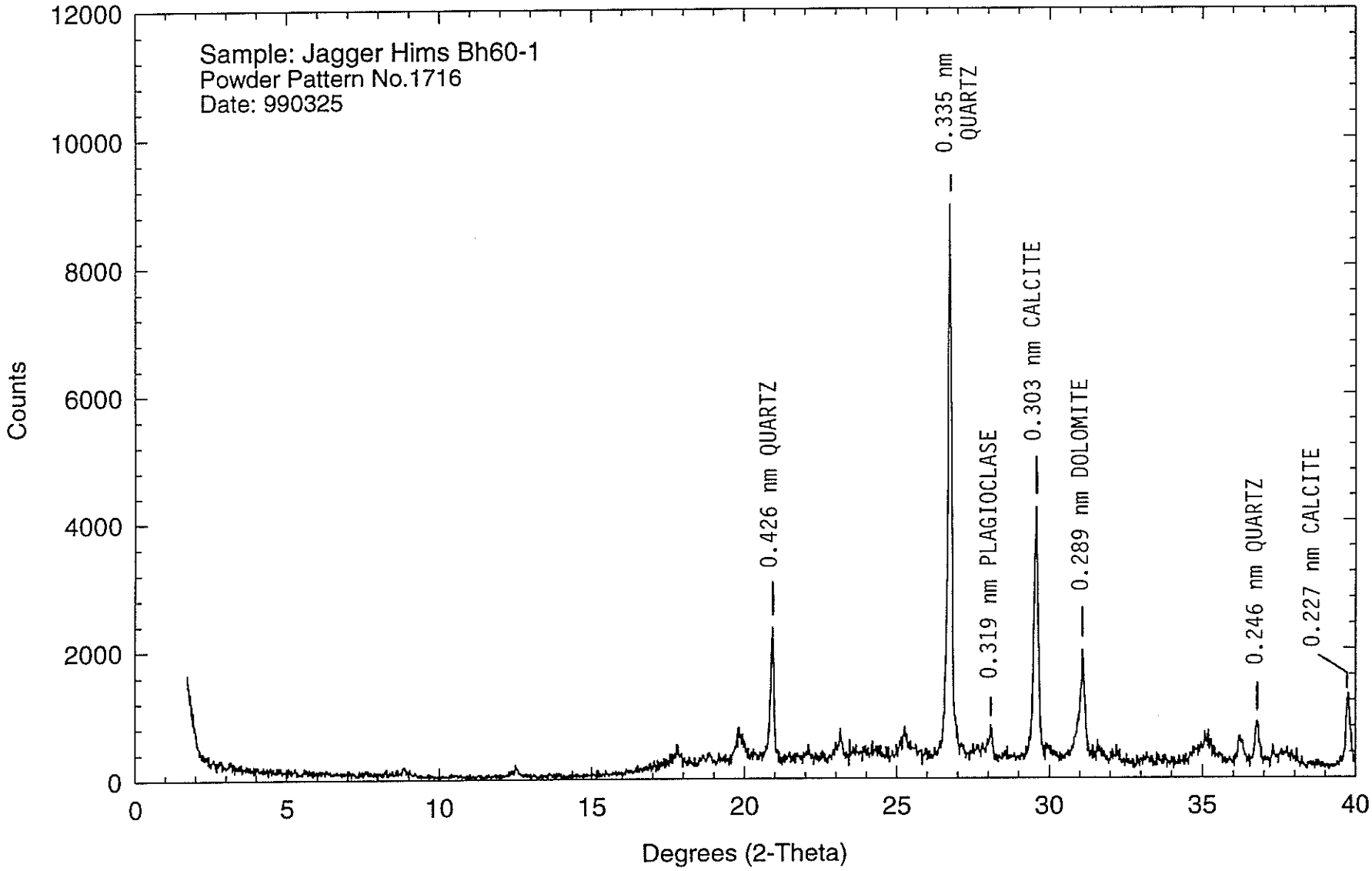


Figure 1 X-RAY RANDOM POWDER DIFFRACTOGRAM OF SOIL BH60-I, AIR-DRIED, WHOLE SOIL

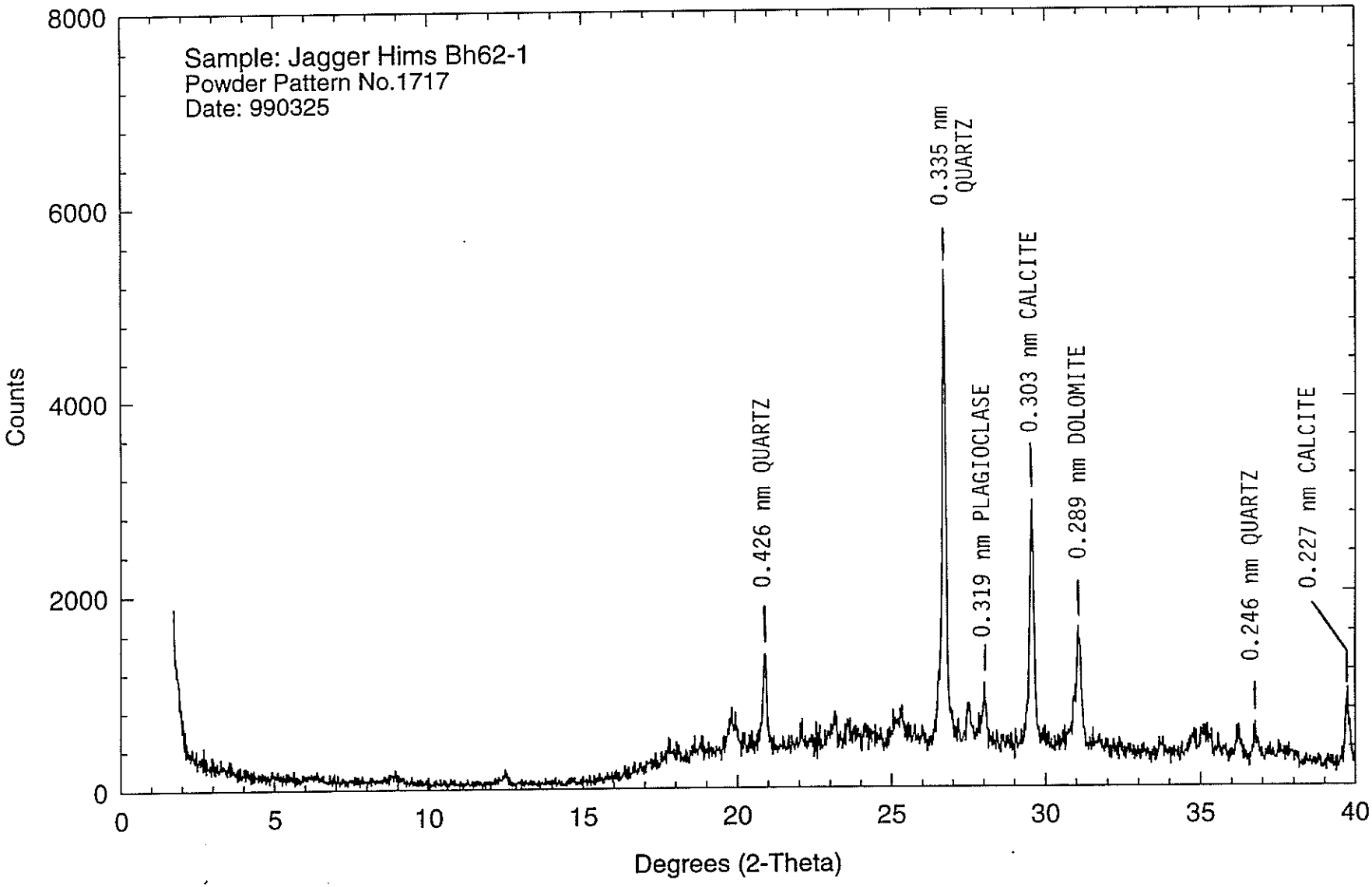


Figure 2 X-RAY RANDOM POWDER DIFFRACTOGRAM OF SOIL BH 62-I, AIR-DRIED, WHOLE SOIL

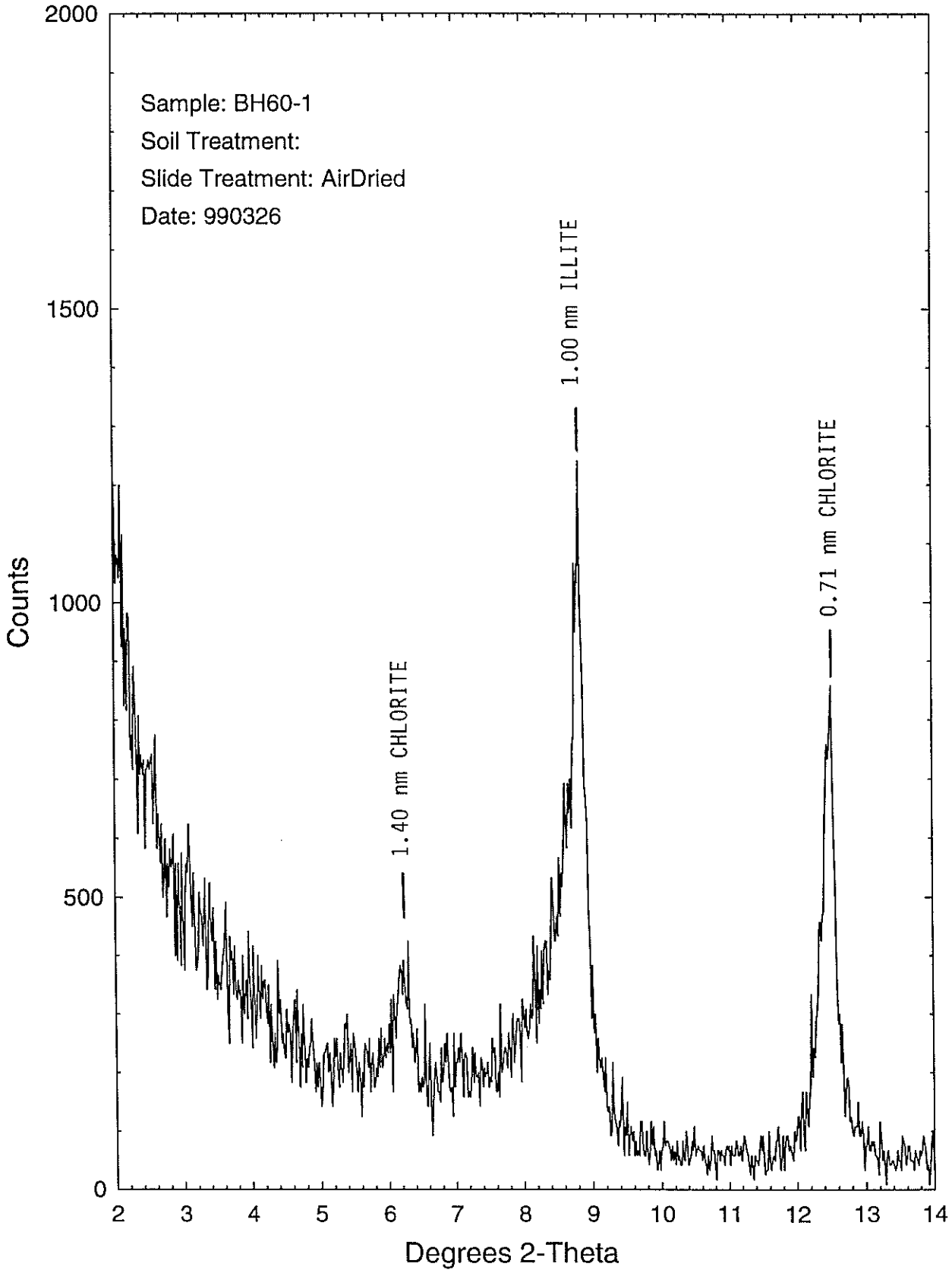


Figure 3 X-RAY DIFFRACTOGRAM OF SOIL BH60-I, ORIENTED, NATURAL, AIR-DRIED <2μm FINES

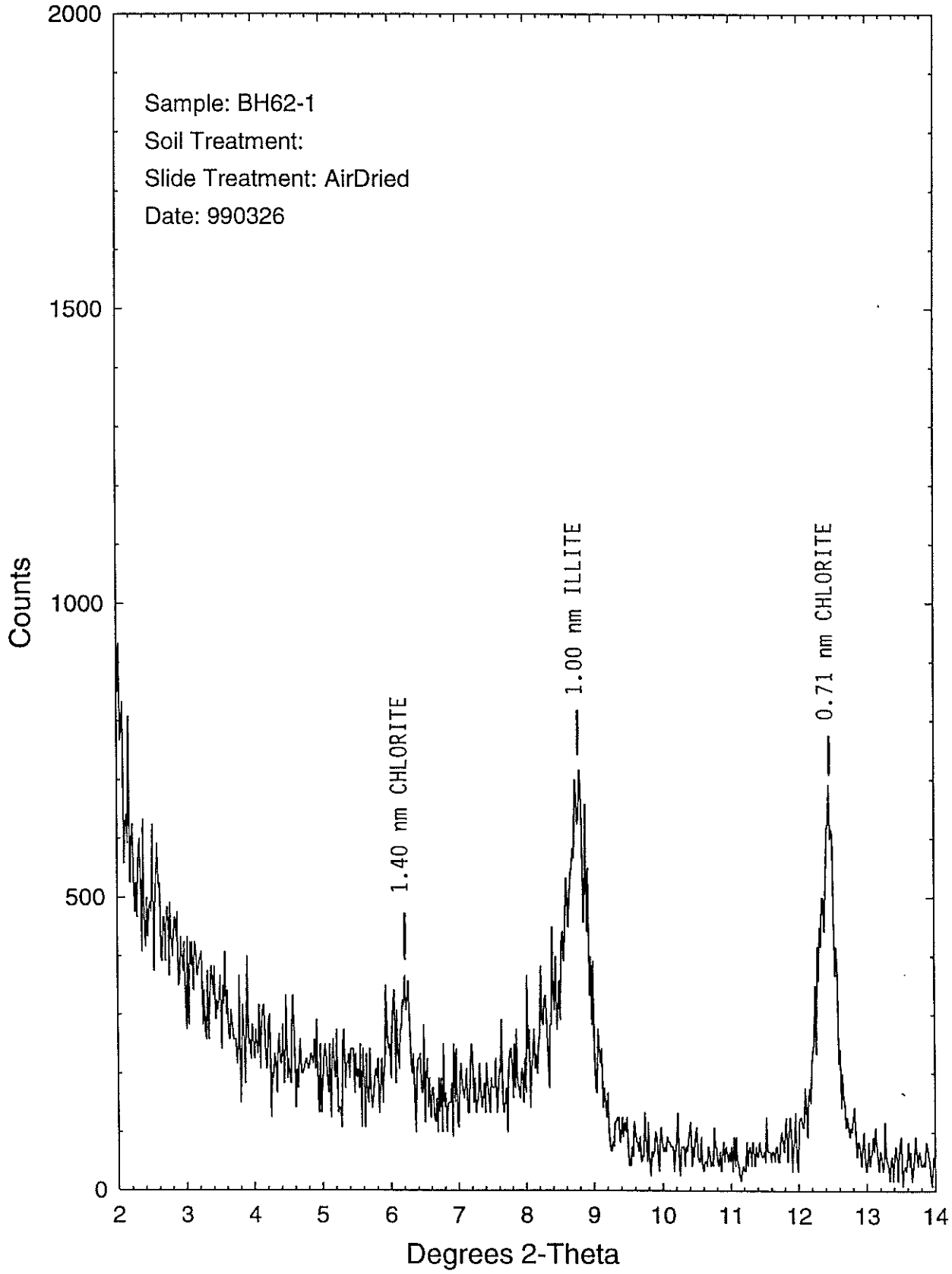


Figure 4 X-RAY DIFFRACTOGRAM OF SOIL BH62-I,
ORIENTED, NATURAL, AIR-DRIED <2μm FINES

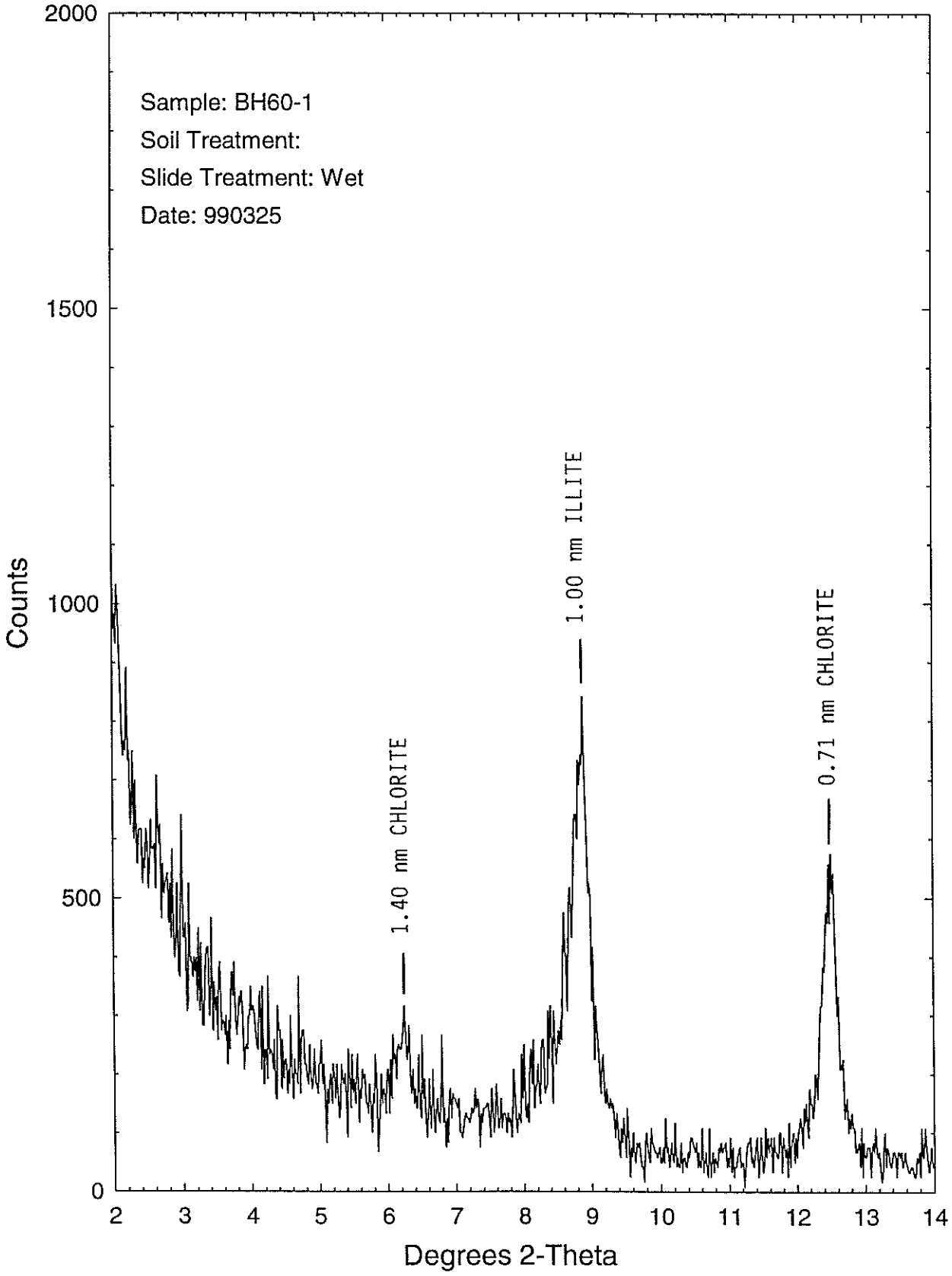


Figure 5 X-RAY DIFFRACTOGRAM OF SOIL BH60-I,
ORIENTED, NATURAL, WATER-WET, <2μm FINES

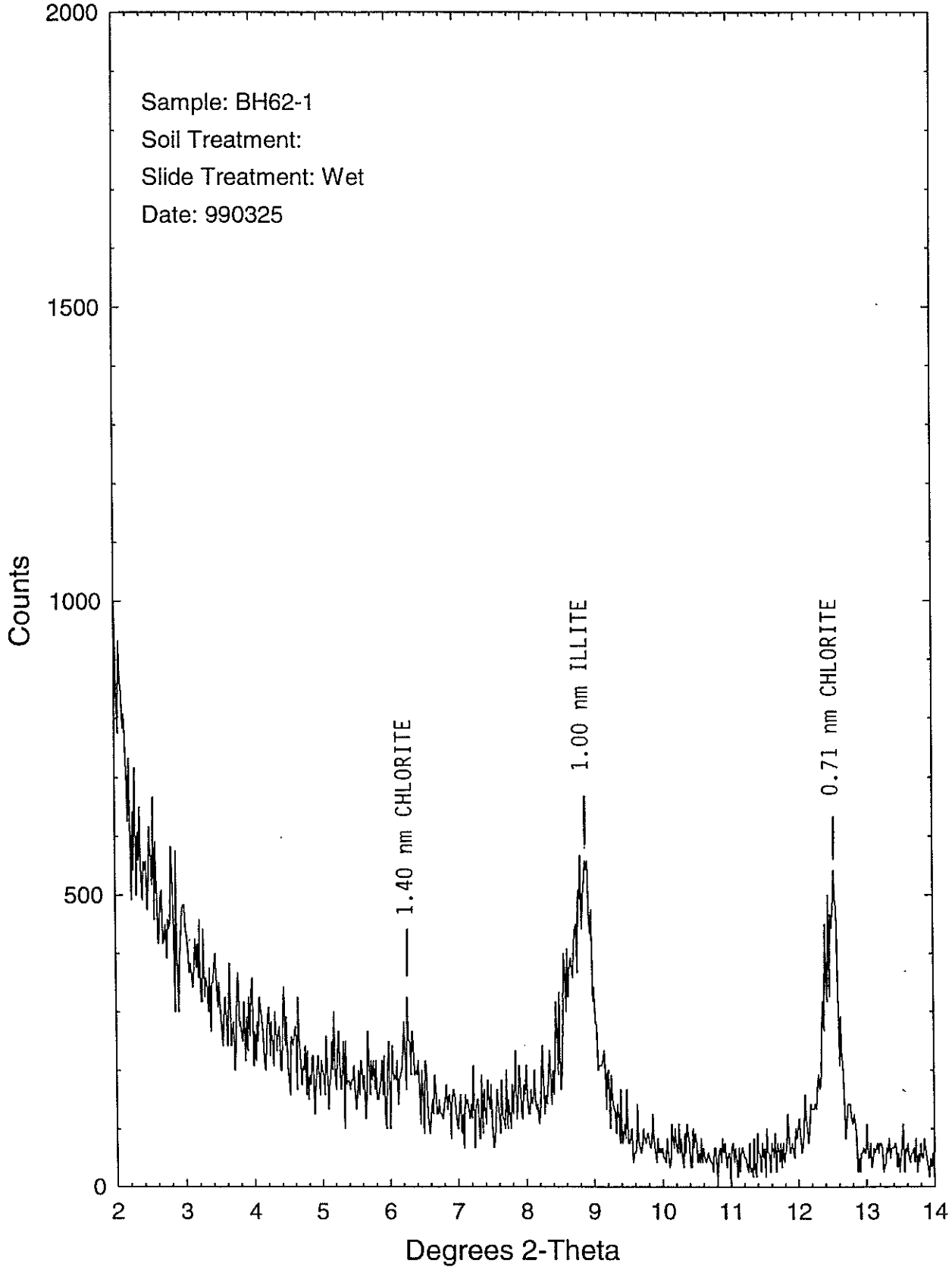


Figure 6 X-RAY DIFFRACTOGRAM OF SOIL BH62-I,
ORIENTED, NATURAL, WATER-WET, <2μm FINES

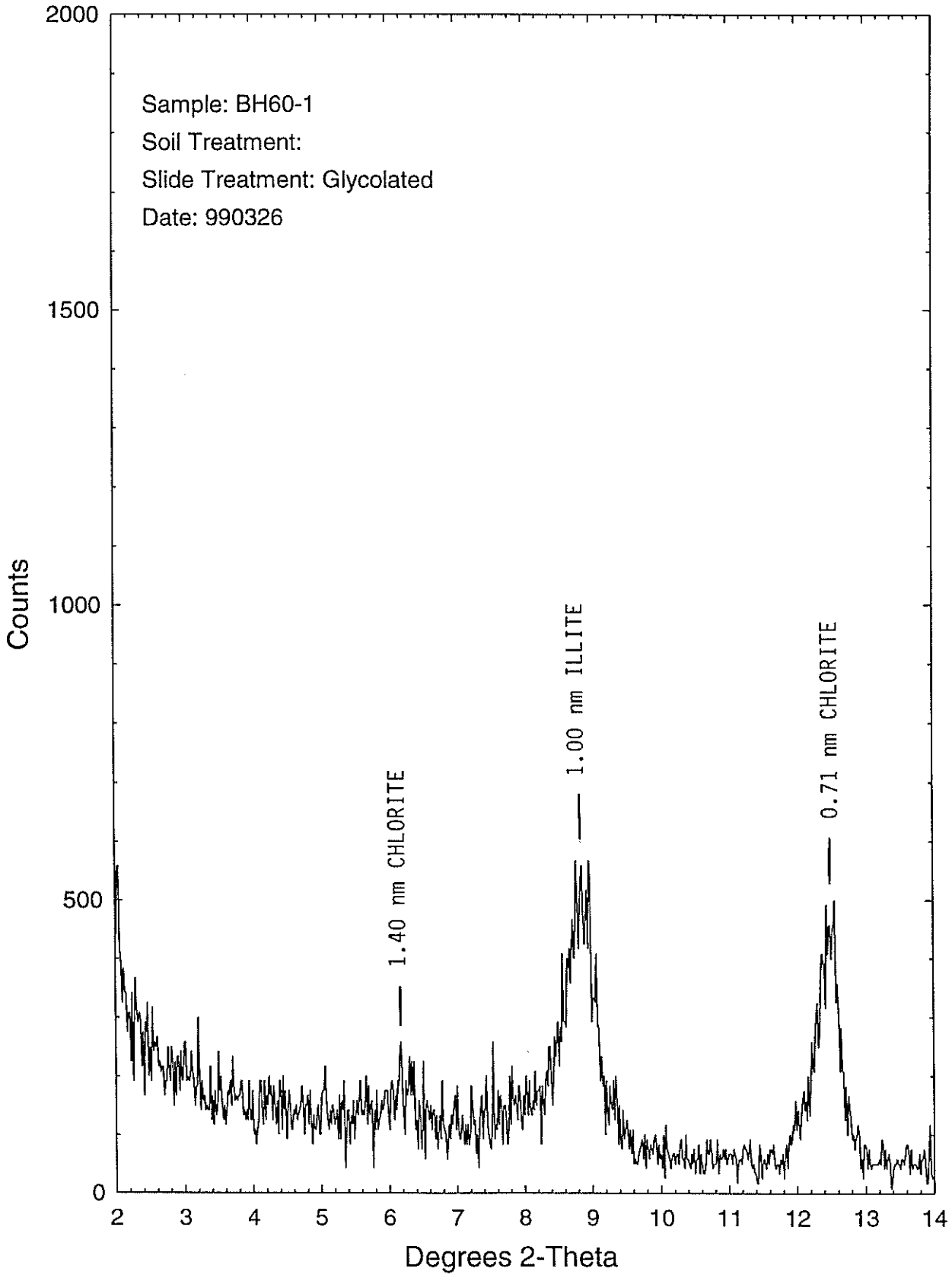


Figure 7 X-RAY DIFFRACTOGRAM OF SOIL BH60-I,
ORIENTED, NATURAL, GLYCOLATED, $<2\mu$m FINES

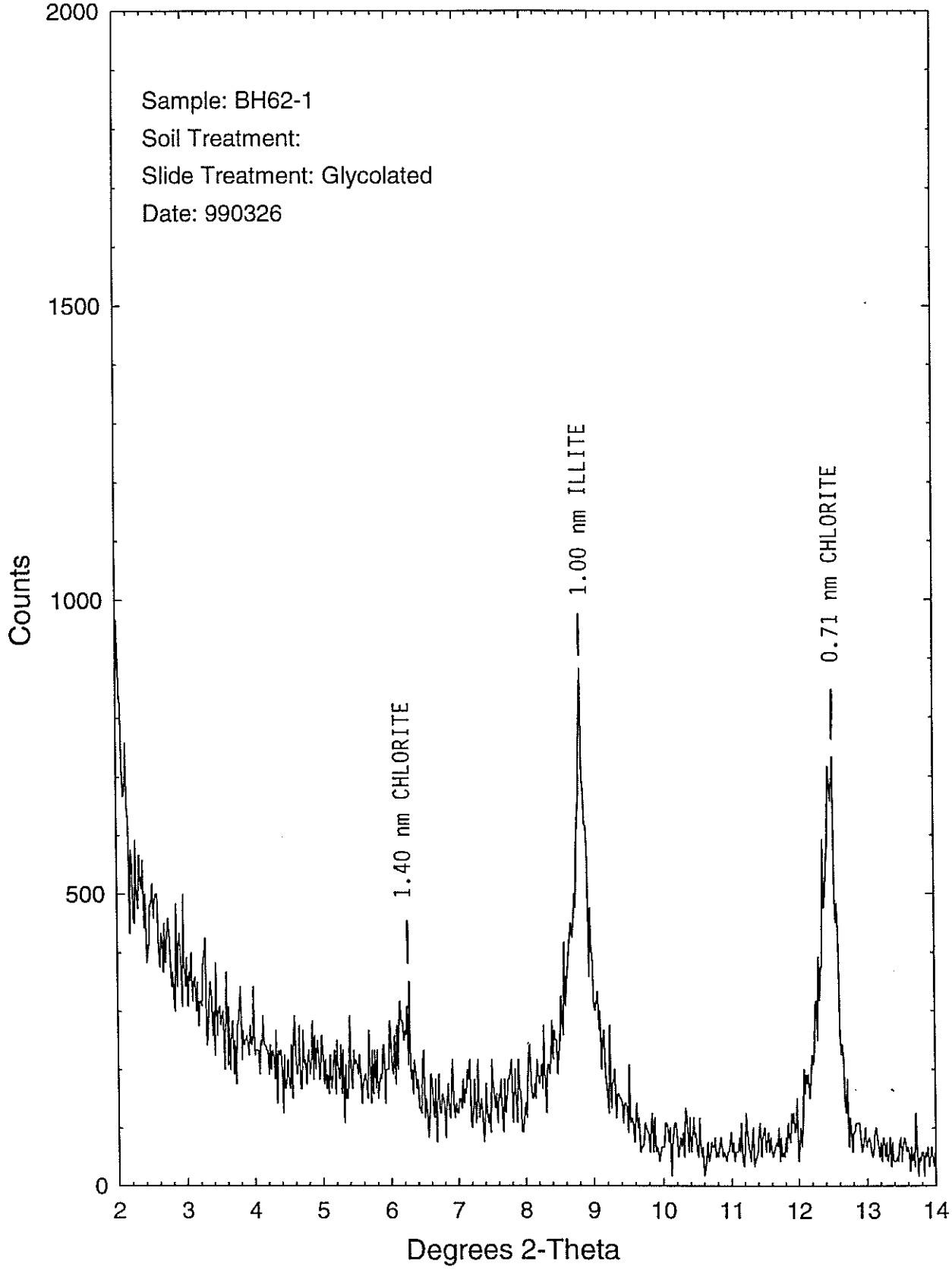


Figure 8 X-RAY DIFFRACTOGRAM OF SOIL BH62-I,
ORIENTED, NATURAL, GLYCOLATED, <2μm FINES

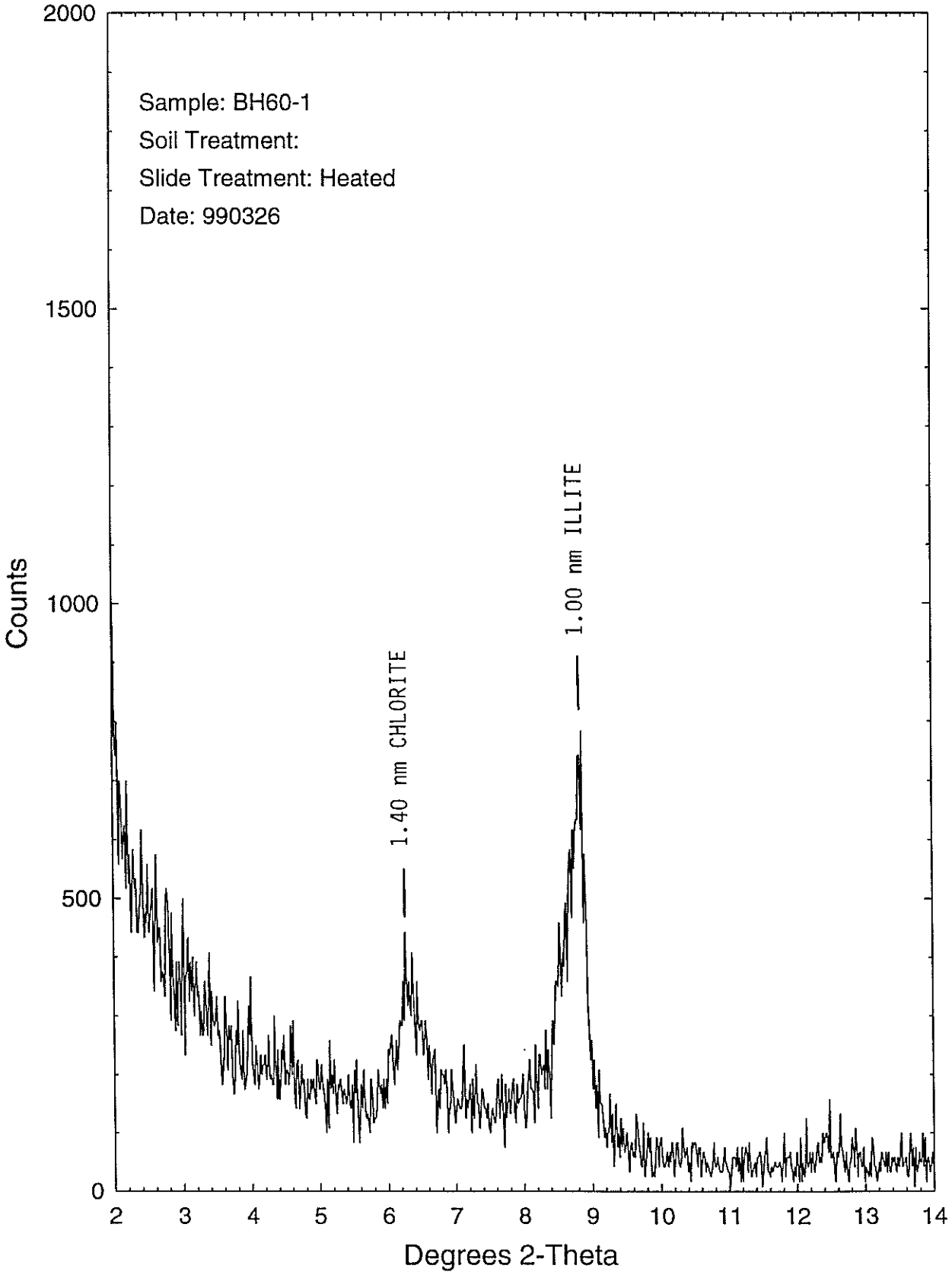


Figure 9 X-RAY DIFFRACTOGRAM OF SOIL BH 60-I, ORIENTED, NATURAL<2μm FINES, HEATED AT 550 ^{o}C FOR 30 MINS

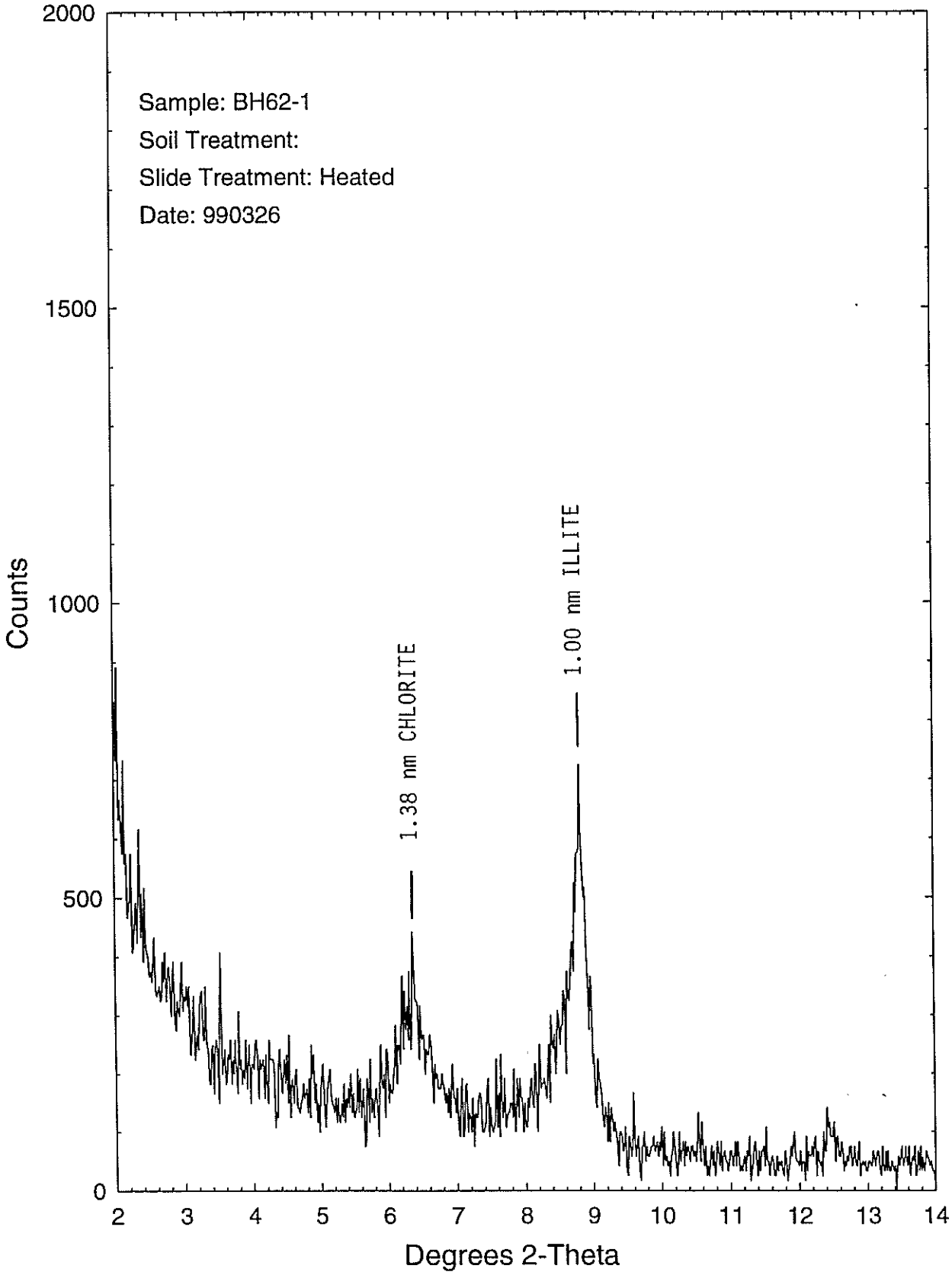


Figure 10 X-RAY DIFFRACTOGRAM OF SOIL BH 62-I, ORIENTED, NATURAL <2μm FINES HEATED AT 550 ^{o}C FOR 30 MINS

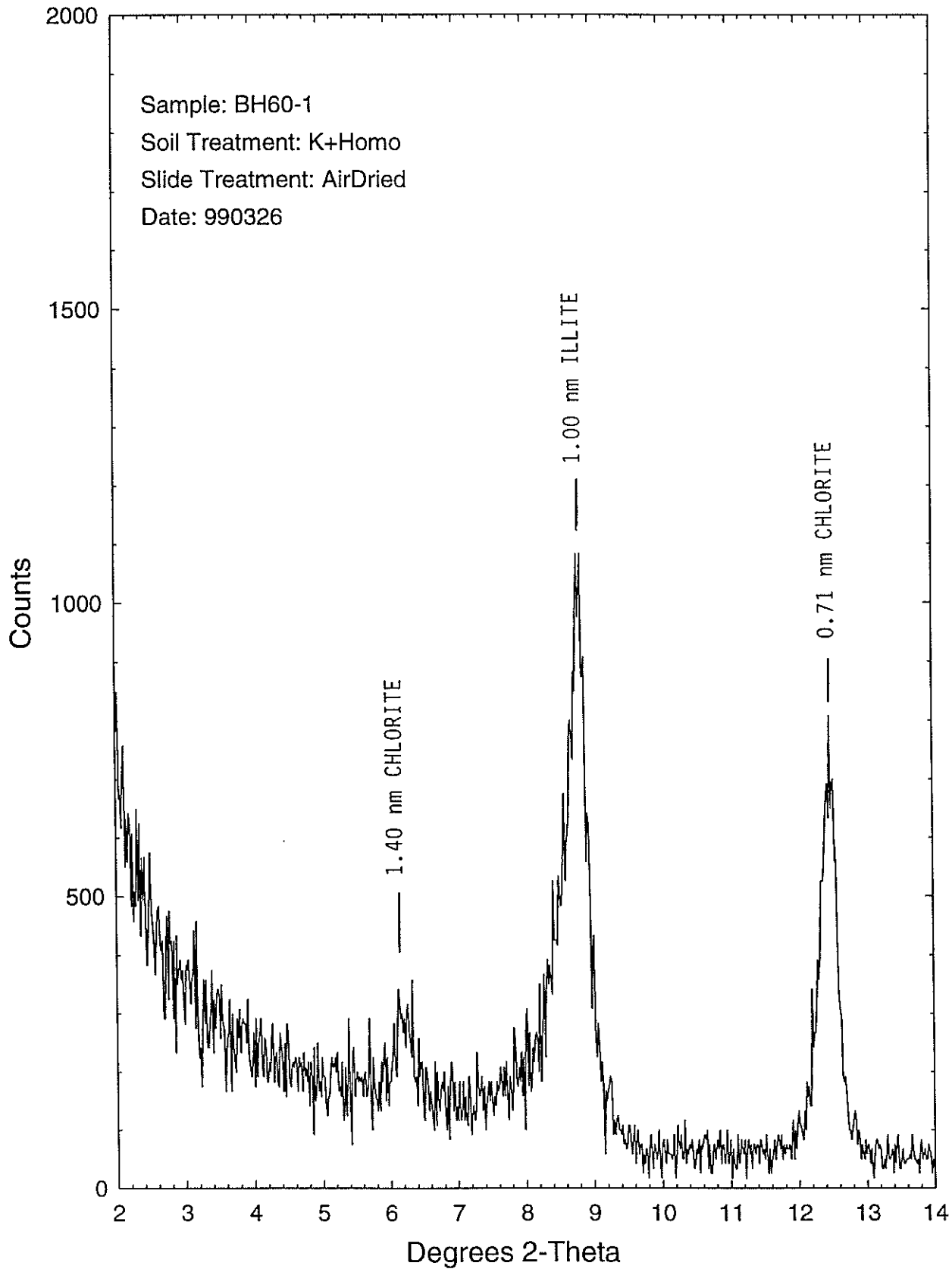


Figure 11 X-RAY DIFFRACTOGRAM OF SOIL BH60-I,
ORIENTED, K-SATURATED, AIR-DRIED, <2μm FINES

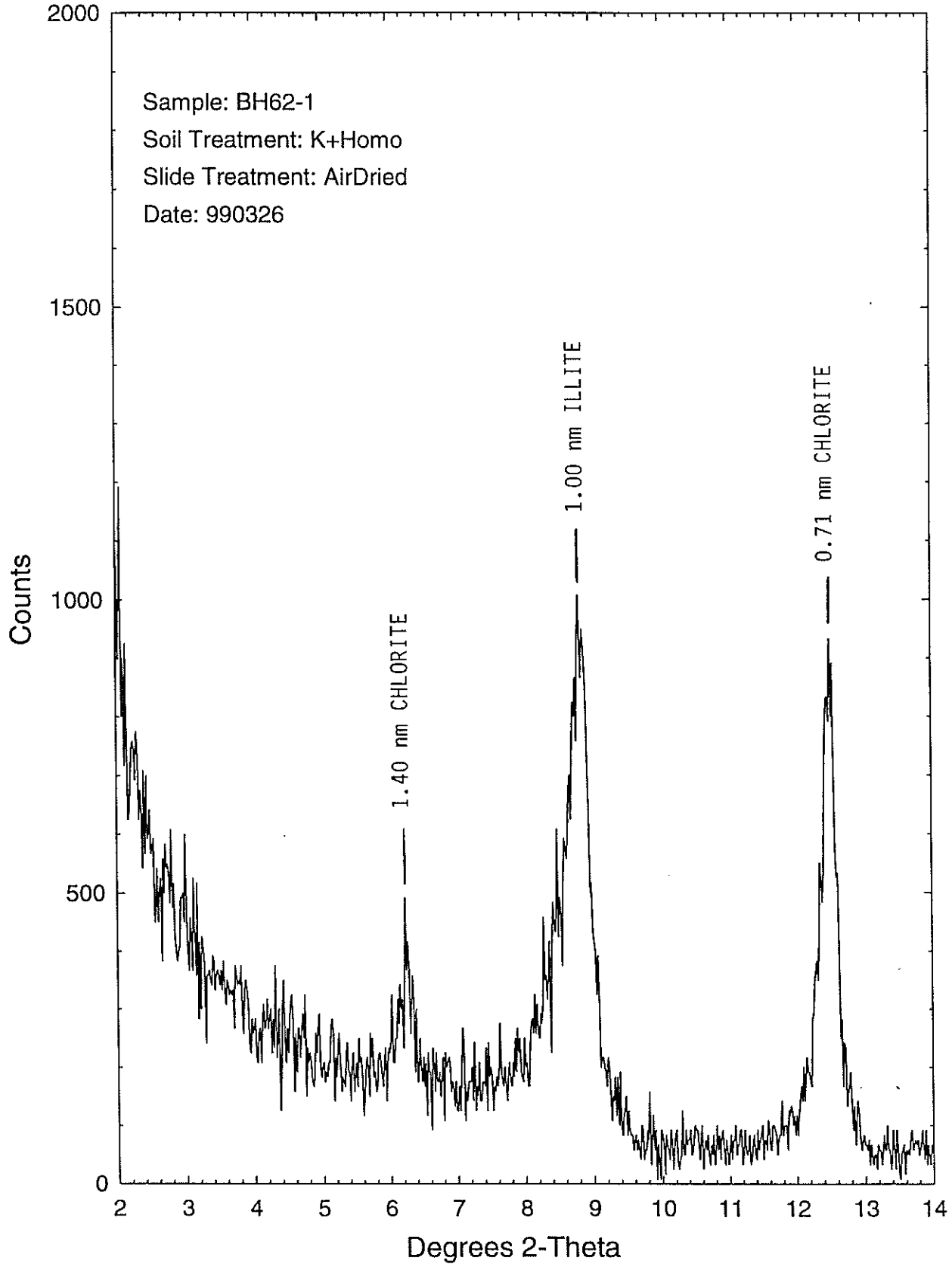


Figure 12 X-RAY DIFFRACTOGRAM OF SOIL BH62-I
ORIENTED, K-SATURATED, AIR-DRIED <2μm FINES

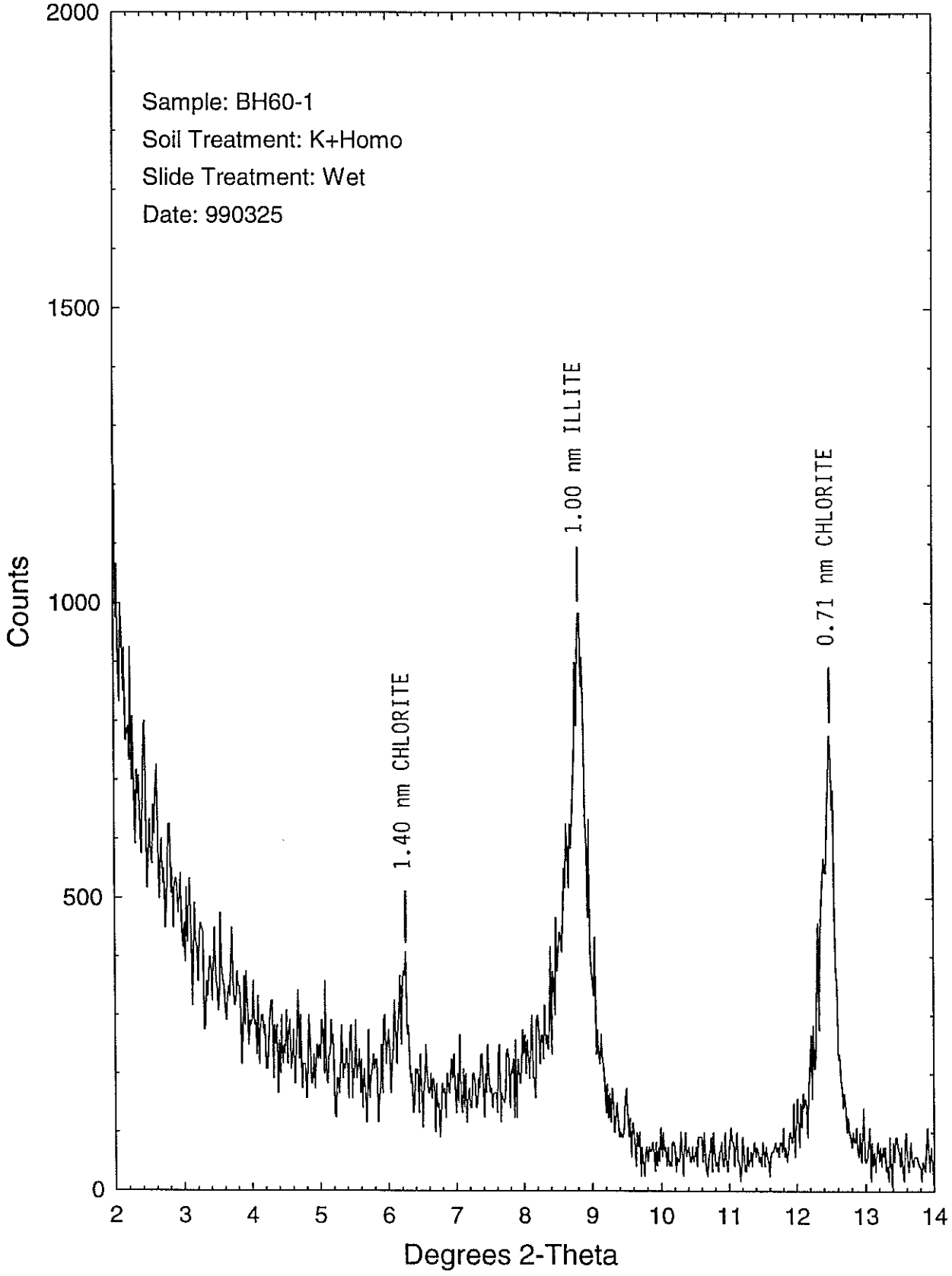


Figure 13 X-RAY DIFFRACTOGRAM OF SOIL BH60-I
ORIENTED, K-SATURATED, WATER-WET <2μm FINES

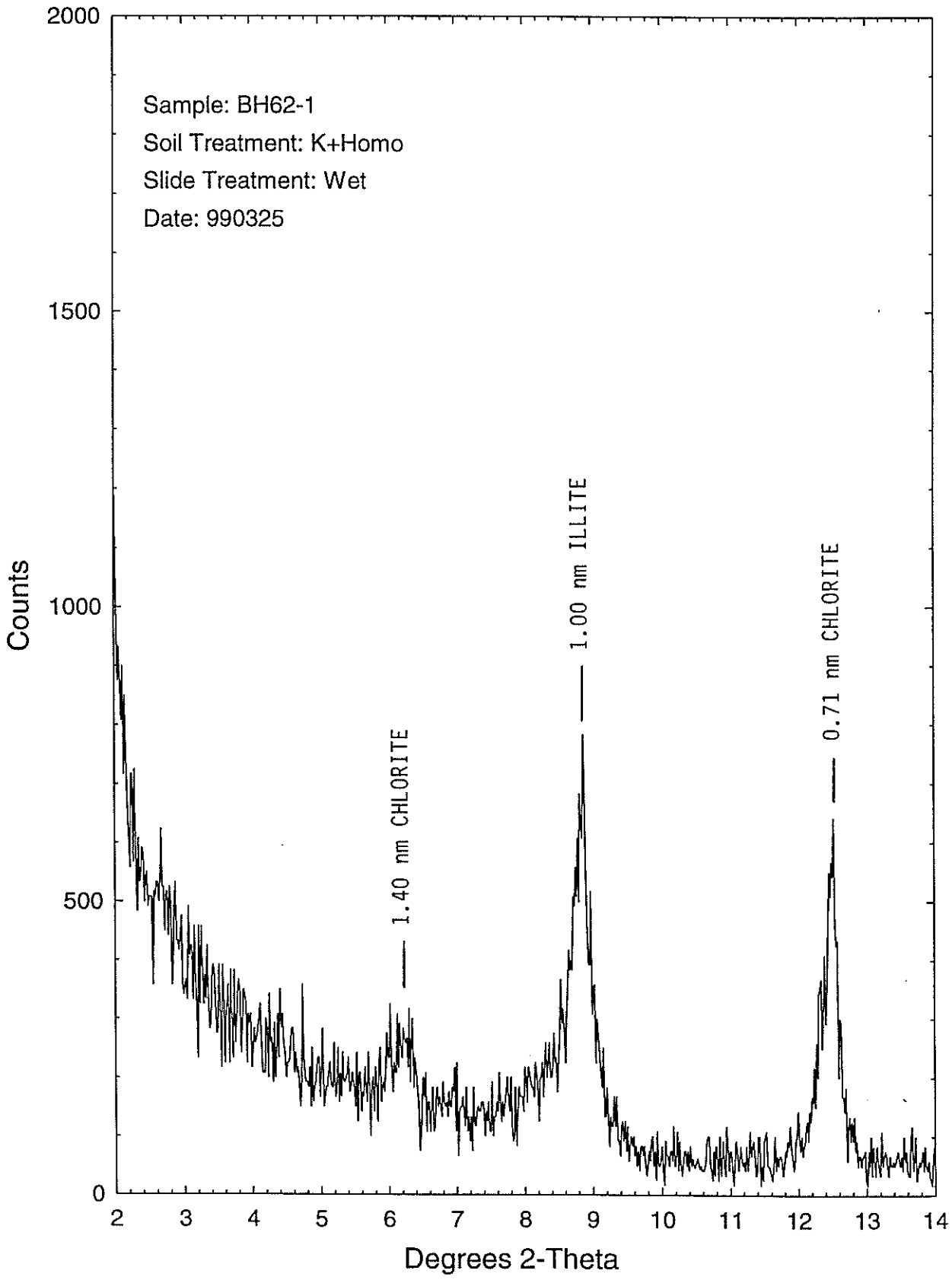


Figure 14 X-RAY DIFFRACTOGRAM OF SOIL BH62-I
ORIENTED, K-SATURATED, WATER-WET, <2μm FINES

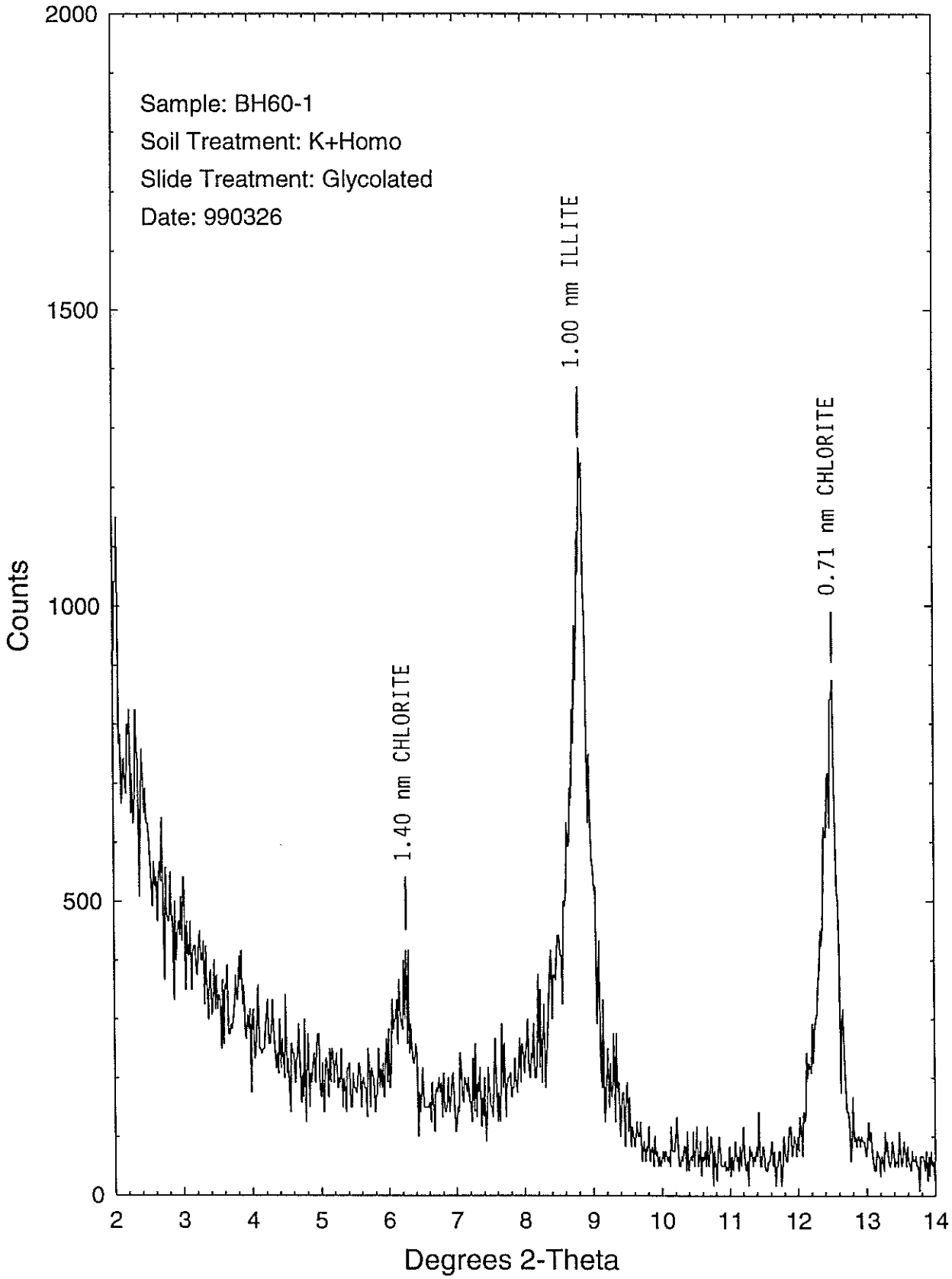


Figure 15 X-RAY DIFFRACTOGRAM OF SOIL BH60-I
ORIENTED, K-SATURATED, GLYCOLATED <2μm FINES

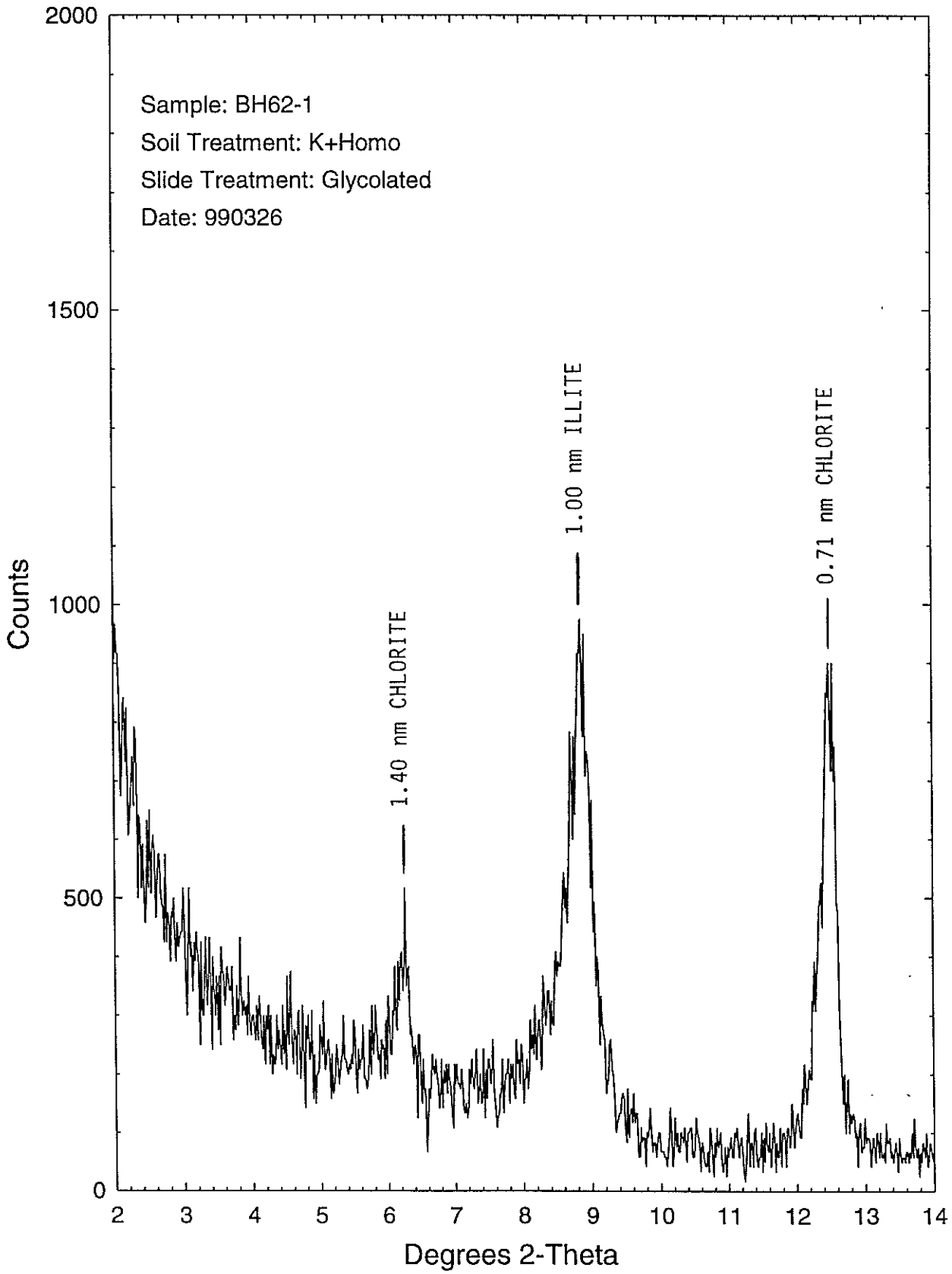


Figure 16 X-RAY DIFFRACTOGRAM OF SOIL BH62-I
ORIENTED, K-SATURATED, GLYCOLATED <2μm FINES

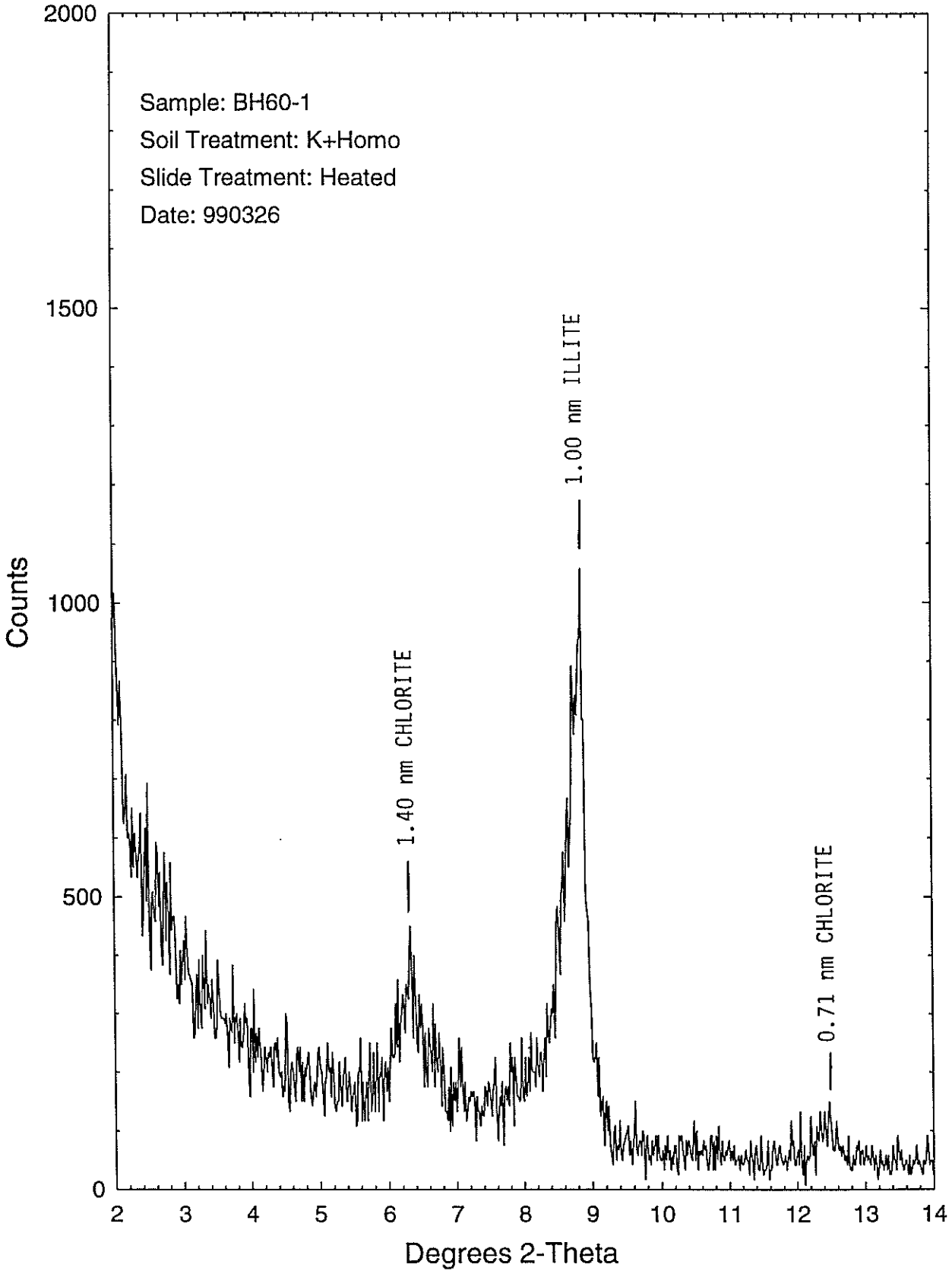


Figure 17 X-RAY DIFFRACTOGRAM OF SOIL BH60-I, ORIENTED, K-SATURATED <2μm FINES, HEATED AT 550 ^{O}C FOR 30 MINS

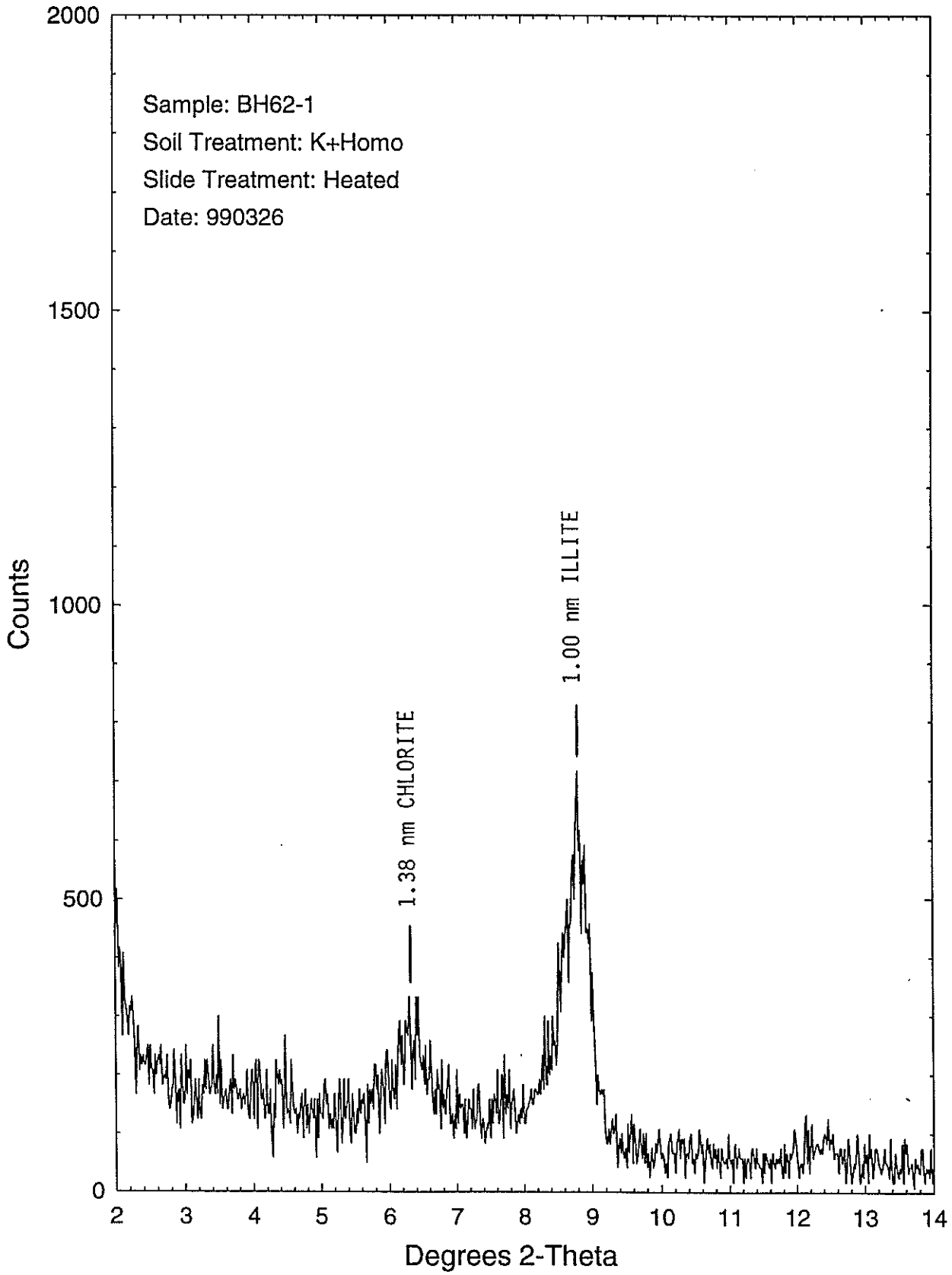


Figure 18 X-RAY DIFFRACTOGRAM OF SOIL BH62-I, ORIENTED, K-SATURATED <2μm FINES, HEATED AT 550 ^{O}C FOR 30 MINS

B

Leachate and Groundwater Liquid Level Data

Table B-1
Leachate Level Elevations - Poplar System
Twin Creeks Environmental Centre

Date	South Cell			West Central Fill Area		
	OW22-9	OW22A-10	OW53-10	OW51-10	OW51A-15	SUMP
T.O.P	243.98	243.78	244.49	246.07^	250.45	248.90
23-Mar-84						
14-Apr-84						
3-May-84	233.65					
29-Jun-84						
27-Jul-84	235.54					
10-Sep-84	235.42					
19-Oct-84	235.55					
27-Nov-84	235.67					
17-Dec-84	235.76					
1-Feb-85	236.13					
27-Feb-85	236.19					
26-Mar-85	236.22					
26-Apr-85	236.46					
21-May-85	236.15					
15-Jul-85	235.64					
10-Sep-85	235.75					
13-Mar-86	236.21					
8-Apr-86						
5-Sep-86	236.49					
25-Feb-87	236.67					
25-Mar-87	236.69					
29-Apr-87	236.72					
22-May-87	236.73					
26-May-88	237.23					
18-Aug-88	237.47					
2-Nov-88	237.38					
6-Jun-89	237.41					
25-Oct-89	237.32					
14-May-90	237.45					
14-Aug-90	236.52					
6-Dec-90	237.58					
15-May-91	237.58					
21-Aug-91	237.66					
15-Nov-91	237.58					
25-May-92	237.56					
10-Nov-92	237.67					
19-Apr-93						
13-Jun-93	237.52					
14-Dec-93	237.67					
10-May-94	237.64					
13-Dec-94	237.65					
9-Jun-95	237.87					
6-Nov-95	237.74					
6-May-96	237.85		236.50	235.53		
9-Dec-96			236.14	235.44		

NOTES: 1) Blank denotes data not available.
2) Elevations in metres above sea level.
3) + denotes elevation reported is below elevation of well screen.
4) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.
5) ^ denotes pre 2004 T.O.P. elevation.
6) * elevation determined to be anomalous
7) T.O.P. elevations adjusted based on updated elevation survey in 2016

Table B-1
Leachate Level Elevations - Poplar System
Twin Creeks Environmental Centre

Date	South Cell			West Central Fill Area		
	OW22-9	OW22A-10	OW53-10	OW51-10	OW51A-15	SUMP
T.O.P	**243.98**	**243.78**	**244.49**	**246.07^**	**250.45**	**248.90**
12-May-97	238.48		236.31	235.44		
4-Dec-97	238.54		236.24	235.45		
12-May-98	238.89		236.37	235.41		
18-Dec-98						
13-Jan-99	238.93		236.28			
30-Mar-99						
1-Jun-99						
10-Nov-99			236.51			
21-Dec-99			236.63			
28-Mar-00			236.8			
19-Jun-00						
28-Nov-00			236.76			
20-Jun-01	239.94					
26-Nov-01	240.11					
18-Apr-02	238.50					
21-May-02	238.35		237.27			239.16
5-Jun-02	238.36		237.39			239.37
22-Oct-02	237.98		237.10			239.48
16-May-03	238.05		237.36			240.10
12-Nov-03	238.00		237.59			239.86
25-May-04		236.72	237.78			239.68
26-Nov-04		237.45	236.12			
6-Apr-05						239.40
12-May-05		237.63	237.54			239.27
29-Nov-05		237.64	237.68		235.97	239.40
27-Mar-06						239.15
17-May-06		238.04	237.75		236.16	239.45
22-Nov-06		237.86	237.58		236.40	239.38
4-Apr-07						239.54
3-May-07		237.84	237.75		235.98	239.15
15-Nov-07		237.96	237.72		235.78	239.31
15-May-08		237.69	237.95		235.93	239.51
4-Nov-08		237.38	237.80		237.98*	239.47
12-May-09		237.80	237.95		236.18	239.40
16-Nov-09		237.97	237.77		236.03	239.15
14-May-10		237.61	237.67		235.85	239.59
2-Nov-10		237.76	237.78		235.90	239.63
9-May-11		238.05	238.49		236.03	240.20
1-Nov-11		238.08	238.26		235.91	238.83
7-May-12		238.27	238.26		236.07	239.89
5-Nov-12		237.73	238.42		235.98	238.69
6-May-13		238.18	238.75		236.05	240.91
4-Nov-13		237.84	238.57		236.47	239.03
5-May-14		238.45	239.11		236.71	240.86
23-May-14		237.72	238.94		236.50	238.99
17-Nov-14		237.77	238.39		236.32	238.65
11-May-15		238.06	238.23		236.23	238.34
10-Nov-15		238.14	238.20		236.23	237.31
24-May-16		237.96	238.27		236.03	241.40
14-Nov-16		237.84	238.02		236.05	240.26
15-May-17		237.75	238.10		236.02	242.01
6-Nov-17		237.65	237.80		236.27	242.05

NOTES: 1) Blank denotes data not available.
2) Elevations in metres above sea level.
3) + denotes elevation reported is below elevation of well screen.
4) T.O.P. denotes 'top of pipe'. Elevations as of July 2016 for active wells.
5) ^ denotes pre 2004 T.O.P. elevation.
6) * elevation determined to be anomalous

Table B-1
Leachate Level Elevations - Poplar System
Twin Creeks Environmental Centre

Date	South Cell			West Central Fill Area		
	OW22-9	OW22A-10	OW53-10	OW51-10	OW51A-15	SUMP
T.O.P	**243.98**	**243.78**	**244.49**	**246.07^**	**250.45**	**248.90**
7-May-18		237.97	238.22		236.05	243.26
5-Nov-18		238.15	238.27		236.04	244.12
13-May-19		238.60	238.52		236.26	245.14
4-Nov-19		238.24	238.28		236.20	242.54
4-May-20		238.40	238.32		236.14	240.37
2-Nov-20		238.11	238.09		236.34	241.03
17-May-21		238.33	238.31		236.47	241.92
1-Nov-21		238.23	238.28		236.29	242.66
2-May-22		238.43	238.53		236.30	242.43
1-Nov-22		238.47	238.36		236.58	242.56

NOTES: 1) Blank denotes data not available.
2) Elevations in metres above sea level.
3) + denotes elevation reported is below elevation of well screen.
4) T.O.P. denotes 'top of pipe'. Elevations as of July 2016 for active wells.
5) ^ denotes pre 2004 T.O.P. elevation.
6) * elevation determined to be anomalous
7) T.O.P. elevations adjusted based on updated elevation survey in 2016

Table B-2
Leachate Management System Liquid Levels - Existing Site
Twin Creeks Environmental Centre

Date	MH3SA	MH3SB	MH3SC	MH3SD	MH3SE	MH3SF	MH4A	MH4B	MH5A	MH5B	MH6A	MH6B
T.O.P.	**241.27**	**241.36**	**239.80**	**239.90**	**249.99**	**249.02**	**241.07**	**245.64**	**244.87**	**242.29**	**243.90**	**241.75**
Approximate Invert	**237.20**	**237.15**	**235.80**	**235.75**	**236.45**	**236.50**					**235.29**	**235.20**
21-May-02	Dry	Dry	236.56	236.54	237.81	239.50	239.46	238.78	240.23	240.22	237.57	237.73
15-Jun-02	Dry	Dry	236.49	236.46	237.71	239.13	238.15	238.75	238.78	238.71	237.76	237.90
22-Oct-02	Dry	Dry	236.11	236.22	237.57	238.82	238.42	238.93	239.66	239.66	238.47	238.55
13-May-03	Dry	Dry	236.92	237.03	238.61	241.87	239.65	239.02	240.15	240.27	238.48	238.57
12-Nov-03	237.59	Dry	236.78	236.79	239.66	242.40	238.56	238.85	240.50	241.04	239.71	239.67
25-May-04	238.34	Dry	236.75	236.76			239.86	238.89	240.59	241.06	239.60	239.56
26-Nov-04	238.20	238.04	235.89	235.44	239.85	242.34	238.36	238.87	240.75	240.81	237.93	237.88
6-Apr-05				236.93			239.19			240.84		238.86
12-May-05	239.14	238.73	236.82	236.83	241.85	244.56	239.15	239.15	241.09	240.90	237.78	237.74
29-Nov-05	Dry	Dry	236.68	236.60	246.08	246.80	237.59	239.19	239.24	239.29		240.26
27-Mar-06			236.75				238.26			239.17		238.04
17-May-06	237.65	Dry	236.35	236.36	242.00	245.02	238.66	239.68	240.05	240.12	237.75	237.69
22-Nov-06	237.47	Dry	236.90	237.03	242.46	244.99	238.19	240.08	239.17	239.25	237.37	237.51
4-Apr-07				236.90			238.89			240.71		237.85
3-May-07	237.82	238.09	236.64	236.75	242.69	244.93	238.68	238.63	240.89		237.70	237.84
15-Nov-07	237.54	<237.18	236.90	236.93	241.07	243.17	237.71	238.98	237.52	237.57	238.80	238.76
15-May-08	237.87	237.85	236.65	236.77	242.61	244.2	238.51	240.29	239.12	239.16	237.99	237.99
4-Nov-08	237.63	237.73	236.86	237.82	242.49	245.14	237.52	238.40	236.38	236.61	236.32	237.36
27-Nov-08												
12-May-09	238.47	237.92	236.56	236.72	240.44	243.79	237.87	240.62	238.29	238.31	237.90	237.86
16-Nov-09	237.83	Dry	236.07	236.07	241.34	243.39	236.34	240.61	236.24	236.32	237.24	237.27
14-May-10	237.73	Dry	233.17	Dry		243.38	238.06	240.33	237.26	237.12	237.03	237.12
2-Nov-10	237.67	Dry	233.38	235.59	240.85	243.20	238.06	240.39	239.27	239.29	237.37	237.39
9-May-11	237.96	237.41	234.43	235.64	242.79	244.89	238.29	241.56	236.29	236.42	237.51	237.60
1-Nov-11	237.86	Dry	234.83	234.97	242.38	244.45	236.52	237.12	238.39	238.37	237.15	237.14
7-May-12	238.19	237.41	233.09	Dry	242.43	244.31	238.38	237.57	237.39	237.38	237.16	237.18
5-Nov-12	237.95	237.19	234.83	Dry	241.86	243.53	238.19	237.57	238.88	239.02	237.81	237.80
6-May-13	238.88	238.67	232.95	Dry	243.04	245.01	238.54	238.35	239.77	239.79	237.71	237.71
4-Nov-13	237.99	237.16	234.79	235.29	242.68	242.72	238.37	237.66	238.97	239.17	237.98	238.27
5-May-14	238.89	238.76	233.00	<235.32	242.97	245.06	238.60	238.38	239.72	239.74	237.70	237.70
23-May-14	237.91	237.24	234.61	235.31	242.70	242.82	238.24	237.73	239.03	239.14	237.86	237.85
17-Nov-14	238.18	<237.29	234.21	<233.65	243.58	243.08	237.27	238.80	236.27	236.32	236.41	235.38
11-May-15	238.60	237.72	233.90	<234.67	244.08	241.34	237.99	240.32	235.99	235.98	236.59	236.49
10-Nov-15	238.05	237.05	233.64	<234.67	242.82	242.97	237.71	238.74*	236.28	236.21	236.04	235.95
24-May-16	238.30	237.05	233.72	<234.69	243.19	244.04	238.39	239.61	238.15	238.14	236.38	236.38
14-Nov-16	238.78	237.44	233.72	<234.69	242.78	242.88	237.64	239.66	237.71	237.61	237.10	236.99
15-May-17	238.99	237.32	234.46	234.36	243.35	244.04	238.38	239.63	239.70	239.69	235.91	235.89
6-Nov-17	238.56	238.00	236.01	234.36	243.99	242.01	235.92	239.58	236.92	236.92	236.69	236.68
7-May-18	239.53	239.32	236.03	235.74	243.98	244.04	234.58	238.91	236.23	236.18	236.98	236.94
5-Nov-18	240.25	240.30	234.83	234.36	243.89	243.92	234.48	239.74	239.47	239.43	236.82	236.82
13-May-19	239.01	239.60	237.44	237.11	243.89	243.92	238.49	239.62	239.74	239.63	240.11	240.00
4-Nov-19	239.00	238.57	237.40	238.11	243.90	243.92	238.79	238.93	236.11	236.06	240.33	240.30
4-May-20	237.93	238.06	235.54	235.51	243.94	243.99	239.24	239.32	239.68	239.63	238.59	238.56
2-Nov-20	238.67	237.99	233.69	235.55	243.43	243.66	235.89	239.43	236.11	236.00	237.92	237.83
17-May-21	239.43	239.51	236.79	236.49	243.88	243.90	238.59	239.44	238.50	238.46	238.50	238.47
1-Nov-21	239.74	239.58	236.82	237.97	243.88	243.92	239.92	239.95	239.95	239.91	240.44	240.45
2-May-22	240.09	239.99	235.57	235.37	244.01	244.05	238.50	239.46	239.73	239.62	240.16	240.30
1-Nov-22	238.77	238.52	237.15	236.84	243.65	243.70	238.38	239.37	236.79	236.71	240.23	240.23

Notes: 1) * denotes liquid level at MH4B was collected on November 5, 2015.
2) T.O.P. denotes 'top of pipe'.
3) Select historical T.O.P. elevations adjusted based on updated elevation survey in 2016
4) + denotes elevation interpreted to be anomolous

Table B-2
Leachate Management System Liquid Levels - Existing Site
Twin Creeks Environmental Centre

Date	MH7A	MH7B	MH8A	MH8B	MH9A	MH9B	MH10	MH11A	MH11B	MH12A	MH12B
T.O.P.	245.68	243.23	243.13	245.89	246.45	242.52	244.43	246.35	242.92	244.39	242.37
Approximate Invert											
21-May-02											
15-Jun-02											
22-Oct-02											
13-May-03											
12-Nov-03											
25-May-04											
26-Nov-04	239.24			-							
6-Apr-05	238.93			-							
12-May-05	238.35	237.80	237.81	238.53							
29-Nov-05	237.64	237.66	237.70	236.90							
27-Mar-06		238.58	237.71								
17-May-06	238.88	238.94	238.36	238.19							
22-Nov-06	236.91	237.53	239.06	238.91							
4-Apr-07				239.03							
3-May-07	238.19	238.65	239.90	239.72							
15-Nov-07	239.03	239.54	237.42	238.24							
15-May-08	239.21	239.84	239.23	239.09	240.72	240.75		241.32	241.22		
4-Nov-08	239.04	239.62	237.34	237.13	240.87	240.00		241.14	239.54		
27-Nov-08											
12-May-09	239.09	239.70	237.23	237.37	240.72	240.75		240.74	240.78		
16-Nov-09	237.82	237.82	236.91	236.94	239.77	239.77		240.64	240.58		
14-May-10	238.57	238.55	237.07	237.08	239.45	239.81		240.51	240.67		
2-Nov-10	238.91	238.91	237.22	237.14	240.10	240.11	237.53	240.08	240.11	237.54	237.48
9-May-11	237.89	238.89	238.30	238.33	239.86	239.82	239.46	238.73	239.58	239.48	239.42
1-Nov-11	238.48	238.48	238.74	238.66	239.66	239.66	237.90	239.32	239.35	237.93	237.83
7-May-12	239.01	239.01	239.64	239.55	238.66	238.66	239.30	239.89	239.92	239.32	239.25
5-Nov-12	238.61	238.61	237.19	237.12	238.22	238.22	236.81	239.56	239.59	236.82	236.75
6-May-13	236.86	236.95	239.29	239.30	238.46	238.45	*237.20*	239.71	239.69	238.17	238.21
4-Nov-13	238.77	238.70	237.42	237.31	238.44	238.37	237.13	239.79	239.92	237.08	237.19
5-May-14	236.93	236.84	239.35	239.36	238.53	238.53	237.26	239.61	239.65	238.11	238.23
23-May-14	237.23	237.08	237.56	237.46	238.46	238.40	237.17	239.82	239.76	237.13	237.24
17-Nov-14	238.70	238.69	236.96	237.55	237.95	237.96	237.16	239.15	239.15	237.19	237.14
11-May-15	238.81	238.79	239.34	237.19	238.66	238.59	237.62	240.12	240.16	237.57	237.59
10-Nov-15	237.93	237.94	239.51	239.41	238.37	238.35	238.22	239.44	239.36	238.22	238.23
24-May-16	237.76	238.27	238.35	238.34	238.25	238.27	240.25	240.90	240.80	240.24	240.22
14-Nov-16	238.88	238.90	239.14	239.03	238.59	238.58	240.81	239.17	238.09	240.81	240.78
15-May-17	238.98	238.99	239.53	239.42	239.22	239.18	241.00	240.64	240.56	241.00	241.01
6-Nov-17	237.90	237.89	239.31	239.01	238.78	237.77	238.20	238.84	238.97	238.19	238.18
7-May-18	238.20	238.19	238.96	239.27	237.64	237.64	240.20	240.47	240.60	240.19	240.18
5-Nov-18	237.87	237.88	239.00	239.31	238.12	238.12	240.93	240.82	240.75	240.93	240.92
13-May-19	239.59	239.58	240.55	240.68	240.06	240.03	241.01	241.11	241.01	241.09	241.00
4-Nov-19	237.02	237.03	237.61	237.92	238.52	238.51	236.46	238.76	238.91	236.43	236.44
4-May-20	238.34	238.35	240.64	240.93	239.40	239.40	237.11	239.29	239.11	237.12	237.11
2-Nov-20	236.56	236.57	237.61	237.83	237.71	237.72	236.27	238.39	238.30	236.27	236.23
17-May-21	237.92	237.92	239.66	239.97	239.17	239.08	237.13	240.15	240.27	237.12	237.12
1-Nov-21	237.08	237.11	238.87	239.05	238.78	238.79	236.75	238.77	238.78	236.74	236.75
2-May-22	237.15	237.03	239.03	239.22	239.24	239.06	236.68	238.73	238.69	236.69	236.55
1-Nov-22	236.60	236.48	238.62	238.90	237.75	237.73	236.81	239.81	240.12	236.83	236.86

Notes: 1) * denotes liquid level at MH4B was collected on November 5, 2015.
2) T.O.P. denotes 'top of pipe'.
3) Select historical T.O.P. elevations adjusted based on updated elevation survey in 2016
4) + denotes elevation interpreted to be anomolous

Table B-2
Leachate Management System Liquid Levels - Existing Site
Twin Creeks Environmental Centre

Date	MH16	MH17	MH18	LW1	LW2	LW3	LW4	LW5	LW6
T.O.P.	239.71	239.63	239.28	248.53	249.99	249.42	248.24	247.20	247.76
Approximate Invert	235.41	235.10	234.93						
21-May-02	237.06	237.06	237.05						
15-Jun-02	237.28	237.31	237.29						
22-Oct-02	237.05	237.04	237.03						
13-May-03	237.45	237.46	237.48						
12-Nov-03	237.22	237.26	237.24						
25-May-04	237.27	237.30	237.28						
26-Nov-04	237.50	237.06	236.60						
6-Apr-05			237.23						
12-May-05	237.28	237.30	237.28						
29-Nov-05	237.20	237.22	237.20						
27-Mar-06			237.45						
17-May-06	237.52	237.49	237.51						
22-Nov-06	237.62	237.63	237.60						
4-Apr-07			237.55						
3-May-07	237.10	237.09	237.11						
15-Nov-07	237.65	237.66	237.63						
15-May-08			237.28						
4-Nov-08			237.12						
27-Nov-08	236.95	236.97	236.96						
12-May-09	237.47	237.49	237.49						
16-Nov-09	237.65	237.71	237.69						
14-May-10	237.11	237.13	237.06						
2-Nov-10	237.54	237.54	237.49						
9-May-11	237.85	237.86	237.87						
1-Nov-11	237.83	237.85	237.77						
7-May-12	237.90	237.92	237.89						
5-Nov-12	237.54	237.54	237.49						
6-May-13	237.89	237.89	237.83						
4-Nov-13	237.66	237.66	237.40						
5-May-14	237.84	237.93	237.77						
23-May-14	237.63	237.60	237.46						
17-Nov-14	236.32	236.30	236.28						
11-May-15	237.77	237.78	237.79						
10-Nov-15	237.93	237.96	237.96						
24-May-16	237.31	237.29	237.31						
14-Nov-16	237.10	237.12	237.12						
15-May-17	237.13	237.14	237.14						
6-Nov-17	236.97	237.00	236.99						
7-May-18	237.56	237.56	237.56	244.95	242.44	242.34	240.44	239.82	237.89
5-Nov-18	237.77	237.77	237.76	244.87	241.94	242.15	240.29	239.78	238.02
13-May-19	238.28	238.30	238.28	245.81	242.98	242.49	240.54	240.05	238.64
4-Nov-19	237.71	237.72	237.71	244.42	241.87	243.21	240.49	239.85	239.68
4-May-20	238.02	238.04	238.01	245.01	243.10	242.81	240.96	239.96	238.60
2-Nov-20	237.70	237.69	237.70	244.19	241.99	242.94	241.39	239.68	237.89
17-May-21	237.82	237.83	237.81	244.93	243.10	243.01	241.90	239.77	238.63
1-Nov-21	238.01	238.00	237.99	244.45	242.72	243.14	242.01	239.58	238.74
2-May-22	238.03	238.09	237.92	244.55	242.43	243.25	242.27	240.03	239.01
1-Nov-22	238.07	238.07	238.08	244.42	242.38	243.29	242.10	239.78	238.85

Notes: 1) * denotes liquid level at MH4B was collected on November 5, 2015.
2) T.O.P. denotes 'top of pipe'.
3) Select historical T.O.P. elevations adjusted based on updated elevation survey in 2016
4) + denotes elevation interpreted to be anomolous

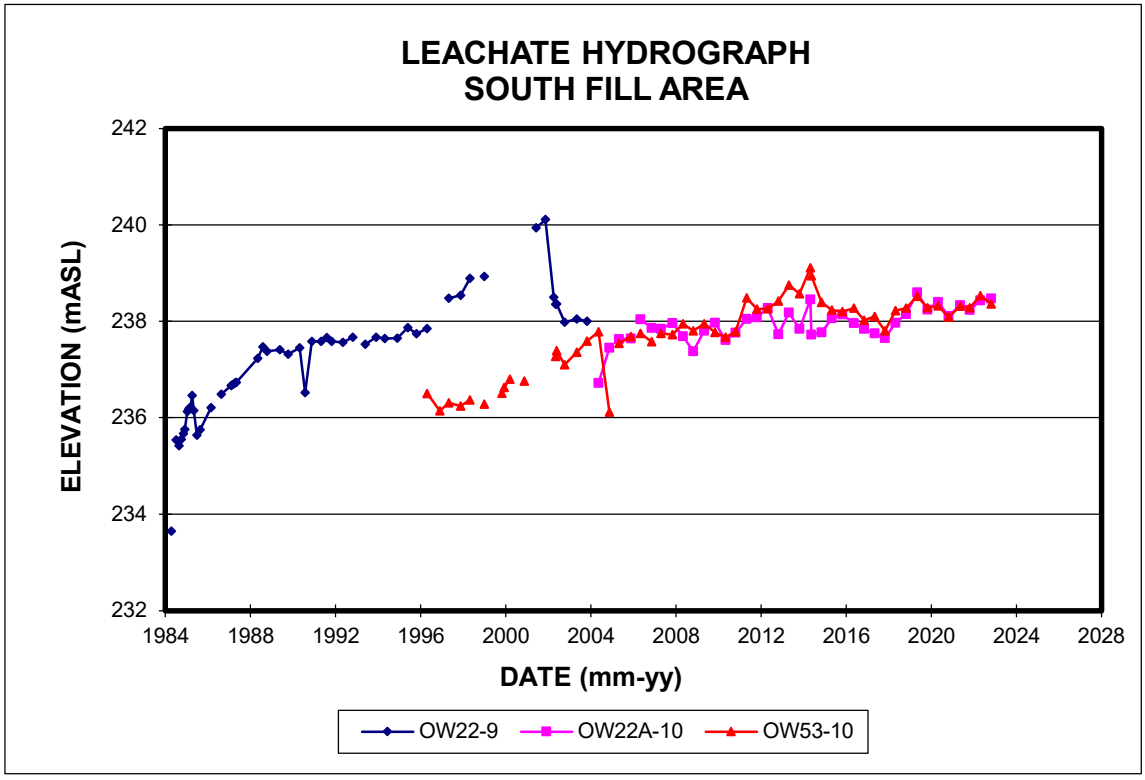


FIGURE B-1

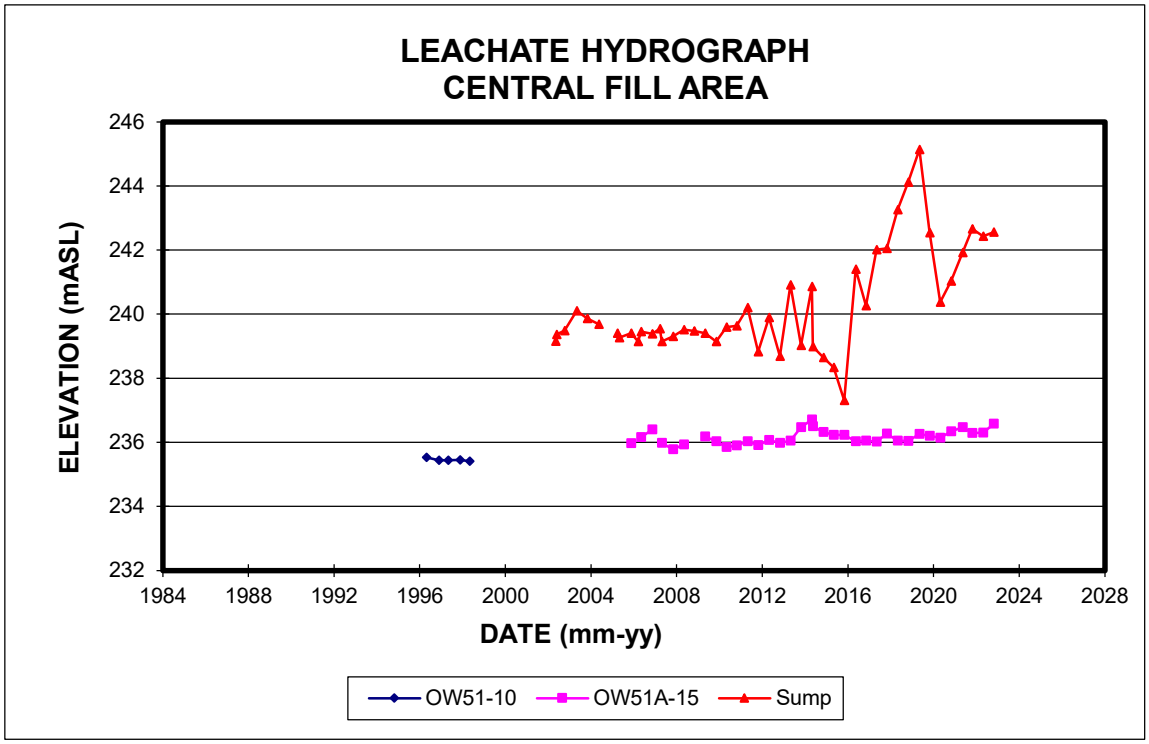


FIGURE B-2

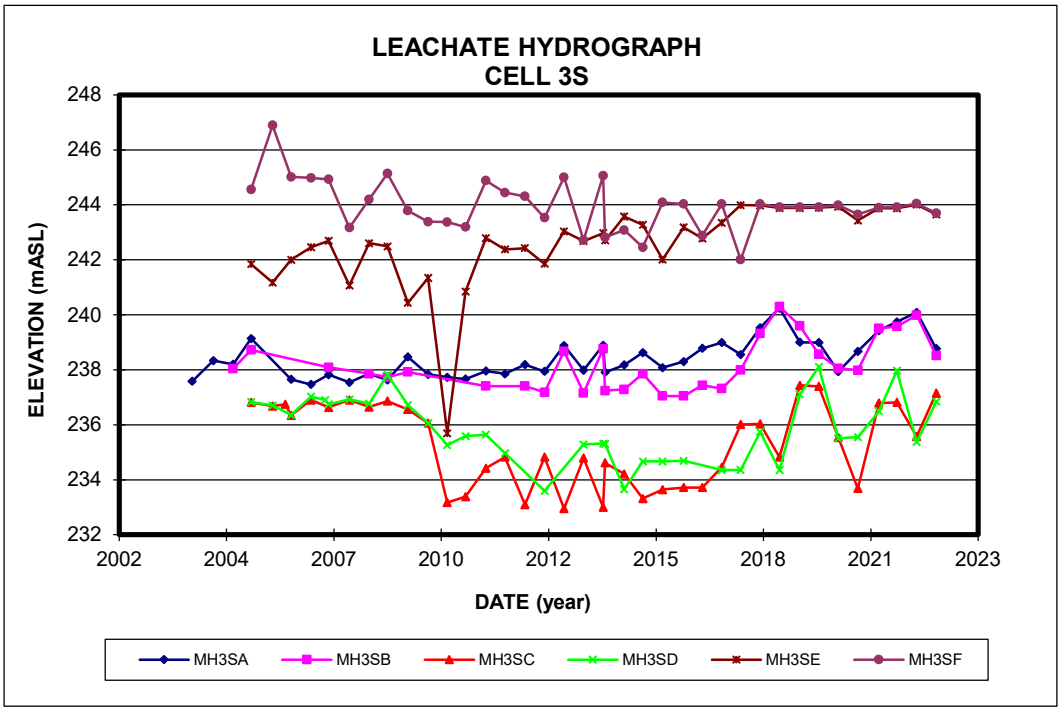


FIGURE B-3

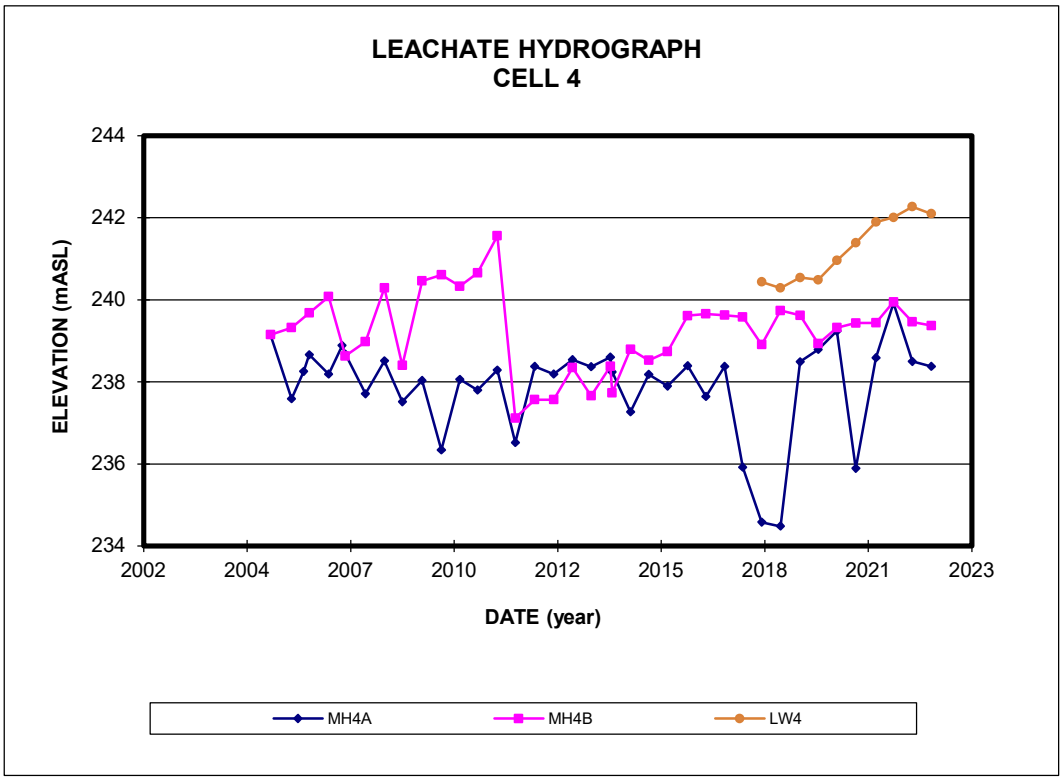


FIGURE B-4

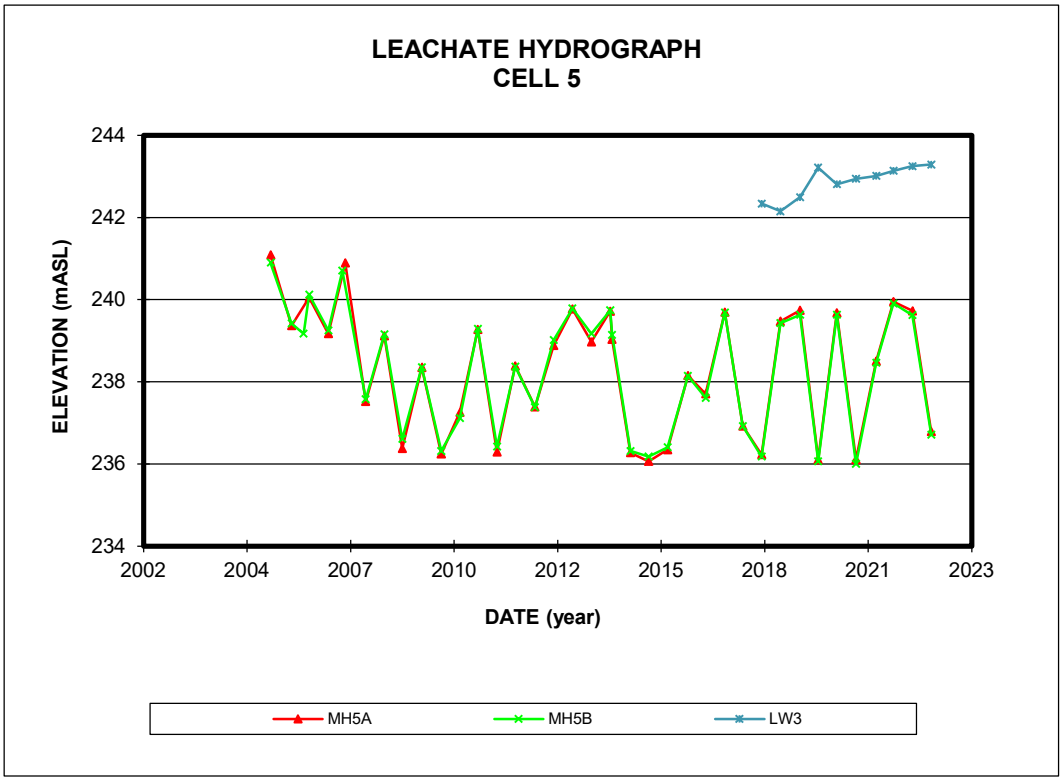


FIGURE B-5

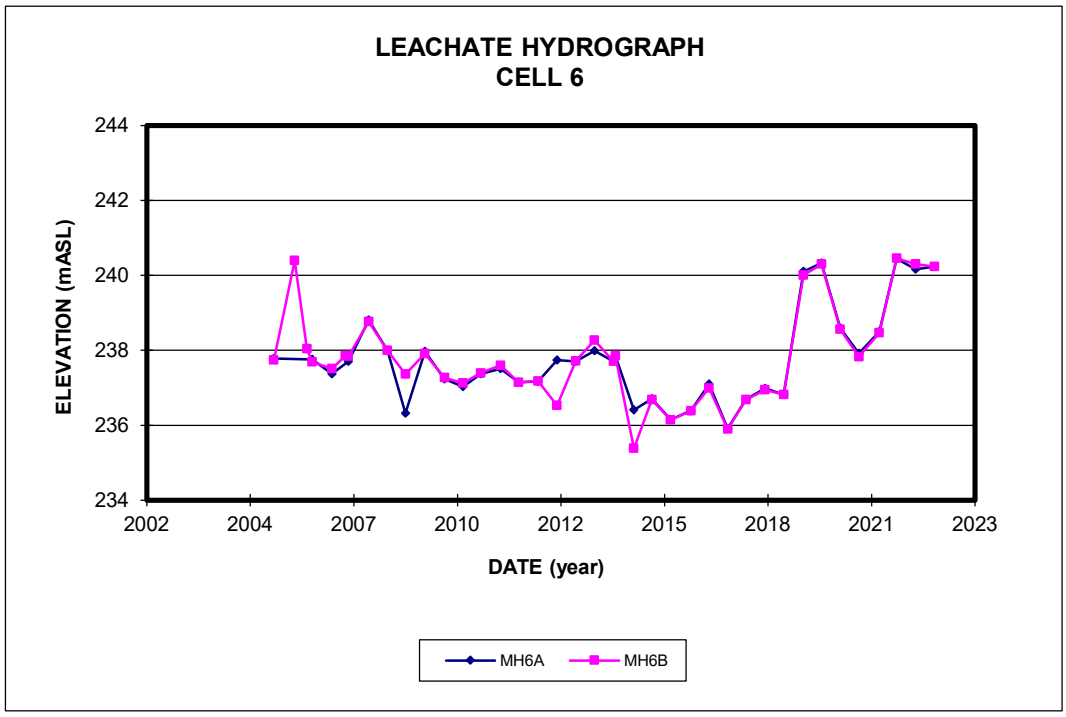


FIGURE B-6

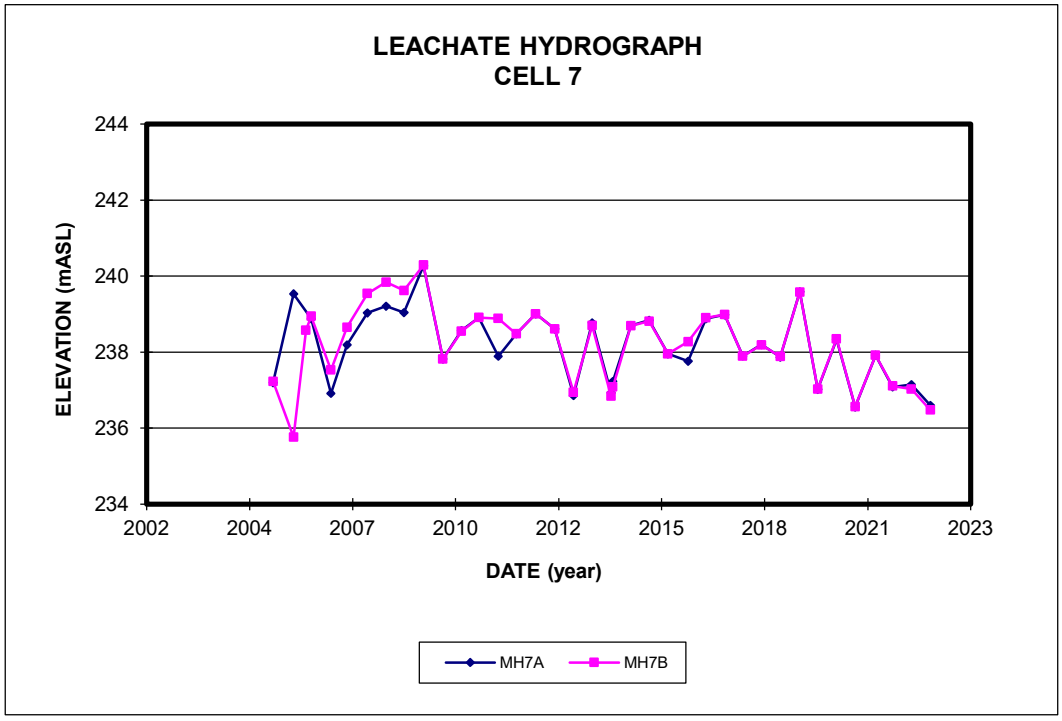


FIGURE B-7

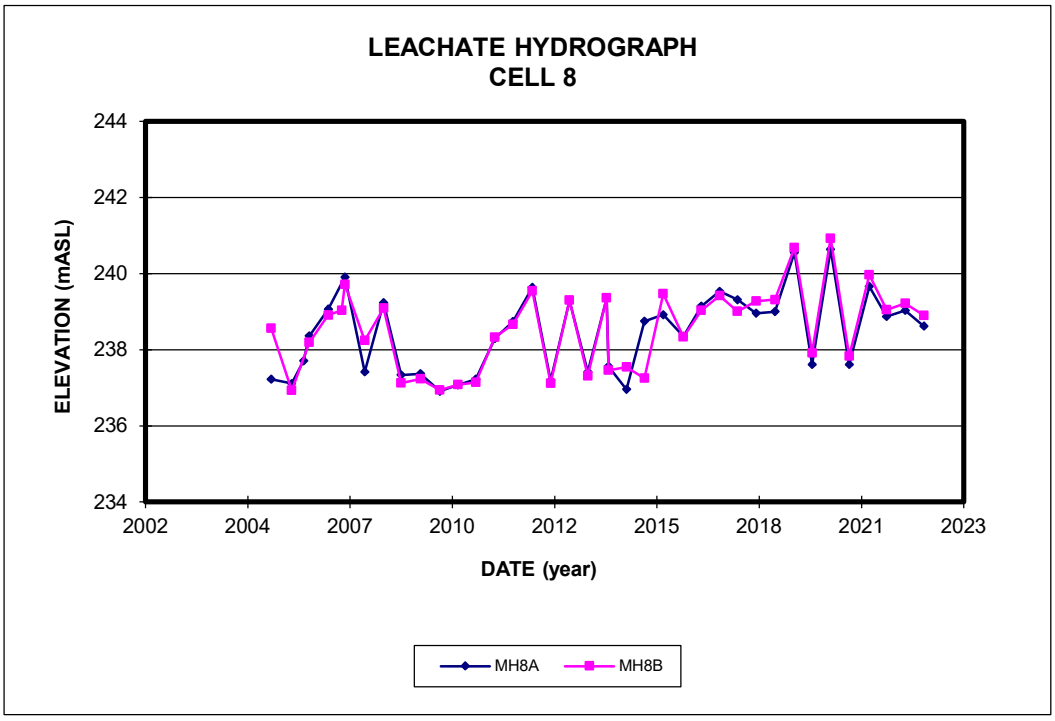


FIGURE B-8

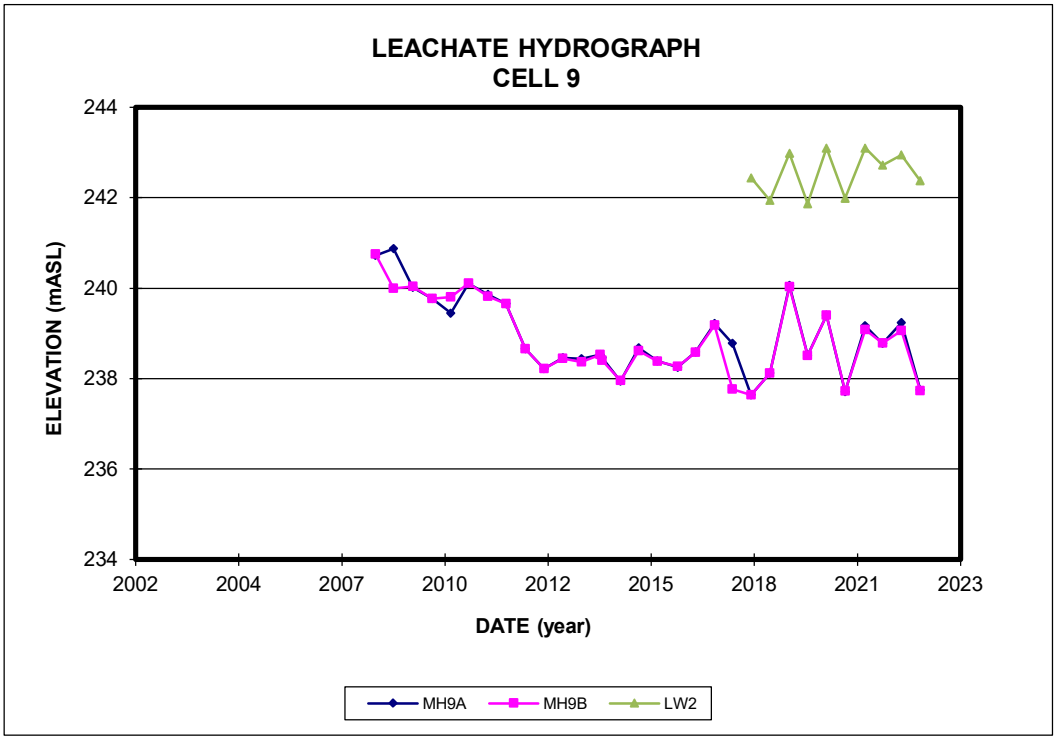


FIGURE B-9

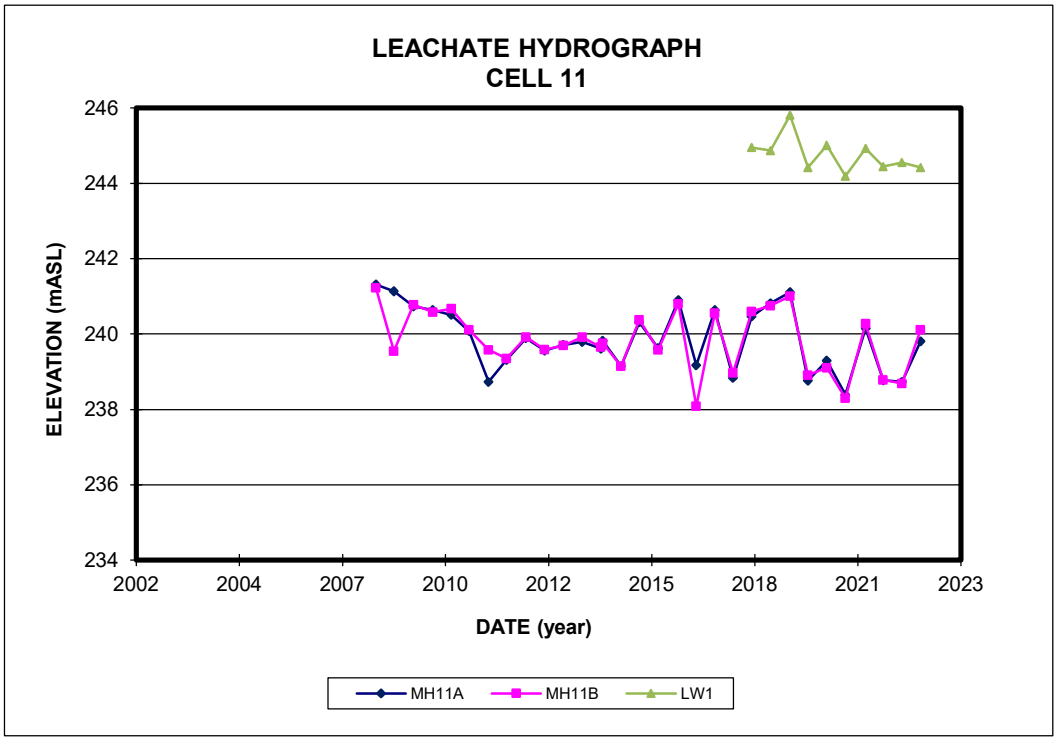


FIGURE B-10

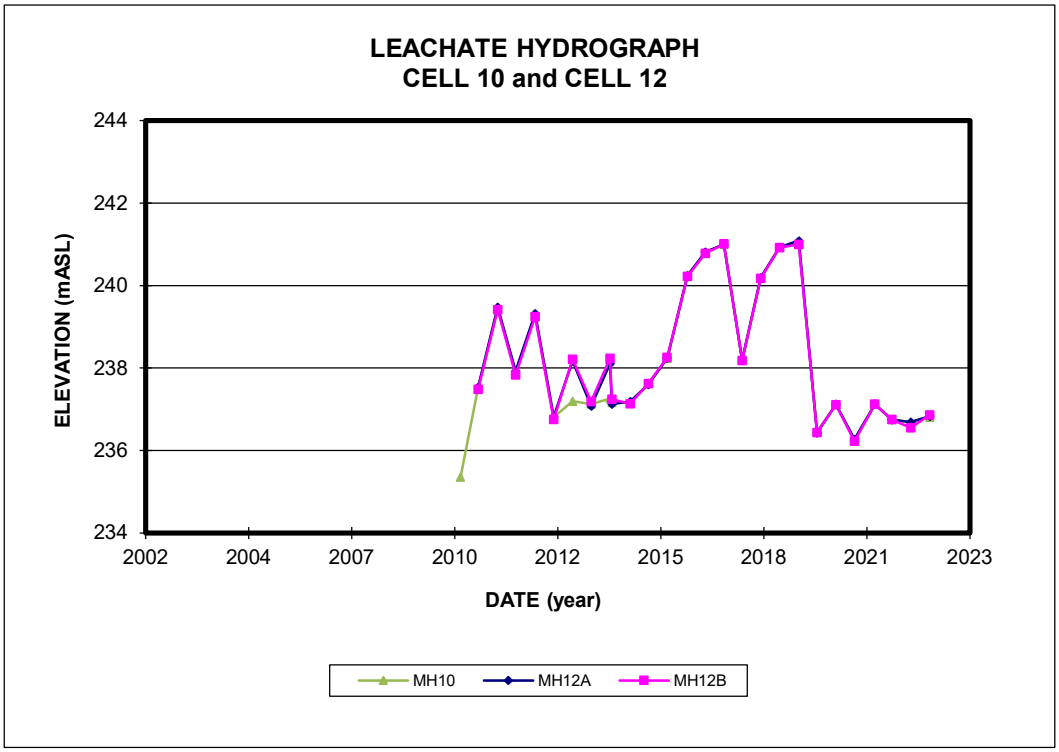


FIGURE B-11

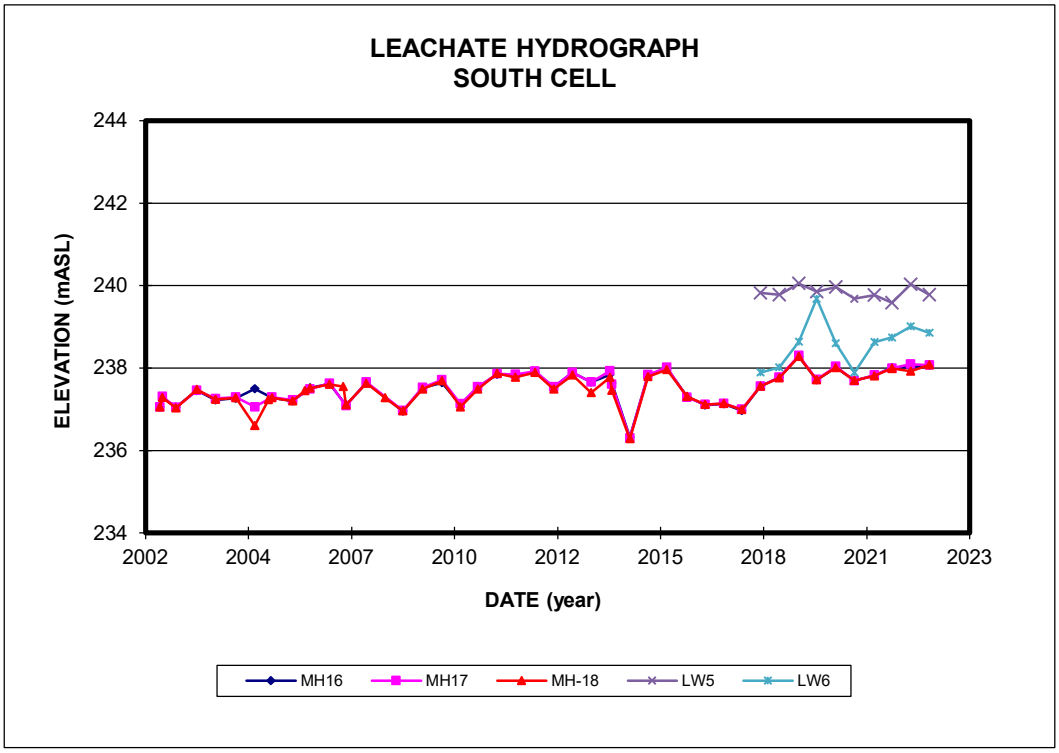


FIGURE B-12

Table B-3
Leachate Elevation Comparison
Twin Creeks Landfill - 2018

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
May 7, 2018							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	225.00	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	225.09	LOWER	LOWER

Notes: 1) Leachate elevations from May 7, 2018.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of monitoring.

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
November 5, 2018							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	226.68	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	226.47	LOWER	LOWER

Notes: 1) Leachate elevations from November 5, 2018.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of utilized for monitoring.

Table B-3
Leachate Elevation Comparison
Twin Creeks Environmental Centre - 2019

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
May 13, 2019							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	226.67	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	226.46	LOWER	LOWER

Notes: 1) Leachate elevations from May 13, 2019.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of monitoring.

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
November 4, 2019							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	229.01	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	227.66	LOWER	LOWER

Notes: 1) Leachate elevations from November 4, 2019.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of utilized for monitoring.

Table B-3
Leachate Elevation Comparison
Twin Creeks Environmental Centre - 2020

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
May 4, 2020							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	226.63	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	226.54	LOWER	LOWER
Expansion Site Cell 4							
PS5	*OW38-6*	240.73		*236.73*	226.34	LOWER	LOWER

Notes: 1) Leachate elevations from May 4, 2020.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of monitoring.
5) PS5 installed in October 2019.

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
November 2, 2020							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	226.64	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	226.75	LOWER	LOWER
Expansion Site Cell 4							
PS5	*OW38-6*	240.73		*236.73*	226.31	LOWER	LOWER

Notes: 1) Leachate elevations from November 2, 2020.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of utilized for monitoring.

Table B-3
Leachate Elevation Comparison
Twin Creeks Environmental Centre - 2021

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
May 17, 2021							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	226.86	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	226.62	LOWER	LOWER
Expansion Site Cell 4							
PS5	*OW38-6*	240.73		*236.73*	226.91	LOWER	LOWER

Notes: 1) Leachate elevations from May 17, 2021.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of monitoring.

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
November 1, 2021							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	226.88	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	232.99	LOWER	LOWER
Expansion Site Cell 4							
PS5	*OW38-6*	240.73		*236.73*	227.41	LOWER	LOWER

Notes: 1) Leachate elevations from November 1, 2021.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of utilized for monitoring.

Table B-3
Leachate Elevation Comparison
Twin Creeks Environmental Centre - 2022

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
May 2, 2022							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	227.00	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	226.65	LOWER	LOWER
Expansion Site Cell 4							
PS5	*OW38-6*	240.73		*236.73*	227.05	LOWER	LOWER

Notes: 1) Leachate elevations from May 2, 2022.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of monitoring.

Monitoring Location	Groundwater Monitoring Wells Compared	Existing Ground Surface Elevation (m ASL)	Exisiting Bottom of Ditch Elevation (m ASL)	Current Local Groundwater Elevation (m ASL)	Leachate Elevation (m ASL)	Leachate Elevation Compared to Ground Surface Elevation	Leachate Elevation Compared to Groundwater Elevation
November 1, 2022							
Expansion Site Cell 1							
PS1	*OW38-6*	240.88		*236.73*	227.08	LOWER	LOWER
Expansion Site Cell 2							
PS3	*OW38-6*	240.18		*236.73*	227.23	LOWER	LOWER
Expansion Site Cell 4							
PS5	*OW38-6*	240.73		*236.73*	227.20	LOWER	LOWER
Expansion Site Cell 6							
PS7	*OW38-6*	239.41		*236.73*	228.16	LOWER	LOWER

Notes: 1) Leachate elevations from November 1, 2022.
2) m ASL denotes meters above sea level.
3) *Italics* denotes historic information used to calculate data.
4) ***Bold and italics*** denotes elevation presented is the maintenance hole bottom elevation as it was dry at the time of utilized for monitoring.
5) PS7 installed in September 2022.

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Jan-22	Saturday	227.12	*229.31*	227.35	-
2022	2-Jan-22	Sunday	227.16	*229.53*	227.35	-
2022	3-Jan-22	Monday	227.03	*229.53*	227.35	-
2022	4-Jan-22	Tuesday	226.99	*229.53*	227.34	-
2022	5-Jan-22	Wednesday	227.00	*226.82*	227.33	-
2022	6-Jan-22	Thursday	226.99	*226.35*	227.32	-
2022	7-Jan-22	Friday	226.99	*226.83*	227.31	-
2022	8-Jan-22	Saturday	226.99	*226.83*	227.31	-
2022	9-Jan-22	Sunday	226.99	*226.99*	227.31	-
2022	10-Jan-22	Monday	226.99	*227.38*	227.31	-
2022	11-Jan-22	Tuesday	226.99	*227.38*	227.28	-
2022	12-Jan-22	Wednesday	226.98	*227.32*	227.27	-
2022	13-Jan-22	Thursday	226.99	*228.16*	227.26	-
2022	14-Jan-22	Friday	227.00	*229.02*	227.26	-
2022	15-Jan-22	Saturday	227.00	*227.31*	227.26	-
2022	16-Jan-22	Sunday	227.00	*227.31*	227.26	-
2022	17-Jan-22	Monday	227.00	*227.31*	227.26	-
2022	18-Jan-22	Tuesday	226.99	*227.81*	227.26	-
2022	19-Jan-22	Wednesday	227.00	*227.84*	227.26	-
2022	20-Jan-22	Thursday	227.00	*228.04*	227.27	-
2022	21-Jan-22	Friday	227.00	*228.63*	227.26	-
2022	22-Jan-22	Saturday	227.00	*230.31*	227.26	-
2022	23-Jan-22	Sunday	227.00	*229.37*	227.26	-
2022	24-Jan-22	Monday	227.00	*231.01*	227.27	-
2022	25-Jan-22	Tuesday	227.00	*228.91*	227.26	-
2022	26-Jan-22	Wednesday	227.00	*228.43*	227.26	-
2022	27-Jan-22	Thursday	227.00	*228.59*	227.22	-
2022	28-Jan-22	Friday	227.00	*230.09*	227.18	-
2022	29-Jan-22	Saturday	227.00	*230.76*	227.19	-
2022	30-Jan-22	Sunday	226.99	*229.30*	227.20	-
2022	31-Jan-22	Monday	226.99	*228.03*	227.18	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Feb-22	Tuesday	226.99	*228.59*	227.14	-
2022	2-Feb-22	Wednesday	226.98	*228.76*	227.13	-
2022	3-Feb-22	Thursday	226.99	*230.52*	227.14	-
2022	4-Feb-22	Friday	226.99	*231.83*	227.14	-
2022	5-Feb-22	Saturday	227.00	*231.84*	227.15	-
2022	6-Feb-22	Sunday	226.99	*231.74*	227.13	-
2022	7-Feb-22	Monday	226.99	*231.91*	227.13	-
2022	8-Feb-22	Tuesday	226.99	*228.48*	227.14	-
2022	9-Feb-22	Wednesday	226.99	*228.98*	227.15	-
2022	10-Feb-22	Thursday	226.99	*229.85*	227.15	-
2022	11-Feb-22	Friday	226.99	*229.85*	227.13	-
2022	12-Feb-22	Saturday	226.99	*230.59*	227.13	-
2022	13-Feb-22	Sunday	226.99	*232.34*	227.14	-
2022	14-Feb-22	Monday	226.99	*232.62*	227.15	-
2022	15-Feb-22	Tuesday	226.99	*229.50*	227.13	-
2022	16-Feb-22	Wednesday	226.99	*231.07*	227.14	-
2022	17-Feb-22	Thursday	226.99	*232.62*	227.15	-
2022	18-Feb-22	Friday	226.99	*232.64*	227.14	-
2022	19-Feb-22	Saturday	226.99	*232.71*	227.14	-
2022	20-Feb-22	Sunday	226.99	*232.49*	227.13	-
2022	21-Feb-22	Monday	227.00	*232.35*	227.15	-
2022	22-Feb-22	Tuesday	227.00	*232.74*	227.13	-
2022	23-Feb-22	Wednesday	226.99	*232.95*	227.13	-
2022	24-Feb-22	Thursday	227.00	*232.99*	227.14	-
2022	25-Feb-22	Friday	227.00	*232.25*	227.13	-
2022	26-Feb-22	Saturday	227.00	*229.28*	227.15	-
2022	27-Feb-22	Sunday	227.00	*231.78*	227.13	-
2022	28-Feb-22	Monday	227.00	*232.19*	227.14	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Mar-22	Tuesday	227.00	*232.34*	227.15	-
2022	2-Mar-22	Wednesday	227.00	*232.99*	227.14	-
2022	3-Mar-22	Thursday	226.99	*232.94*	227.13	-
2022	4-Mar-22	Friday	226.99	*232.87*	227.14	-
2022	5-Mar-22	Saturday	226.99	*232.97*	227.15	-
2022	6-Mar-22	Sunday	226.99	*232.99*	227.12	-
2022	7-Mar-22	Monday	226.99	*232.99*	227.13	-
2022	8-Mar-22	Tuesday	226.99	*232.99*	227.14	-
2022	9-Mar-22	Wednesday	227.00	*232.99*	227.15	-
2022	10-Mar-22	Thursday	226.99	*232.99*	227.14	-
2022	11-Mar-22	Friday	227.00	*232.99*	227.13	-
2022	12-Mar-22	Saturday	227.00	*232.99*	227.13	-
2022	13-Mar-22	Sunday	227.00	*232.99*	227.15	-
2022	14-Mar-22	Monday	227.00	*232.99*	227.15	-
2022	15-Mar-22	Tuesday	227.00	*232.99*	227.12	-
2022	16-Mar-22	Wednesday	227.00	*232.99*	227.13	-
2022	17-Mar-22	Thursday	227.00	*232.99*	227.14	-
2022	18-Mar-22	Friday	227.00	*232.99*	227.15	-
2022	19-Mar-22	Saturday	227.00	*232.99*	227.15	-
2022	20-Mar-22	Sunday	226.99	*232.99*	227.13	-
2022	21-Mar-22	Monday	226.99	*232.99*	227.13	-
2022	22-Mar-22	Tuesday	227.00	*232.99*	227.14	-
2022	23-Mar-22	Wednesday	226.96	*232.99*	227.14	-
2022	24-Mar-22	Thursday	226.98	*232.99*	227.13	-
2022	25-Mar-22	Friday	227.00	*232.99*	227.13	-
2022	26-Mar-22	Saturday	226.99	*232.99*	227.14	-
2022	27-Mar-22	Sunday	227.00	*232.99*	227.15	-
2022	28-Mar-22	Monday	227.00	*232.99*	227.13	-
2022	29-Mar-22	Tuesday	227.00	*232.99*	227.13	-
2022	30-Mar-22	Wednesday	226.99	*232.99*	227.14	-
2022	31-Mar-22	Thursday	226.98	*232.99*	227.13	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Apr-22	Friday	226.98	*232.99*	227.13	-
2022	2-Apr-22	Saturday	226.99	*232.99*	227.14	-
2022	3-Apr-22	Sunday	226.99	*232.99*	227.16	-
2022	4-Apr-22	Monday	226.99	*232.99*	227.17	-
2022	5-Apr-22	Tuesday	226.99	*229.70*	227.19	-
2022	6-Apr-22	Wednesday	226.99	226.65	227.17	-
2022	7-Apr-22	Thursday	226.99	226.65	227.18	-
2022	8-Apr-22	Friday	226.99	226.65	227.18	-
2022	9-Apr-22	Saturday	226.99	226.65	227.18	-
2022	10-Apr-22	Sunday	226.99	226.65	227.19	-
2022	11-Apr-22	Monday	226.99	226.65	227.18	-
2022	12-Apr-22	Tuesday	226.99	226.65	227.18	-
2022	13-Apr-22	Wednesday	226.99	226.65	227.18	-
2022	14-Apr-22	Thursday	226.99	226.65	227.18	-
2022	15-Apr-22	Friday	226.99	226.65	227.19	-
2022	16-Apr-22	Saturday	226.99	226.65	227.18	-
2022	17-Apr-22	Sunday	226.99	226.65	227.18	-
2022	18-Apr-22	Monday	226.99	226.65	227.20	-
2022	19-Apr-22	Tuesday	227.00	226.65	227.15	-
2022	20-Apr-22	Wednesday	226.99	226.65	227.14	-
2022	21-Apr-22	Thursday	227.00	226.65	227.13	-
2022	22-Apr-22	Friday	226.99	226.65	227.06	-
2022	23-Apr-22	Saturday	226.99	226.65	227.04	-
2022	24-Apr-22	Sunday	226.99	226.65	227.04	-
2022	25-Apr-22	Monday	226.99	226.66	227.04	-
2022	26-Apr-22	Tuesday	226.99	226.65	227.05	-
2022	27-Apr-22	Wednesday	227.00	226.66	227.03	-
2022	28-Apr-22	Thursday	226.99	226.65	227.05	-
2022	29-Apr-22	Friday	226.99	226.65	227.04	-
2022	30-Apr-22	Saturday	226.99	226.65	227.05	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-May-22	Sunday	226.99	226.65	227.04	-
2022	2-May-22	Monday	227.00	226.65	227.05	-
2022	3-May-22	Tuesday	227.00	226.65	227.04	-
2022	4-May-22	Wednesday	226.99	226.65	227.04	-
2022	5-May-22	Thursday	226.99	226.65	227.04	-
2022	6-May-22	Friday	227.00	226.65	227.04	-
2022	7-May-22	Saturday	226.99	226.65	227.05	-
2022	8-May-22	Sunday	226.99	226.65	227.04	-
2022	9-May-22	Monday	226.99	226.65	227.04	-
2022	10-May-22	Tuesday	226.99	226.65	227.04	-
2022	11-May-22	Wednesday	226.99	226.65	227.04	-
2022	12-May-22	Thursday	226.99	226.65	227.04	-
2022	13-May-22	Friday	226.99	226.65	227.04	-
2022	14-May-22	Saturday	226.99	226.65	227.04	-
2022	15-May-22	Sunday	226.99	226.65	227.04	-
2022	16-May-22	Monday	226.99	226.65	227.04	-
2022	17-May-22	Tuesday	226.99	226.65	227.04	-
2022	18-May-22	Wednesday	226.99	226.65	227.04	-
2022	19-May-22	Thursday	226.99	226.65	227.05	-
2022	20-May-22	Friday	226.99	226.65	227.05	-
2022	21-May-22	Saturday	226.99	226.65	227.04	-
2022	22-May-22	Sunday	226.99	226.65	227.04	-
2022	23-May-22	Monday	226.99	226.65	227.04	-
2022	24-May-22	Tuesday	226.99	226.65	227.04	-
2022	25-May-22	Wednesday	226.99	226.65	227.04	-
2022	26-May-22	Thursday	226.99	226.65	227.04	-
2022	27-May-22	Friday	226.99	226.65	227.04	-
2022	28-May-22	Saturday	226.99	226.65	227.04	-
2022	29-May-22	Sunday	226.99	226.65	227.04	-
2022	30-May-22	Monday	226.99	226.65	227.04	-
2022	31-May-22	Tuesday	226.99	226.65	227.04	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Jun-22	Wednesday	226.99	226.65	227.04	-
2022	2-Jun-22	Thursday	226.99	226.65	227.04	-
2022	3-Jun-22	Friday	226.99	226.65	227.04	-
2022	4-Jun-22	Saturday	226.99	226.65	227.05	-
2022	5-Jun-22	Sunday	226.99	226.65	227.04	-
2022	6-Jun-22	Monday	226.99	226.65	227.04	-
2022	7-Jun-22	Tuesday	226.99	226.65	227.04	-
2022	8-Jun-22	Wednesday	226.99	226.65	227.04	-
2022	9-Jun-22	Thursday	226.99	226.65	227.04	-
2022	10-Jun-22	Friday	226.99	226.65	227.04	-
2022	11-Jun-22	Saturday	226.99	226.65	227.05	-
2022	12-Jun-22	Sunday	226.99	226.65	227.05	-
2022	13-Jun-22	Monday	226.99	226.65	227.04	-
2022	14-Jun-22	Tuesday	226.99	226.65	227.00	-
2022	15-Jun-22	Wednesday	226.99	226.65	226.95	-
2022	16-Jun-22	Thursday	226.99	226.65	226.87	-
2022	17-Jun-22	Friday	226.99	226.65	226.67	-
2022	18-Jun-22	Saturday	226.99	226.65	226.65	-
2022	19-Jun-22	Sunday	226.99	226.65	226.65	-
2022	20-Jun-22	Monday	227.00	226.65	226.65	-
2022	21-Jun-22	Tuesday	227.00	226.65	226.65	-
2022	22-Jun-22	Wednesday	226.99	226.65	226.65	-
2022	23-Jun-22	Thursday	226.99	226.65	226.65	-
2022	24-Jun-22	Friday	226.99	226.65	226.65	-
2022	25-Jun-22	Saturday	226.99	226.65	226.65	-
2022	26-Jun-22	Sunday	227.00	226.65	226.65	-
2022	27-Jun-22	Monday	227.00	226.65	226.65	-
2022	28-Jun-22	Tuesday	226.99	226.65	226.65	-
2022	29-Jun-22	Wednesday	226.99	226.65	226.65	-
2022	30-Jun-22	Thursday	227.00	226.65	226.65	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Jul-22	Friday	227.00	226.65	226.64	-
2022	2-Jul-22	Saturday	227.00	226.65	226.65	-
2022	3-Jul-22	Sunday	226.99	226.65	226.65	-
2022	4-Jul-22	Monday	226.99	226.65	226.65	-
2022	5-Jul-22	Tuesday	226.99	226.65	226.65	-
2022	6-Jul-22	Wednesday	226.99	226.65	226.65	-
2022	7-Jul-22	Thursday	226.99	226.65	226.65	-
2022	8-Jul-22	Friday	226.99	226.65	226.66	-
2022	9-Jul-22	Saturday	226.99	226.65	226.66	-
2022	10-Jul-22	Sunday	226.99	226.65	226.63	-
2022	11-Jul-22	Monday	226.99	226.65	226.64	-
2022	12-Jul-22	Tuesday	226.99	226.65	226.64	-
2022	13-Jul-22	Wednesday	226.99	226.65	226.65	-
2022	14-Jul-22	Thursday	227.07	226.65	226.66	-
2022	15-Jul-22	Friday	227.13	226.65	226.67	-
2022	16-Jul-22	Saturday	227.17	226.65	226.63	-
2022	17-Jul-22	Sunday	227.20	226.65	226.63	-
2022	18-Jul-22	Monday	227.23	226.65	226.64	-
2022	19-Jul-22	Tuesday	227.25	226.65	226.66	-
2022	20-Jul-22	Wednesday	227.27	226.65	226.64	-
2022	21-Jul-22	Thursday	226.92	226.65	226.65	-
2022	22-Jul-22	Friday	226.98	226.65	226.66	-
2022	23-Jul-22	Saturday	226.99	226.65	226.66	-
2022	24-Jul-22	Sunday	226.99	226.65	226.64	-
2022	25-Jul-22	Monday	226.99	226.65	226.63	-
2022	26-Jul-22	Tuesday	226.99	226.65	226.64	-
2022	27-Jul-22	Wednesday	226.98	226.65	226.65	-
2022	28-Jul-22	Thursday	226.99	226.65	226.67	-
2022	29-Jul-22	Friday	226.99	226.65	226.64	-
2022	30-Jul-22	Saturday	226.99	226.65	226.63	-
2022	31-Jul-22	Sunday	226.99	225.96	226.65	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Aug-22	Monday	226.99	226.65	226.69	-
2022	2-Aug-22	Tuesday	226.99	226.77	226.65	-
2022	3-Aug-22	Wednesday	226.99	226.65	226.63	-
2022	4-Aug-22	Thursday	226.99	226.65	226.65	-
2022	5-Aug-22	Friday	226.98	226.65	226.66	-
2022	6-Aug-22	Saturday	226.99	226.65	226.64	-
2022	7-Aug-22	Sunday	226.99	226.65	226.64	-
2022	8-Aug-22	Monday	226.99	226.64	226.66	-
2022	9-Aug-22	Tuesday	227.06	226.65	226.65	-
2022	10-Aug-22	Wednesday	227.08	226.64	226.65	-
2022	11-Aug-22	Thursday	226.99	226.64	226.64	-
2022	12-Aug-22	Friday	226.99	226.64	226.64	-
2022	13-Aug-22	Saturday	226.99	226.64	226.65	-
2022	14-Aug-22	Sunday	226.99	226.65	226.66	-
2022	15-Aug-22	Monday	226.99	226.65	226.67	-
2022	16-Aug-22	Tuesday	226.99	226.65	226.64	-
2022	17-Aug-22	Wednesday	226.99	226.64	226.63	-
2022	18-Aug-22	Thursday	226.99	226.65	226.64	-
2022	19-Aug-22	Friday	226.99	226.65	226.65	-
2022	20-Aug-22	Saturday	226.99	226.65	226.66	-
2022	21-Aug-22	Sunday	226.99	226.65	226.67	-
2022	22-Aug-22	Monday	226.99	226.65	226.63	-
2022	23-Aug-22	Tuesday	226.99	226.65	226.64	-
2022	24-Aug-22	Wednesday	226.99	226.65	226.65	-
2022	25-Aug-22	Thursday	226.99	226.65	226.66	-
2022	26-Aug-22	Friday	226.99	226.65	226.66	-
2022	27-Aug-22	Saturday	226.99	226.64	226.65	-
2022	28-Aug-22	Sunday	226.99	226.65	226.66	-
2022	29-Aug-22	Monday	226.99	226.80	226.63	-
2022	30-Aug-22	Tuesday	226.99	226.65	226.64	-
2022	31-Aug-22	Wednesday	226.99	226.65	226.64	-

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Sep-22	Thursday	226.99	226.65	226.65	-
2022	2-Sep-22	Friday	226.99	226.65	226.65	-
2022	3-Sep-22	Saturday	226.98	226.65	226.65	-
2022	4-Sep-22	Sunday	226.99	226.65	226.66	-
2022	5-Sep-22	Monday	226.99	226.65	226.65	-
2022	6-Sep-22	Tuesday	226.99	226.65	226.65	-
2022	7-Sep-22	Wednesday	226.98	226.65	226.67	-
2022	8-Sep-22	Thursday	226.98	226.65	226.63	-
2022	9-Sep-22	Friday	226.98	226.65	226.64	-
2022	10-Sep-22	Saturday	226.98	226.65	226.64	-
2022	11-Sep-22	Sunday	226.98	226.65	226.65	-
2022	12-Sep-22	Monday	226.98	226.65	226.67	-
2022	13-Sep-22	Tuesday	226.98	226.65	226.66	-
2022	14-Sep-22	Wednesday	226.98	226.65	226.63	227.30
2022	15-Sep-22	Thursday	226.98	226.65	226.64	227.33
2022	16-Sep-22	Friday	226.98	226.68	226.65	227.28
2022	17-Sep-22	Saturday	226.98	226.65	226.66	227.12
2022	18-Sep-22	Sunday	226.98	226.65	226.66	227.13
2022	19-Sep-22	Monday	226.98	226.65	226.66	227.68
2022	20-Sep-22	Tuesday	226.98	226.66	226.63	227.54
2022	21-Sep-22	Wednesday	226.98	226.65	226.64	227.25
2022	22-Sep-22	Thursday	226.98	226.65	226.64	227.25
2022	23-Sep-22	Friday	226.98	226.65	226.65	227.28
2022	24-Sep-22	Saturday	226.98	226.65	226.64	227.21
2022	25-Sep-22	Sunday	226.98	226.65	226.65	227.24
2022	26-Sep-22	Monday	226.98	226.66	226.65	227.47
2022	27-Sep-22	Tuesday	226.98	226.66	226.66	227.64
2022	28-Sep-22	Wednesday	226.98	226.65	226.67	228.27
2022	29-Sep-22	Thursday	226.98	226.65	226.65	228.31
2022	30-Sep-22	Friday	227.17	227.85	226.79	228.27

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Oct-22	Saturday	227.17	226.65	226.92	228.27
2022	2-Oct-22	Sunday	227.21	227.85	226.96	228.27
2022	3-Oct-22	Monday	227.06	226.65	226.81	228.26
2022	4-Oct-22	Tuesday	227.00	226.80	226.75	228.24
2022	5-Oct-22	Wednesday	227.12	226.64	226.87	228.22
2022	6-Oct-22	Thursday	227.17	226.97	226.92	228.16
2022	7-Oct-22	Friday	227.20	227.06	226.95	228.15
2022	8-Oct-22	Saturday	227.23	226.65	226.98	228.16
2022	9-Oct-22	Sunday	227.25	227.20	227.00	228.16
2022	10-Oct-22	Monday	227.27	227.15	227.02	228.16
2022	11-Oct-22	Tuesday	227.29	226.75	227.04	228.15
2022	12-Oct-22	Wednesday	227.30	226.64	227.05	228.12
2022	13-Oct-22	Thursday	227.32	226.64	227.07	228.09
2022	14-Oct-22	Friday	227.33	226.65	227.08	228.05
2022	15-Oct-22	Saturday	227.34	226.65	227.09	228.03
2022	16-Oct-22	Sunday	227.36	226.65	227.11	228.03
2022	17-Oct-22	Monday	227.37	227.04	227.12	228.03
2022	18-Oct-22	Tuesday	227.38	226.65	227.13	228.13
2022	19-Oct-22	Wednesday	227.40	226.65	227.15	228.23
2022	20-Oct-22	Thursday	227.42	226.65	227.17	228.25
2022	21-Oct-22	Friday	227.44	226.65	227.19	228.24
2022	22-Oct-22	Saturday	227.44	227.25	227.19	228.24
2022	23-Oct-22	Sunday	227.44	227.95	227.19	228.24
2022	24-Oct-22	Monday	227.45	227.12	227.20	228.24
2022	25-Oct-22	Tuesday	227.45	227.02	227.20	228.21
2022	26-Oct-22	Wednesday	227.45	227.10	227.20	228.19
2022	27-Oct-22	Thursday	227.45	227.17	227.20	228.17
2022	28-Oct-22	Friday	227.45	227.05	227.20	228.15
2022	29-Oct-22	Saturday	227.46	226.63	227.21	228.16
2022	30-Oct-22	Sunday	227.46	227.49	227.21	228.16
2022	31-Oct-22	Monday	227.46	227.54	227.21	228.16

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Nov-22	Tuesday	227.08	227.23	227.20	228.16
2022	2-Nov-22	Wednesday	227.08	226.64	227.20	228.12
2022	3-Nov-22	Thursday	227.09	226.84	227.20	228.09
2022	4-Nov-22	Friday	227.10	227.01	227.21	228.06
2022	5-Nov-22	Saturday	227.21	227.91	227.21	228.05
2022	6-Nov-22	Sunday	227.28	227.96	227.21	228.05
2022	7-Nov-22	Monday	227.13	227.11	227.21	228.05
2022	8-Nov-22	Tuesday	227.08	226.64	227.21	228.05
2022	9-Nov-22	Wednesday	227.08	226.64	227.20	228.05
2022	10-Nov-22	Thursday	227.08	226.64	227.21	228.02
2022	11-Nov-22	Friday	227.10	227.00	227.21	227.97
2022	12-Nov-22	Saturday	227.08	226.64	227.20	227.98
2022	13-Nov-22	Sunday	227.18	227.66	227.20	227.99
2022	14-Nov-22	Monday	227.13	227.03	227.21	228.00
2022	15-Nov-22	Tuesday	227.08	226.64	227.21	227.95
2022	16-Nov-22	Wednesday	227.08	226.64	227.21	227.89
2022	17-Nov-22	Thursday	227.08	226.64	227.21	227.85
2022	18-Nov-22	Friday	227.08	226.64	227.20	227.84
2022	19-Nov-22	Saturday	227.08	226.65	227.21	227.85
2022	20-Nov-22	Sunday	227.08	226.64	227.21	227.86
2022	21-Nov-22	Monday	227.08	226.74	227.21	227.85
2022	22-Nov-22	Tuesday	227.08	226.64	227.20	227.83
2022	23-Nov-22	Wednesday	227.08	226.64	227.20	227.82
2022	24-Nov-22	Thursday	227.08	226.64	227.20	227.80
2022	25-Nov-22	Friday	227.08	226.65	227.20	227.80
2022	26-Nov-22	Saturday	227.08	226.65	227.20	227.79
2022	27-Nov-22	Sunday	227.08	226.65	227.20	227.79
2022	28-Nov-22	Monday	227.08	226.65	227.20	227.79
2022	29-Nov-22	Tuesday	227.08	226.65	227.20	227.79
2022	30-Nov-22	Wednesday	227.08	226.65	227.20	227.79

Table B-4
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date		Weekday	Leachate Elevation (m asl)			
			PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)			**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)			**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)			**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation			**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.			**235.97**	**240.63**	**241.62**	**240.28**
2022	1-Dec-22	Thursday	227.08	226.65	227.19	227.79
2022	2-Dec-22	Friday	227.08	226.65	227.18	227.78
2022	3-Dec-22	Saturday	227.08	226.65	227.18	227.78
2022	4-Dec-22	Sunday	227.08	226.65	227.18	227.78
2022	5-Dec-22	Monday	227.08	226.65	227.18	227.79
2022	6-Dec-22	Tuesday	227.08	226.65	227.18	227.78
2022	7-Dec-22	Wednesday	227.08	226.65	227.18	227.77
2022	8-Dec-22	Thursday	227.08	226.64	227.10	227.75
2022	9-Dec-22	Friday	227.08	226.65	226.90	227.72
2022	10-Dec-22	Saturday	227.08	226.65	226.90	227.71
2022	11-Dec-22	Sunday	227.08	226.65	226.90	227.72
2022	12-Dec-22	Monday	227.08	226.65	226.89	227.69
2022	13-Dec-22	Tuesday	227.08	226.65	226.89	227.63
2022	14-Dec-22	Wednesday	227.08	226.65	226.84	227.53
2022	15-Dec-22	Thursday	227.09	226.65	226.77	227.53
2022	16-Dec-22	Friday	227.08	226.65	226.61	227.37
2022	17-Dec-22	Saturday	227.08	226.65	226.66	227.24
2022	18-Dec-22	Sunday	227.08	226.65	226.67	227.22
2022	19-Dec-22	Monday	227.08	226.65	226.63	227.30
2022	20-Dec-22	Tuesday	227.08	226.65	226.69	227.25
2022	21-Dec-22	Wednesday	227.08	226.65	226.62	227.18
2022	22-Dec-22	Thursday	227.08	226.65	226.66	227.25
2022	23-Dec-22	Friday	227.08	226.65	226.66	227.25
2022	24-Dec-22	Saturday	227.08	226.65	226.64	227.21
2022	25-Dec-22	Sunday	227.08	226.65	226.70	227.26
2022	26-Dec-22	Monday	227.08	226.65	226.61	227.30
2022	27-Dec-22	Tuesday	227.08	226.65	226.66	227.16
2022	28-Dec-22	Wednesday	227.08	226.65	226.66	227.23
2022	29-Dec-22	Thursday	227.08	226.65	226.63	227.27
2022	30-Dec-22	Friday	227.08	226.66	226.67	227.24
2022	31-Dec-22	Saturday	227.07	226.65	226.66	227.23

Note: 1) 'm asl' denotes metres above sea level.
2) ' - ' denotes data not available as pumping station not installed.
3) 'ND' denotes no data for that day.
4) 'T.O.P.' denotes 'top of pipe'.
5) '*Italics*' denotes a false elevation due to level sensor error.
6) '**bold**' denotes the 80% warning of the 0.3m Head Max Elevation was reached.
7) '**bold**' and grey shading denotes the Condition 7.18: 0.3 Head Max Elevation was triggered.
8) '**bold**' and red shading denotes the Condition 14.1: Head Max Elevation was triggered.

Table B-5
Leachate Level Elevations - Early Vertical Gas Wells
Twin Creeks Environmental Centre Expansion Site

Date	Cell 1		Cell 2	
	EV299 (1A S1)	EV268 (1A S2)	EV022 (2B)	EV226 (2D)
Well Base	**230.08**	**231.70**	**229.65**	**230.15**
T.O.P. 2018	**257.02**	**254.77**	**258.19**	**256.88**
7-May-18	Dry @ 230.08	Dry @ 231.70	Dry @ 229.65	Dry @ 230.15
5-Nov-18	Dry @ 230.08	Dry @ 231.70	Dry @ 229.65	Dry @ 230.15
T.O.P. May 2019	**257.93**	**260.52**	**258.82**	**257.92**
31-May-19	OBS @ 237.17	OBS @242.82	OBS @ 252.15	OBS @ 254.92
T.O.P. Nov 2019	**257.71**	**261.97**	**258.45**	**260.34**
4-Nov-19	OBS @249.96	Dry @ 232.19	OBS @ 251.84	OBS @ 255.42
T.O.P. May 2020	**257.19**	**261.72**	**258.06**	**259.74**
5-May-20	OBS @ 249.37	Dry @ 232.08	OBS @ 251.49	OBS @ 256.49
T.O.P. Nov 2020	**256.87**	**261.61**	**258.74**	**259.17**
2-Nov-20	OBS @ 249.18	Dry @ 232.14	OBS @ 252.19	OBS @ 255.53
T.O.P. May 2021	**256.57**	**260.70**	**257.44**	**258.62**
17-May-21	OBS @ 248.92	Dry @ 232.16	OBS @ 250.98	OBS @ 255.33
T.O.P. Nov 2021	**256.31**	**260.53**	**257.21**	**258.14**
1-Nov-21	OBS @ 248.68	Dry @ 232.10	OBS @ 250.73	OBS @ 254.87
T.O.P. May 2022	**256.11**	**260.38**	**257.03**	**257.70**
20-May-22	OBS @ 248.49	OBS @ 245.55	OBS @ 250.57	OBS @ 254.43
T.O.P. Nov 2022	**255.93**	**260.20**	**261.05**	**261.32**
1-Nov-22	OBS @ 248.12	OBS @ 245.64	OBS @ 255.98	OBS @ 255.97

NOTES: 1) Blank denotes data not available.
2) Elevations in metres above sea level.
3) T.O.P. denotes 'top of pipe'.
4) Liquid levels are accurate to 0.1 m due to gas and condensate interferences during the measuring of liquid levels from leachate monitoring wells/locations.
5) OBS denotes 'Not Determined' as the liquid level probe was unable to reach bottom of Early Vertical Gas Well.

Table B-6
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	235.72	240.29	241.56	239.93
20-Jan-10	225.97	-	-	-
19-Feb-10	226.01	-	-	-
31-Mar-10	226.21	-	-	-
23-Apr-10	226.28	-	-	-
31-May-10	226.54	-	-	-
22-Jun-10	226.57	-	-	-
14-Jul-10	226.75	-	-	-
17-Aug-10	226.96	-	-	-
14-Sep-10	226.96	-	-	-
15-Oct-10	227.10	-	-	-
19-Nov-10	227.12	-	-	-
8-Dec-10	227.19	-	-	-
18-Jan-11	227.69	-	-	-
28-Feb-11	228.40	-	-	-
21-Mar-11	228.61	-	-	-
15-Apr-11	227.86	-	-	-
3-May-11	227.99	-	-	-
28-Jun-11	227.14	-	-	-
10-Jul-11	226.09	-	-	-
19-Aug-11	226.23	-	-	-
22-Sep-11	226.58	-	-	-
12-Oct-11	226.70	-	-	-
9-Nov-11	226.88	-	-	-
14-Dec-11	227.04	-	-	-
17-Jan-12	227.17	-	-	-
17-Feb-12	227.27	-	-	-
15-Mar-12	227.32	-	-	-
24-Apr-12	227.30	-	-	-
7-May-12	226.56	-	-	-
7-Jun-12	225.95	-	-	-
12-Jul-12	226.18	-	-	-
15-Aug-12	226.41	-	-	-
13-Sep-12	226.56	-	-	-
10-Oct-12	226.67	-	-	-
5-Nov-12	226.75	-	-	-
18-Dec-12	226.88	-	-	-
16-Jan-13	226.96	-	-	-
6-Feb-13	226.99	-	-	-
8-Mar-13	227.05	-	-	-
10-Apr-13	227.11	-	-	-
6-May-13	227.15	-	-	-
20-Jun-13	227.22	-	-	-

Table B-6
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	235.72	240.29	241.56	239.93
3-Jul-13	227.28	-	-	-
15-Aug-13	227.27	-	-	-
13-Sep-13	227.20	-	-	-
9-Oct-13	227.24	-	-	-
13-Nov-13	227.26	224.90	-	-
13-Dec-13	227.38	225.49	-	-
10-Jan-14	227.22	226.27	-	-
6-Feb-14	227.17	226.25	-	-
11-Mar-14	227.40	226.72	-	-
17-Apr-14	227.12	225.19	-	-
5-May-14	227.08	226.17	-	-
4-Jun-14	227.49	228.77	-	-
3-Jul-14	227.52	228.69	-	-
26-Aug-14	227.58	225.04	-	-
22-Sep-14	227.60	228.11	-	-
16-Oct-14	227.63	226.07	-	-
17-Nov-14	227.65	225.92	-	-
2-Dec-14	227.67	226.07	-	-
4-Jan-15	*226.36*	226.02	-	-
25-Feb-15	227.75	227.05	-	-
17-Mar-15	227.76	227.19	-	-
14-Apr-15	227.80	228.01	-	-
11-May-15	227.84	227.50	-	-
10-Jun-15	227.96	227.54	-	-
16-Jul-15	227.96	226.07	-	-
13-Aug-15	227.99	227.97	-	-
9-Sep-15	228.03	226.18	-	-
6-Oct-15	228.05	226.64	-	-
2-Nov-15	228.10	227.44	-	-
11-Dec-15	228.15	227.83	-	-
14-Jan-16	228.21	227.99	-	-
9-Feb-16	228.27	228.13	-	-
3-Mar-16	228.36	228.30	-	-
5-Apr-16	228.62	228.53	-	-
24-May-16	229.05	229.32	-	-
13-Jun-16	229.25	228.49	-	-
19-Jul-16	229.27	228.49	-	-
4-Aug-16	229.51	225.51	-	-
12-Sep-16	229.84	225.35	-	-
3-Oct-16	229.98	227.85	-	-
14-Nov-16	230.14	228.25	-	-
8-Dec-16	230.79	228.46	-	-

Table B-6
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	**235.72**	**240.29**	**241.56**	**239.93**
6-Jan-17	231.24	229.14	-	-
13-Feb-17	231.64	229.46	-	-
8-Mar-17	231.17	229.48	-	-
13-Apr-17	231.17	229.48	-	-
11-May-17	231.06	229.60	-	-
20-Jun-17	228.13	229.47	-	-
17-Jul-17	229.90	228.16	-	-
4-Aug-17	*224.66*	227.39	-	-
7-Sep-17	*225.32*	227.43	-	-
23-Oct-17	*224.49*	227.77	-	-
27-Nov-17	*224.49*	228.12	-	-
15-Dec-17	*221.88*	228.31	-	-
12-Jan-18	*224.59*	228.50	-	-
5-Feb-18	224.57	228.63	-	-
8-Mar-18	224.60	228.85	-	-
19-Apr-18	231.21	229.43	-	-
7-May-18	231.38	230.03	-	-
4-Jun-18	231.46	230.32	-	-
11-Jul-18	231.45	230.73	-	-
21-Aug-18	231.40	230.65	-	-
20-Sep-18	231.43	230.31	-	-
11-Oct-18	231.51	230.13	-	-
5-Nov-18	231.59	229.99	-	-
5-Dec-18	231.73	230.06	-	-
4-Jan-19	231.88	230.08	-	-
6-Feb-19	232.08	230.08	-	-
7-Mar-19	232.24	230.03	-	-
3-Apr-19	232.37	230.22	-	-
13-May-19	232.65	230.50	-	-
5-Jun-19	232.78	230.56	-	-
2-Jul-19	232.99	230.93	-	-
5-Aug-19	233.14	231.62	-	-
2-Sep-19	233.17	230.29	-	-
7-Oct-19	233.22	230.90	-	-
20-Nov-19	233.15	231.71	228.45	-
3-Dec-19	233.16	231.87	228.99	-
3-Jan-20	233.08	232.25	229.18	-
6-Feb-20	233.11	231.94	228.92	-
2-Mar-20	233.11	232.06	228.95	-
1-Apr-20	233.10	232.03	228.98	-
4-May-20	233.04	232.00	229.03	-

Table B-6
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	**235.72**	**240.29**	**241.56**	**239.93**
3-Jun-20	232.94	232.06	229.14	-
3-Jul-20	232.64	231.85	226.86	-
6-Aug-20	232.41	228.39	227.75	-
1-Sep-20	232.33	228.16	227.34	-
9-Oct-20	232.18	228.50	227.79	-
2-Nov-20	*235.62*	228.65	227.94	-
3-Dec-20	232.02	228.90	229.66	-
7-Jan-21	231.99	229.68	229.57	-
4-Feb-21	231.96	229.54	229.77	-
17-Mar-21	231.90	229.58	229.77	-
7-Apr-21	231.91	229.59	229.77	-
5-May-21	231.87	229.56	227.92	-
16-Jun-21	*236.22*	228.08	226.79	-
12-Jul-21	231.79	228.35	227.44	-
6-Aug-21	231.74	228.57	227.85	-
3-Sep-21	231.67	228.89	227.46	-
21-Oct-21	231.66	*230.72*	226.46	-
1-Nov-21	231.65	228.23	226.71	-
7-Dec-21	231.64	228.06	227.41	-
5-Jan-22	231.87	227.84	227.74	-
2-Feb-22	231.61	227.87	227.96	-
1-Mar-22	231.61	228.23	228.19	-
8-Apr-22	231.66	229.98	228.51	-
2-May-22	231.66	229.94	227.73	-
8-Jun-22	231.62	229.95	225.00	-
8-Jul-22	231.58	230.10	226.09	-
8-Aug-22	231.50	230.23	227.21	-
14-Sep-22	231.37	230.31	227.45	226.26
13-Oct-22	231.26	230.35	228.22	227.35
1-Nov-22	231.22	230.21	228.52	227.81
7-Dec-22	231.08	230.10	228.78	228.69

NOTES: 1) PS2 operational in November 2009.
2) PS4 operational in November 2013.
3) PS6 operational in November 2019.
4) PS8 operational in September 2022.
5) T.O.P. denotes 'top of pipe'.
6) mASL denotes metres above sea level.
7) *Italics* denotes a level sensor error.

Figure B-13
PDL (PS1, PS3, PS5, and PS7) Hydrograph

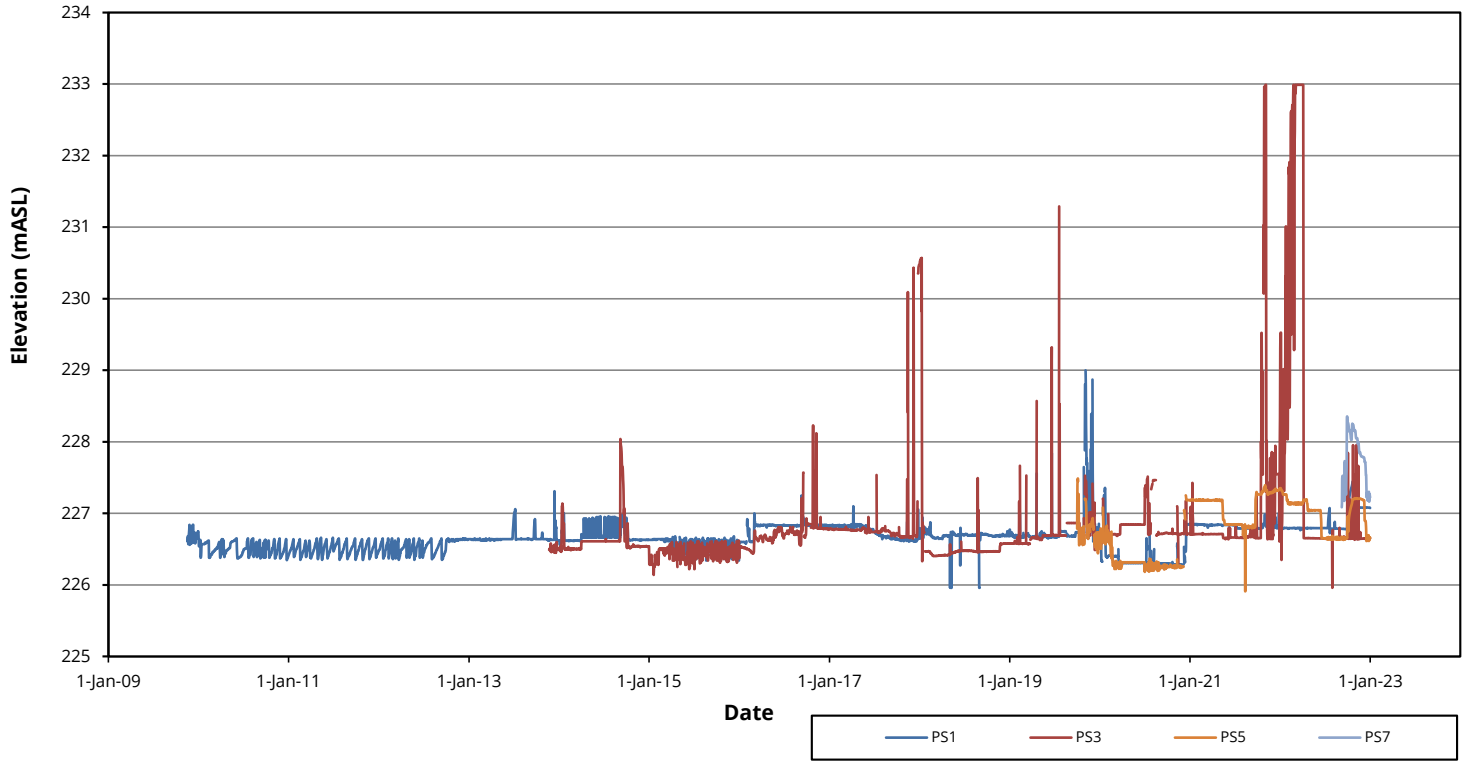
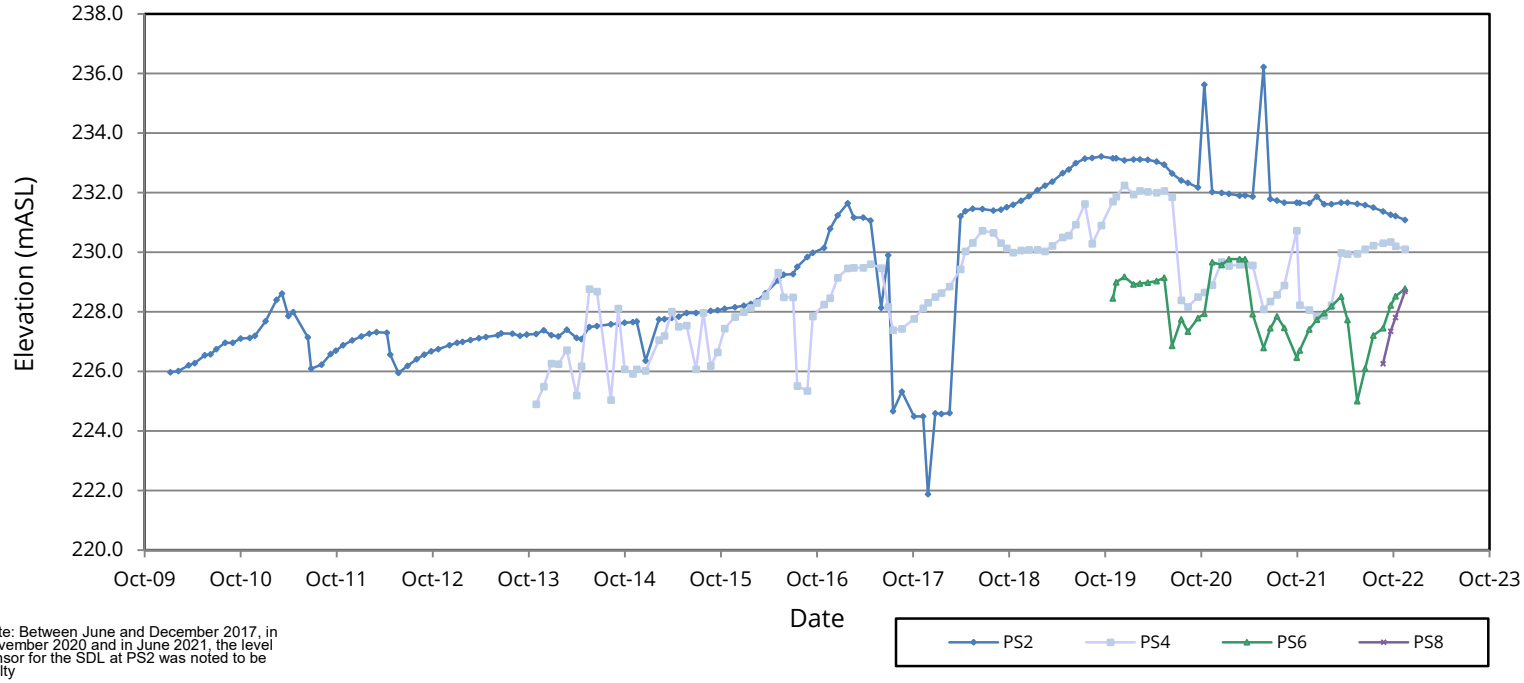
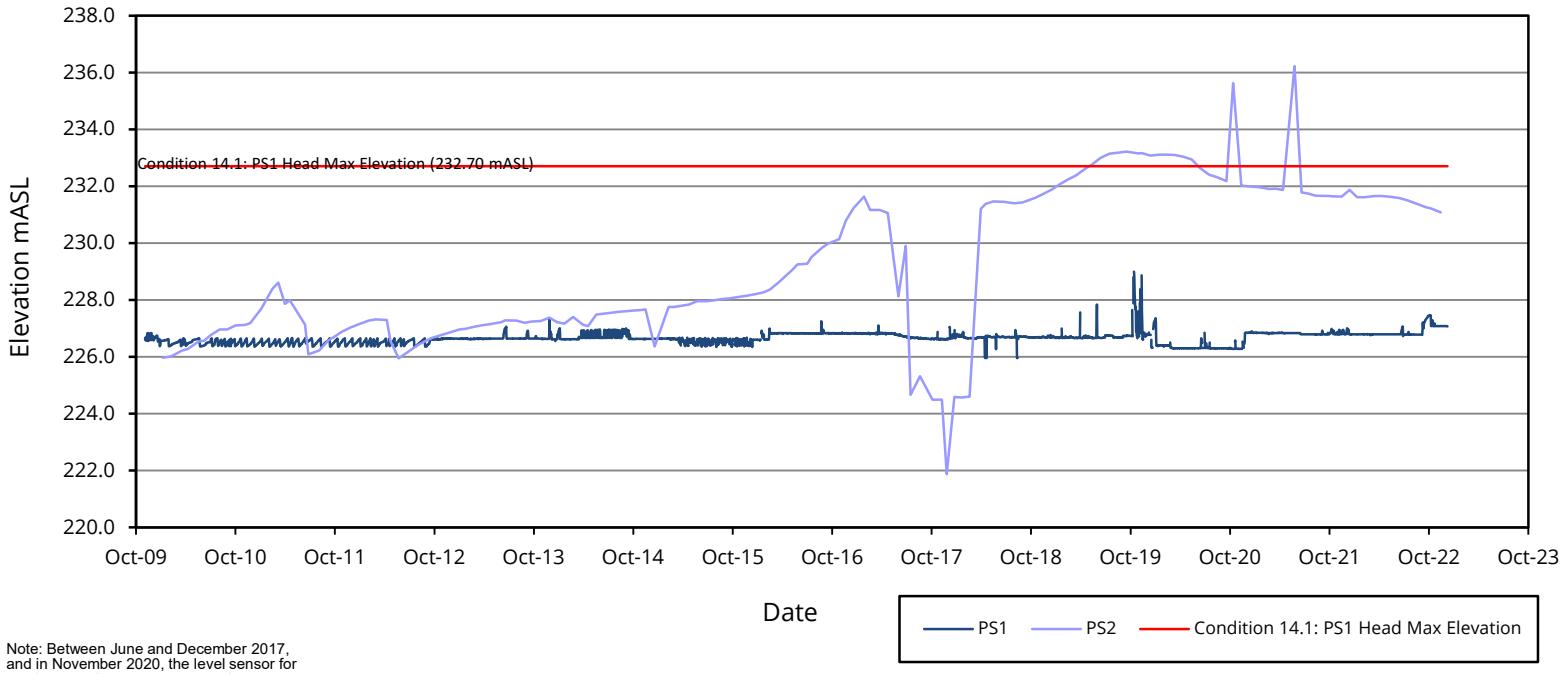


Figure B-14
SDL (PS2, PS4, PS6, and PS8) Hydrograph



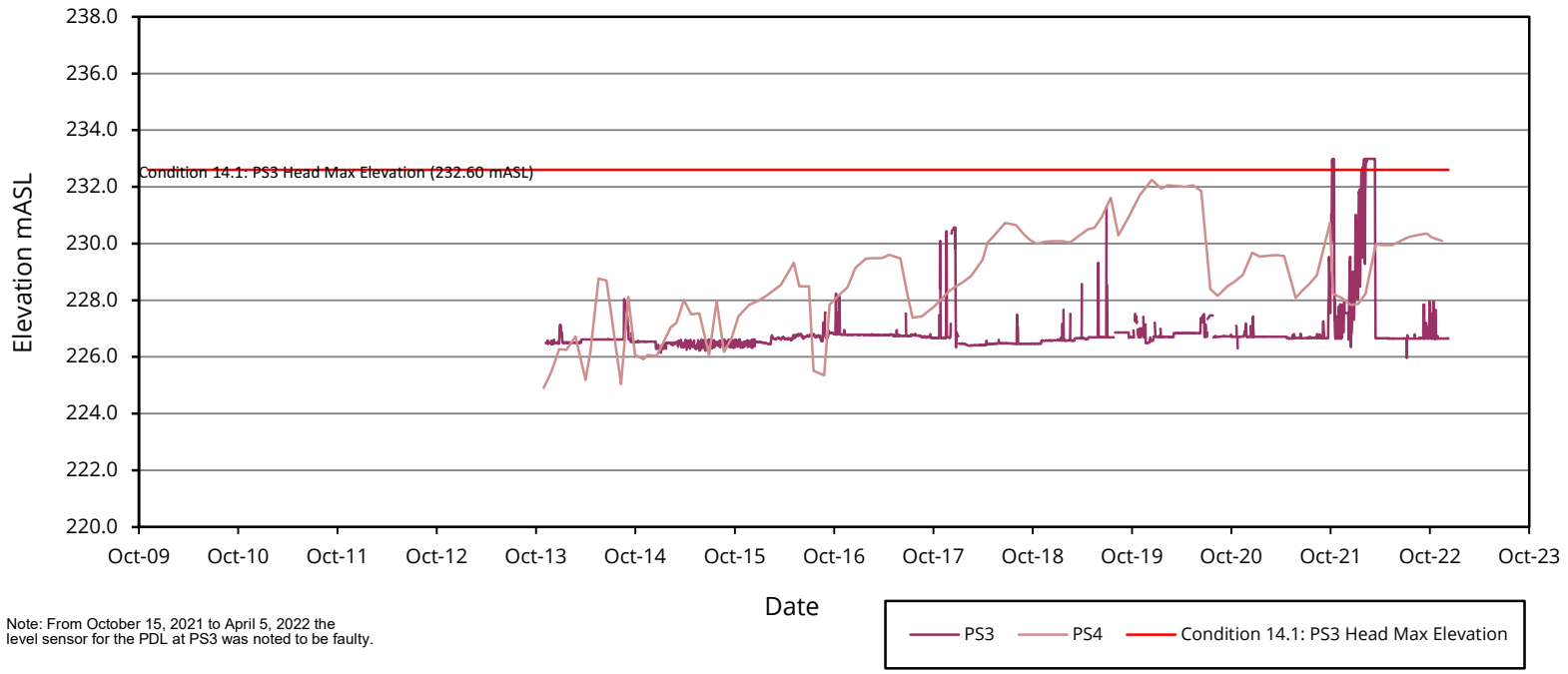
Note: Between June and December 2017, in November 2020 and in June 2021, the level sensor for the SDL at PS2 was noted to be faulty

Figure B-15
PDL (PS1) & SDL (PS2) Hydrograph



Note: Between June and December 2017, and in November 2020, the level sensor for the SDL at PS2 was noted to be faulty.

Figure B-16
PDL (PS3) & SDL (PS4) Hydrograph



Note: From October 15, 2021 to April 5, 2022 the level sensor for the PDL at PS3 was noted to be faulty.

Figure B-17
PDL (PS5) & SDL (PS6) Hydrograph

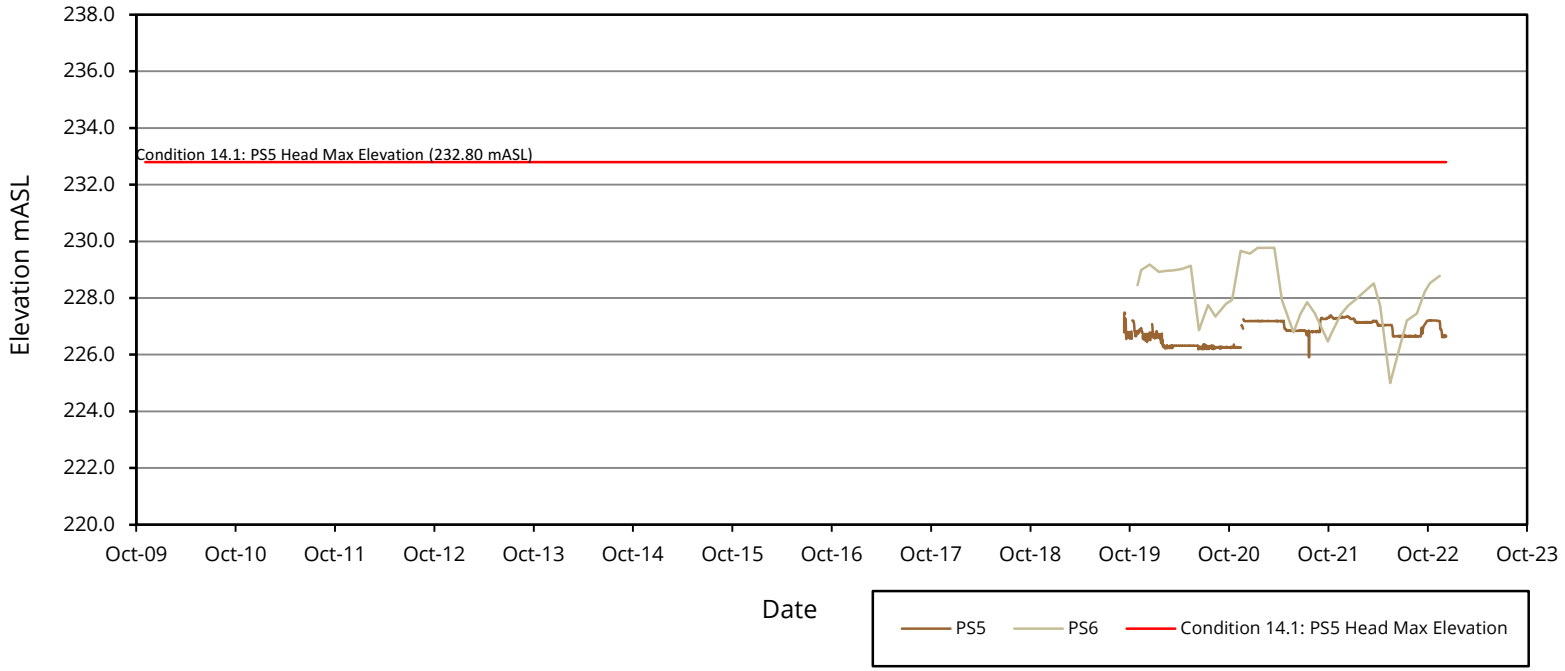


Figure B-18
PDL (PS7) & SDL (PS8) Hydrograph

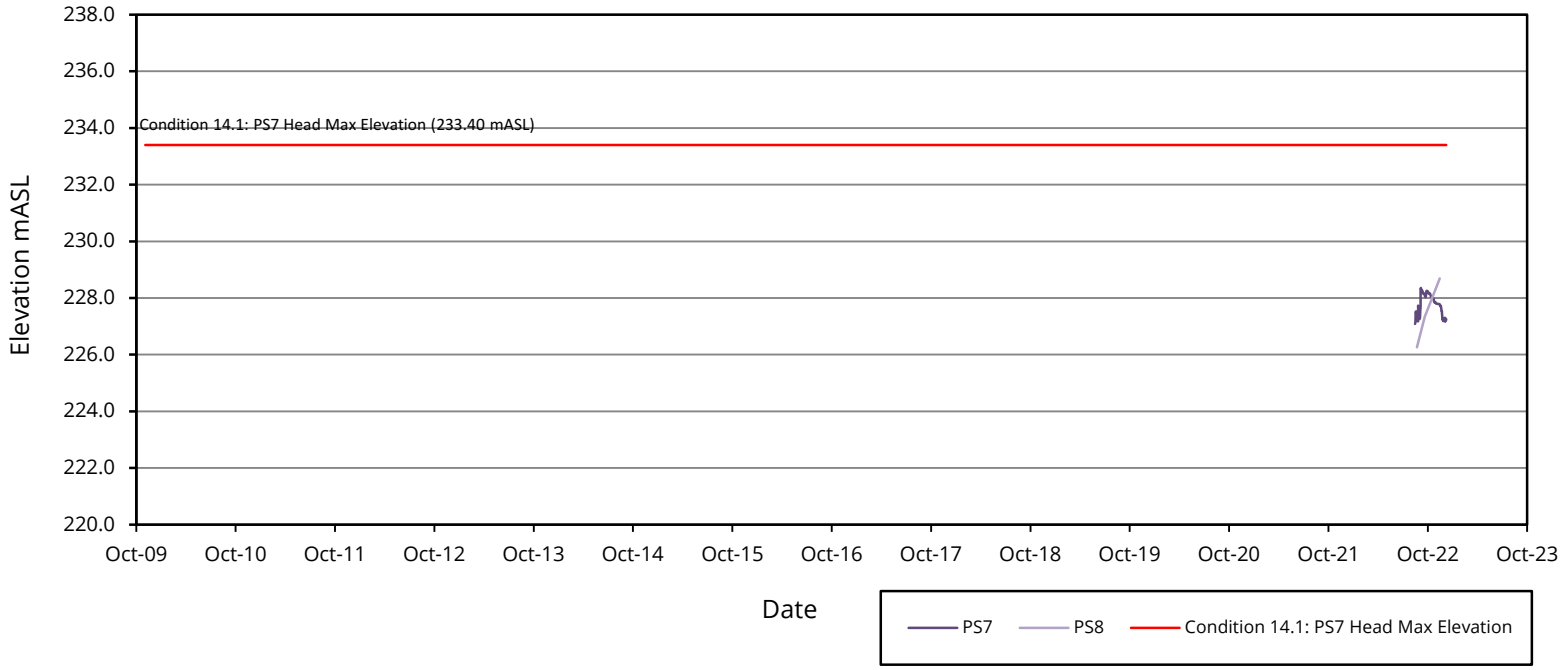


Table B-7
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW16-5*	OW16-6*	OW16-7	OW17-4	OW17-30	OW19-29	OW39-26	OW39A-26	OW40-6	OW40A-4	OW40B-4	OW40B-4r	OW40D-4*	OW40A-7	OW40-28	OW40A-28
T.O.P.	**241.50**	**241.36**	**241.55**	**240.64**	**240.72**	**241.83**	**235.74**	**235.60**	**239.14**	**239.08**	**238.74**	**238.66**	**238.76**	**239.13**	**239.09**	**239.11**
23-Mar-84	238.57		238.73	235.65	232.27											
12-Apr-84	240.08		238.97	237.88	232.80											
3-May-84	239.97		238.85	238.67	232.88											
29-Jun-84	239.83		238.75	238.86	233.26											
27-Jul-84	239.31		238.29	238.48	233.43											
10-Sep-84	239.02		238.25	238.35	233.30											
19-Oct-84	238.84		238.25		233.28											
27-Nov-84	239.16		238.60		233.35											
17-Dec-84	239.49		238.62	238.60	233.38											
1-Feb-85	239.31		238.40	238.54	233.44											
27-Feb-85	239.45		238.37	238.80	237.14											
26-Mar-85	239.81		238.75	238.97	235.58											
26-Apr-85	239.87		238.80	238.98	236.51											
21-May-85	239.36		237.86	238.66	236.40											
15-Jul-85	238.71		237.68	238.02	233.17											
10-Sep-85	238.30		237.69	237.38	232.97											
13-Mar-86				238.66	235.13											
8-Apr-86	239.68		238.59													
5-Sep-86	237.88		238.17	238.19	235.80											
25-Feb-87	240.01		238.73	238.35	235.88											
25-Mar-87	240.07		238.92	238.45	233.85											
29-Apr-87	240.04		238.94	238.64	233.95											
22-May-87	239.63		238.71	238.36	233.78											
26-May-88	239.34		238.45	237.66	233.67											
18-Aug-88	238.77		237.92	237.42	232.68											
2-Nov-88	238.72		238.14	236.86	232.71											
6-Jun-89				237.10	233.02											
25-Oct-89	238.38		237.64	237.16	232.38				233.58						230.35	
14-May-90	239.52		238.57	238.16	234.00				237.15						230.66	
14-Aug-90	238.85		238.02	238.10	233.70				236.86						230.71	
6-Dec-90	239.56		238.61	237.83	234.13				237.19						230.87	
15-May-91	239.92		238.90	238.13	233.66				237.33						231.10	
21-Aug-91	238.69		237.72	238.85	233.56				236.50						230.76	
15-Nov-91	237.54		236.80	237.41	233.36				234.96						230.73	
25-May-92	238.88		238.56	237.86	234.09				236.79						230.84	
10-Nov-92	239.26		238.52	238.36	234.50				237.14						231.02	
19-Apr-93																
13-Jun-93	239.34		238.54	237.65	234.22				237.20						231.21	
4-Dec-93	237.60		238.06	237.72	234.50				234.36						231.03	
10-May-94	239.39		238.65	238.43	234.34				236.58						230.97	
13-Dec-94	236.88		236.84	236.80	234.25				236.92						230.74	

Table B-7
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW16-5*	OW16-6*	OW16-7	OW17-4	OW17-30	OW19-29	OW39-26	OW39A-26	OW40-6	OW40A-4	OW40B-4	OW40B-4r	OW40D-4*	OW40A-7	OW40-28	OW40A-28
T.O.P.	**241.50**	**241.36**	**241.55**	**240.64**	**240.72**	**241.83**	**235.74**	**235.60**	**239.14**	**239.08**	**238.74**	**238.66**	**238.76**	**239.13**	**239.09**	**239.11**
9-Jun-95	239.25		238.59	238.00	234.00				235.39						230.73	
6-Nov-95	237.25		236.86	237.84	234.24											
6-May-96	238.90		238.78	238.86	234.49											
9-Dec-96	238.91		238.50	238.77	232.93											
12-May-97	239.70		238.97	239.05	235.05											
4-Dec-97	237.61		238.31	237.71	234.60											
3-Mar-98			239.03		234.98										231.60	
12-May-98	239.70		239.08	239.15	234.69											
21-Jul-98					234.53	234.16	231.28								230.55	
18-Dec-98	236.36		237.31	237.65	233.84											
13-Jan-99	236.37		237.49	237.06	233.86	233.04	231.26		236.09						230.58	
30-Mar-99	238.80		238.60	238.69	233.45											
1-Jun-99	238.70		238.44	238.06	233.32	233.92	231.31		236.94						230.46	
10-Nov-99	Dry		236.49	237.29	232.96	233.63	231.45		235.17						230.12	
21-Dec-99	Dry		237.22	238.05	233.10											
28-Mar-00	237.69		238.11	238.21	233.20											
19-Jun-00	238.59		238.42	238.72	233.06	233.71	230.90		237.18						230.15	
28-Nov-00	237.90		237.99	238.33	233.25	234.06	230.82		237.04						230.30	
5-Dec-00	237.70		238.21	238.74	233.36											
10-Apr-01	239.94		238.88	238.35	233.75											
20-Jun-01	238.89		238.49	239.03	233.74	234.28	231.37		237.42						230.65	
26-Nov-01	238.46		238.35	239.08	233.52	234.14	231.45		237.22						230.57	
21-May-02	239.75		238.82	239.86	233.80	234.32	231.78		237.33						230.73	
5-Jun-02	239.33		238.94	239.70	233.86	234.38	231.49		237.30						230.76	
22-Oct-02	236.47		237.37	238.57	233.39	233.86										
13-May-03	238.78		238.62	239.82	233.00	233.45										
12-Nov-03	<237.24**		237.80	239.95												
25-May-04	239.53		238.50	239.28												
21-Jun-04																
27-Sep-04	237.25		237.22	238.93	233.71	234.25										
26-Nov-04	<237.24**		236.80	238.51												
12-May-05	239.11		238.30	238.94	233.12	234.29										
29-Nov-05		234.98	236.79	237.39												
17-May-06		238.36	238.20	238.61	233.30	234.46										
22-Nov-06		237.05	238.00	239.64												
3-May-07		239.22	238.62	239.44												
15-Nov-07		<235.29**	236.23	238.40												
15-May-08		235.44	237.37	239.04	232.85	234.21	**228.77**									
4-Nov-08		237.68	237.66	238.99	233.05	234.36	231.00			235.53				236.41		230.12
12-May-09		239.36	238.61	239.39	233.54	234.85	231.48			235.99	235.99			237.11		230.54
16-Nov-09		237.54	237.74	238.84	233.35	234.62	231.51				236.28			236.63		230.52

Table B-7
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW16-5*	OW16-6*	OW16-7	OW17-4	OW17-30	OW19-29	OW39-26	OW39A-26	OW40-6	OW40A-4	OW40B-4	OW40B-4r	OW40D-4*	OW40A-7	OW40-28	OW40A-28
T.O.P.	**241.50**	**241.36**	**241.55**	**240.64**	**240.72**	**241.83**	**235.74**	**235.60**	**239.14**	**239.08**	**238.74**	**238.66**	**238.76**	**239.13**	**239.09**	**239.11**
14-May-10		238.57	238.37	239.72	233.39	234.61	231.61				237.52			236.99		230.55
9-Nov-10		236.23	236.31	239.20	233.08	234.35	230.80				235.43			236.63		230.33
9-May-11		239.27	238.54	239.64	233.16	234.48	230.64				237.92			237.01		230.37
1-Nov-11		237.89	237.76	239.71	233.18	234.47	230.76				237.27			236.79		230.44
7-May-12		238.65	238.29	239.39	233.50	234.78	230.94				237.96			237.10		230.68
5-Nov-12		236.18	236.07	239.73	233.01	234.32	230.47					234.45		235.93		230.28
6-May-13		238.88	238.18	238.93	232.95	234.26	230.47					237.10		236.77		230.11
4-Nov-13		236.39	236.30	239.52	233.04	234.41	230.52					235.77		235.80		**231.12**
5-May-14		239.52	238.77	239.26	233.17	234.56	230.93					237.54		237.15		230.42
23-May-14				239.45												
27-May-14																
17-Nov-14		238.77	238.41	239.06	233.18	234.58	230.38						234.68	236.89		230.46
11-May-15		239.27	238.65	239.19	233.18	234.57	230.54						236.51	237.10		230.46
10-Nov-15		236.85	236.85	239.53	232.95	234.30	230.25						236.07	236.80		230.28
24-May-16		238.99	238.48	239.55	233.02	234.33	230.23						237.60	237.46		230.40
14-Nov-16		236.68	236.87	239.40	232.64	234.07							235.77	236.67		230.06
15-May-17		238.97	238.34	239.29	232.77	234.15		229.71					237.49	237.43		230.16
6-Nov-17		236.88	236.56	239.67	232.50	233.93		229.61					235.91	236.22		229.89
7-May-18		239.32	238.53	239.54	232.60	234.08		229.25					237.07	237.14		229.94
5-Nov-18		238.74	238.36	239.85	232.42	233.94		229.17					237.26	237.21		229.85
13-May-19		239.80	239.01	239.69	232.85	234.29		229.76					237.82	237.46		230.19
4-Nov-19		238.08	237.98	239.33	232.63	234.07		229.64					237.70	237.07		229.96
4-May-20		239.48	238.91	239.63	232.90	234.24		230.15					237.80	237.32		230.24
2-Nov-20		236.97	237.14	239.09	232.47	233.94		229.38					235.90	236.34		229.89
17-May-21		238.89	238.76	239.36	232.57	233.53		230.43					235.86	237.56		229.88
1-Nov-21		239.38	238.62	239.50	232.50	233.63		230.65					238.02	237.22		229.75
2-May-22		239.68	238.95	239.72	232.64	233.91		230.87					238.01	237.27		229.88
1-Nov-22		239.08	237.84	239.24	232.54	233.68		230.61					236.19	236.66		229.80

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended ECA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

11) OW39-26 noted to have been damaged during the fall 2016 monitoring event.

Table B-7
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW46-7	OW47-6	OW49-29	OW54-4	OW54A-4	OW54-10	OW56-4*	OW57-4*	OW57-15	OW58-4*	OW58-6*	OW58-14	OW58-17	OW59-4*	OW59-6*	OW59-10
T.O.P.	240.66	240.77	243.21	242.71	242.95	243.44	240.46	241.32	241.44	241.71	241.62	241.53	242.17	241.79	241.84	242.03
23-Mar-84																
12-Apr-84																
3-May-84																
29-Jun-84																
27-Jul-84																
10-Sep-84																
19-Oct-84																
27-Nov-84																
17-Dec-84																
1-Feb-85																
27-Feb-85																
26-Mar-85																
26-Apr-85																
21-May-85																
15-Jul-85																
10-Sep-85																
13-Mar-86																
8-Apr-86																
5-Sep-86																
25-Feb-87																
25-Mar-87																
29-Apr-87																
22-May-87																
26-May-88																
18-Aug-88																
2-Nov-88																
6-Jun-89																
25-Oct-89																
14-May-90																
14-Aug-90																
6-Dec-90	237.78	237.94														
15-May-91	238.21	238.45														
21-Aug-91	238.37	238.26														
15-Nov-91	237.41	237.59														
25-May-92	236.99	237.64														
10-Nov-92	237.28	237.70														
19-Apr-93																
13-Jun-93	237.49	238.06														
4-Dec-93	238.04	237.42														
10-May-94	237.93	237.72														
13-Dec-94	236.69	236.87														

Table B-7
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW46-7	OW47-6	OW49-29	OW54-4	OW54A-4	OW54-10	OW56-4*	OW57-4*	OW57-15	OW58-4*	OW58-6*	OW58-14	OW58-17	OW59-4*	OW59-6*	OW59-10
T.O.P.	**240.66**	**240.77**	**243.21**	**242.71**	**242.95**	**243.44**	**240.46**	**241.32**	**241.44**	**241.71**	**241.62**	**241.53**	**242.17**	**241.79**	**241.84**	**242.03**
9-Jun-95	237.27	237.42														
6-Nov-95	237.18	236.80														
6-May-96		236.79														
9-Dec-96	237.47	237.20														
12-May-97	237.91	237.68														
4-Dec-97	237.78	237.34														
3-Mar-98	238.38	237.83														
12-May-98	238.71	238.20														
21-Jul-98																
18-Dec-98	237.60	236.81														
13-Jan-99	237.89	236.74					236.89	237.10		Dry				Dry		
30-Mar-99	237.80	237.19					237.61									
1-Jun-99		238.11					238.34	237.10	237.87	Dry		237.03		238.79		
10-Nov-99	236.92	235.78					236.26	237.32	237.70	Dry		236.48		Dry		235.33
21-Dec-99	237.10			240.50			Dry	237.16	237.40	Dry		233.96		Dry		
28-Mar-00	237.65			240.09			Dry	237.15	237.43	237.37		236.06		Dry		
19-Jun-00	237.24	237.96					236.74	238.78	237.86	Dry		236.39		Dry		236.54
28-Nov-00	238.09	237.19					237.76	237.83	238.49	237.39		237.10		237.52		236.82
5-Dec-00	236.94	238.27		240.72			236.19	237.81	238.46	237.36		237.11		Dry		236.77
10-Apr-01	238.35	237.72		241.58			237.21	237.84	238.55	Dry		236.06		237.83		237.30
20-Jun-01	238.57	238.19					238.75	238.24	238.80	Dry		237.55		238.95		237.54
26-Nov-01	238.16	237.88		240.88			238.94	238.59	238.96	238.97		235.46		237.80		236.77
21-May-02	238.83	238.21		241.18			239.08	238.53	239.05	237.43		238.07		237.51		237.59
5-Jun-02	238.90	238.26		241.03			237.43	237.63	238.99	237.55		238.13		237.62		237.64
22-Oct-02	238.13	237.75		238.55			237.99	239.10	238.86	238.51		238.00		237.45		236.29
13-May-03	237.82	237.34		240.48			238.61	238.05	237.66	<237.96**		237.24		237.39		235.33
12-Nov-03	238.37	237.61		240.78			239.81	238.58	238.31	238.98		237.89		237.41		236.79
25-May-04	238.87	238.38		240.95			239.12	238.80	238.82	<237.75**		238.23		Dry		238.22
21-Jun-04																
27-Sep-04	238.62	238.00		239.36			238.53	239.32	238.93	238.95		238.40		237.72		238.88
26-Nov-04	238.03	237.45		238.57			239.72	238.62	238.61	238.68		237.86		237.60		238.56
12-May-05	238.41	237.99		240.55			238.79	238.35	238.45	238.52		238.37		237.48		238.42
29-Nov-05	237.79	236.92		240.44			239.47	238.07	238.30		235.48	238.28			238.04	238.52
17-May-06	238.39	237.47		240.97			238.01	238.09	238.64		235.98	238.53			239.57	237.13
22-Nov-06	238.27	237.39		240.30			238.45	238.36	238.73		237.07	238.47			238.56	238.83
3-May-07	238.81	238.22		240.92			238.83	238.73	239.00		238.09	238.87			238.69	239.06
15-Nov-07	237.44	236.47		239.03			236.42	238.12	238.02		237.89	238.29			238.29	238.36
15-May-08	237.43	236.54			237.44		237.24	237.76	237.55		237.39	238.05			238.04	238.35
4-Nov-08	237.94	237.35			239.72		237.92	238.44	238.36		238.57	238.26			238.98	239.05
12-May-09	238.43	238.35	234.25		239.45	240.98	239.10	239.02	238.79		239.32	238.58			239.56	239.27
16-Nov-09	238.25	237.92	233.99		239.72	240.54	238.42	238.79	238.70		238.64	238.67			239.25	238.95

Table B-7
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW46-7	OW47-6	OW49-29	OW54-4	OW54A-4	OW54-10	OW56-4*	OW57-4*	OW57-15	OW58-4*	OW58-6*	OW58-14	OW58-17	OW59-4*	OW59-6*	OW59-10
T.O.P.	**240.66**	**240.77**	**243.21**	**242.71**	**242.95**	**243.44**	**240.46**	**241.32**	**241.44**	**241.71**	**241.62**	**241.53**	**242.17**	**241.79**	**241.84**	**242.03**
14-May-10	238.46	237.91	234.06		239.63	240.02	238.75	238.90	238.50		239.17	239.28			239.42	239.53
9-Nov-10	237.68	237.28	233.62		239.67	239.50	237.36	238.39	238.37		237.99	238.44			238.93	238.71
9-May-11	238.16	237.78	233.85		239.88	239.47	238.86	238.61	238.43		237.66	238.35			239.29	239.71
1-Nov-11	238.32	237.95	233.83		239.94	239.63	238.45	238.96	238.75		238.56	238.64			239.33	239.90
7-May-12	238.31	238.23	234.16		240.05	239.46	238.87	239.38	238.34		238.56	238.58			239.83	239.91
5-Nov-12	237.70	237.38	233.49		240.14	238.75	237.37	238.46	238.47		237.59	238.53			238.42	239.59
6-May-13	237.64	237.02	233.63		240.41	238.83	238.24	238.10	238.06		237.15	238.30			238.93	239.46
4-Nov-13	237.58	237.26	233.80		240.20	238.89	237.55	238.34	238.35		237.51	238.39			238.51	239.64
5-May-14	238.46	238.12	233.91		240.46	238.99	238.91	238.95	238.67		237.64	238.14			239.55	239.01
23-May-14					240.67		238.97	239.02			237.77					
27-May-14												237.13	234.77			
17-Nov-14	237.56	238.28	233.85		240.72	238.98	238.69	238.85	238.89		238.03	238.71	237.33		239.44	239.20
11-May-15	238.66	238.03	233.86		240.95	238.85	239.36	239.36	238.75		238.12	238.80	237.84		239.95	238.91
10-Nov-15	238.20	237.94	233.49		240.01	238.53	237.99	238.60	238.59		238.03	238.65	237.88		239.15	238.80
24-May-16	238.42	238.20	233.65		241.12	238.69	238.97	238.85	238.50		237.59	238.59	237.52		239.56	238.71
14-Nov-16	238.38	237.66	233.22		240.52	238.30	237.87	238.50	238.43		237.99		236.60		238.66	238.75
15-May-17	238.30	237.51	233.46		241.36	238.30	238.93	238.93	238.47		237.67		237.35		239.46	238.75
6-Nov-17	238.30	237.58	233.00		239.88	238.42	238.47	238.80	238.58		238.66		237.66		239.25	238.90
7-May-18	238.70	237.76	233.19		241.46	238.23	239.29	239.90	238.93		239.87		237.67		240.16	239.06
5-Nov-18	238.94	237.93	233.01		241.07	238.46	238.85	239.28	238.98		239.44		237.85		239.70	239.24
13-May-19	239.15	239.52	233.43		241.79	238.63	239.61	240.25	239.30		240.50		237.98		240.56	239.41
4-Nov-19	239.02	238.30	232.41		240.79	238.19	239.00	239.06	239.05		239.18		238.02		239.61	239.04
4-May-20	239.28	238.64	233.29		241.80	238.38	239.53	240.24	239.33		240.42		237.98		240.41	239.14
2-Nov-20	238.71	237.97	232.99		239.62	237.96	238.68	238.89	238.71		240.17		237.73		238.92	238.52
17-May-21	238.99	238.10	233.07		240.95	237.89	239.09	240.04	239.07		240.01		237.39		239.91	238.55
1-Nov-21	239.21	238.14	232.88		241.34	238.19	238.84	239.42	239.18		240.92		237.77		239.40	238.50
2-May-22	239.20	238.54	233.14		241.90	238.48	239.43	239.60	239.23		240.88		237.85		240.28	238.66
1-Nov-22	238.89	238.11	232.64		240.16	238.22	238.37	238.80	238.72		239.18		237.35		239.66	237.73

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended ECA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW60-4*	OW60-8	OW60-25	OW67-4*	OW67-11	OW68-5	OW69-5*	OW70-5*	OW70B-5	OW71-5*	OW71A-5*	OW72-6*	OW72-10	OW73-6*	OW73-9	OW79-5*
T.O.P.	235.73	235.76	235.74	243.26	243.1	241.68	240.66^	242.53^	242.84	242.79	242.75	242.72	243.09	242.43	242.88	238.559
23-Mar-84																
12-Apr-84																
3-May-84																
29-Jun-84																
27-Jul-84																
10-Sep-84																
19-Oct-84																
27-Nov-84																
17-Dec-84																
1-Feb-85																
27-Feb-85																
26-Mar-85																
26-Apr-85																
21-May-85																
15-Jul-85																
10-Sep-85																
13-Mar-86																
8-Apr-86																
5-Sep-86																
25-Feb-87																
25-Mar-87																
29-Apr-87																
22-May-87																
26-May-88																
18-Aug-88																
2-Nov-88																
6-Jun-89																
25-Oct-89																
14-May-90																
14-Aug-90																
6-Dec-90																
15-May-91																
21-Aug-91																
15-Nov-91																
25-May-92																
10-Nov-92																
19-Apr-93																
13-Jun-93																
4-Dec-93																
10-May-94																
13-Dec-94																

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW60-4*	OW60-8	OW60-25	OW67-4*	OW67-11	OW68-5	OW69-5*	OW70-5*	OW70B-5	OW71-5*	OW71A-5*	OW72-6*	OW72-10	OW73-6*	OW73-9	OW79-5*
T.O.P.	**235.73**	**235.76**	**235.74**	**243.26**	**243.1**	**241.68**	**240.66^**	**242.53^**	**242.84**	**242.79**	**242.75**	**242.72**	**243.09**	**242.43**	**242.88**	**238.559**
9-Jun-95																
6-Nov-95																
6-May-96																
9-Dec-96																
12-May-97																
4-Dec-97																
3-Mar-98																
12-May-98																
21-Jul-98																
18-Dec-98																
13-Jan-99	235.00	234.11	231.19													
30-Mar-99																
1-Jun-99	234.51	**230.91**	231.65													
10-Nov-99	231.60	**228.19**	231.49	241.09	238.38											
21-Dec-99				240.88	238.71											
28-Mar-00				241.67	239.18											
19-Jun-00	235.14	234.63		242.18	239.58											
28-Nov-00	235.14	234.46	231.73	241.88	239.65											
5-Dec-00				241.83	240.57											
10-Apr-01				242.37	239.96											
20-Jun-01	234.55	234.84	232.04	241.70	239.94											
26-Nov-01	234.99	234.47	231.88	242.44	239.47											
21-May-02	234.48	235.06	232.01	242.10	239.97	239.32	238.55	241.69								
5-Jun-02	234.49	235.02	232.06	241.97	239.97	239.18	238.57	239.18								
22-Oct-02				239.75	238.59	236.79	238.25	239.52								
13-May-03				242.35	238.31	239.54	237.23	241.44								
12-Nov-03				242.43	238.32	237.48	237.49	240.67								
25-May-04				242.69	239.32	239.77	238.34	241.81								
21-Jun-04										241.58						
27-Sep-04				240.57	238.77	237.42	238.49	240.22		240.28						
26-Nov-04				239.94	238.23	<237.30**	237.99	239.50		239.22						
12-May-05				242.00	238.77	239.11	237.63	241.60		241.57						
29-Nov-05				242.69	238.12	237.33	237.69	238.84		238.52		236.19	237.14	237.35	238.65	
17-May-06				242.72	239.28	239.59	237.66	241.38		241.50		236.53	237.84	239.52	236.01	
22-Nov-06				242.52	239.00	238.56	237.90	241.52		241.46		237.30	239.05	238.26	239.05	
3-May-07				242.31	239.58	239.63	238.33	241.74		241.97		238.22	240.09	238.10	239.16	
15-Nov-07				<239.54**	236.34	<237.30**	237.44			238.48		239.33		238.82	239.82	
15-May-08	234.82	233.97	**229.04**	239.64	238.39	238.13	236.71		DRY	240.19		238.92	240.90	238.47	239.32	
4-Nov-08	234.51	233.77	230.88	242.53	238.38	238.78	237.80		238.66	239.42		240.08	241.49	239.04	239.70	
12-May-09	235.15	235.05	231.94	242.52	240.82	239.62	237.78		238.27	240.12		239.62	240.88	238.65	239.44	237.31
16-Nov-09	234.73	234.09	231.78	242.05	239.31	237.72	238.14		239.84	240.48		240.03	240.45	238.98	239.17	233.17

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW60-4*	OW60-8	OW60-25	OW67-4*	OW67-11	OW68-5	OW69-5*	OW70-5*	OW70B-5	OW71-5*	OW71A-5*	OW72-6*	OW72-10	OW73-6*	OW73-9	OW79-5*
T.O.P.	**235.73**	**235.76**	**235.74**	**243.26**	**243.1**	**241.68**	**240.66^**	**242.53^**	**242.84**	**242.79**	**242.75**	**242.72**	**243.09**	**242.43**	**242.88**	**238.559**
14-May-10	235.16	234.94	231.92	242.64	239.31	239.76	237.78		239.91	**242.10**		238.65	239.86	238.39	238.87	235.77
9-Nov-10	234.62	230.76	231.59	242.55	238.41	<237.30**	237.82		240.25			239.77	239.72	238.82	238.95	DRY
9-May-11	235.14	234.86	231.75	242.39	239.14	239.66	237.47		241.54		241.05	238.95	239.41	238.18	238.74	236.42
1-Nov-11	234.98	234.27	231.76	241.86	238.95	238.26	238.15		240.86		241.14	239.60	239.55	238.77	238.99	<233.74**
7-May-12	235.10	234.94	232.10	241.68	239.24	238.91	238.62		241.35		241.46	239.10	239.29	238.39	238.87	236.60
5-Nov-12	232.45	231.28	231.56	242.44	237.95	237.35	238.09		240.44		239.61	239.30	238.91	239.74	238.73	233.74
6-May-13	235.14	234.72	**229.55**	242.13	238.71	239.29	237.44		241.85		241.57	238.36	238.65	237.98	238.38	236.54
4-Nov-13	232.68	231.25	231.71	242.53	238.08	237.79	237.97		240.71		239.77	239.45	239.10	239.79	238.79	233.87
5-May-14	235.11	234.92	231.94	242.48	239.03	239.63	238.54		241.94		242.18	238.49	238.70	238.12	238.58	237.35
23-May-14							237.97					238.70		238.24		
27-May-14																
17-Nov-14	235.19	234.78	231.94	242.28	239.11	239.37	238.45		241.35		242.01	239.11	238.75	238.80	238.96	235.04
11-May-15	235.18	235.06	231.89	242.27	239.00	239.46	238.23		241.73		241.99	238.63	238.56	238.33	238.66	236.96
10-Nov-15	232.42	232.42	231.59	242.19	238.10		238.23		240.64		240.30	239.17	238.53	238.77	238.67	233.16
24-May-16	235.01	234.83	231.77	242.06	238.75	239.35	238.03		241.80		242.04	238.38	238.39	238.08	238.44	236.79
14-Nov-16	<232.44	231.81	231.38	241.96	237.71	237.43	238.02		240.87		241.27	238.96	238.51	238.72	238.68	233.77
15-May-17	234.95	234.78	231.55	242.19	237.80	238.98	237.90		241.82		242.04	236.49	238.39	238.17	238.49	236.93
6-Nov-17	232.44	231.29	231.22	242.51	237.51	237.34	238.12		240.96		241.86	238.92	238.26	238.70	238.70	233.77
7-May-18	235.14	234.73	231.36	242.49	237.81	239.32	238.47		241.95		242.27	240.06	238.38	239.40	238.83	236.85
5-Nov-18	235.03	234.52	231.24	242.56	238.04	239.32	238.58		241.29		242.14	240.09	238.53	239.67	238.83	235.61
13-May-19	235.03	235.06	231.63	242.60	238.04	239.91	239.15		242.04		242.30	240.54	238.82	240.20	239.17	237.36
4-Nov-19	234.98	233.99	231.34	242.53	237.77	239.05	238.84		241.34		241.97	239.99	238.46	239.71	239.01	<233.74**
4-May-20	235.15	235.01	231.57	242.32	237.93	239.43	239.32		241.90		242.14	240.61	238.58	240.73	239.06	237.01
2-Nov-20	232.45	231.00	231.27	242.47	237.67	238.05	238.77		241.27		241.20	239.81	238.16	239.26	238.71	233.73
17-May-21	234.74	234.78	231.23	241.86	237.87	238.91	239.08		241.30		241.80	240.50	238.29	240.71	238.78	236.06
1-Nov-21	235.24	234.77	230.99	242.50	237.96	239.86	239.07		241.62		242.24	240.46	238.33	240.17	238.77	235.53
2-May-22	235.21	234.72	231.40	242.47	238.11	239.66	239.24		242.02		242.09	240.90	238.60	240.68	238.76	235.75
1-Nov-22	235.00	233.97	230.98	242.39	237.76	238.20	238.75		240.28		240.88	240.89	238.59	240.08	239.06	234.56

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended CofA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW79-7	OW79-26	OW80-3*	OW80-6	OW80-27	OW81-5*	OW81-7	OW81-27	OW82-5	OW82-14	OW82-28	OW83-5	OW83-9	OW83-29
T.O.P.	238.773	238.954	236.156	236.59	236.58	236.04	236.5	236.55	236.76	236.99	236.92	240.75	240.89	240.82
23-Mar-84														
12-Apr-84														
3-May-84														
29-Jun-84														
27-Jul-84														
10-Sep-84														
19-Oct-84														
27-Nov-84														
17-Dec-84														
1-Feb-85														
27-Feb-85														
26-Mar-85														
26-Apr-85														
21-May-85														
15-Jul-85														
10-Sep-85														
13-Mar-86														
8-Apr-86														
5-Sep-86														
25-Feb-87														
25-Mar-87														
29-Apr-87														
22-May-87														
26-May-88														
18-Aug-88														
2-Nov-88														
6-Jun-89														
25-Oct-89														
14-May-90														
14-Aug-90														
6-Dec-90														
15-May-91														
21-Aug-91														
15-Nov-91														
25-May-92														
10-Nov-92														
19-Apr-93														
13-Jun-93														
4-Dec-93														
10-May-94														
13-Dec-94														

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW79-7	OW79-26	OW80-3*	OW80-6	OW80-27	OW81-5*	OW81-7	OW81-27	OW82-5	OW82-14	OW82-28	OW83-5	OW83-9	OW83-29
T.O.P.	**238.773**	**238.954**	**236.156**	**236.59**	**236.58**	**236.04**	**236.5**	**236.55**	**236.76**	**236.99**	**236.92**	**240.75**	**240.89**	**240.82**
9-Jun-95														
6-Nov-95														
6-May-96														
9-Dec-96														
12-May-97														
4-Dec-97														
3-Mar-98														
12-May-98														
21-Jul-98														
18-Dec-98														
13-Jan-99														
30-Mar-99														
1-Jun-99														
10-Nov-99														
21-Dec-99														
28-Mar-00														
19-Jun-00														
28-Nov-00														
5-Dec-00														
10-Apr-01														
20-Jun-01														
26-Nov-01														
21-May-02														
5-Jun-02														
22-Oct-02														
13-May-03														
12-Nov-03														
25-May-04														
21-Jun-04														
27-Sep-04														
26-Nov-04														
12-May-05														
29-Nov-05														
17-May-06														
22-Nov-06														
3-May-07														
15-Nov-07														
15-May-08														
4-Nov-08														
12-May-09	236.25	231.68	234.94	235.45	230.99									
16-Nov-09	232.48	231.71	234.32	234.41	231.06									

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW79-7	OW79-26	OW80-3*	OW80-6	OW80-27	OW81-5*	OW81-7	OW81-27	OW82-5	OW82-14	OW82-28	OW83-5	OW83-9	OW83-29
T.O.P.	**238.773**	**238.954**	**236.156**	**236.59**	**236.58**	**236.04**	**236.5**	**236.55**	**236.76**	**236.99**	**236.92**	**240.75**	**240.89**	**240.82**
14-May-10	233.55	231.39	235.18	235.13	230.79									
9-Nov-10	232.31	230.98	234.54	233.85	230.41									
9-May-11	234.94	230.82	235.01	235.46	230.29									
1-Nov-11	233.83	230.97	234.93	235.10	230.33									
7-May-12	235.62	231.14	234.78	235.05	230.51									
5-Nov-12	232.40	230.69	234.87	233.32	230.03									
6-May-13	235.67	230.46	234.78	235.24	229.89									
4-Nov-13	232.25	230.83	234.85	233.34	230.01									
5-May-14	236.35	230.92	235.54	235.54	230.33									
23-May-14														
27-May-14														
17-Nov-14	235.17	230.39	235.02	235.31	229.88									
11-May-15	236.15	230.54	234.67	235.14	230.05									
10-Nov-15	233.16	230.28	234.68	234.15	229.76									
24-May-16	236.13	230.20	234.93	235.17	229.74									
14-Nov-16	233.29	229.71	234.73	234.57	229.30									
15-May-17	236.28	229.91	234.86	235.27	229.53									
6-Nov-17	232.89	229.83	234.82	234.29	229.37									
7-May-18	236.19	229.46	235.08	235.42	229.10									
5-Nov-18	234.82	229.38	235.18	235.37	228.98									
13-May-19	236.59	229.97	235.25	235.56	229.50									
4-Nov-19	233.88	229.88	235.32	235.12	229.39	234.64	234.38	229.42						
4-May-20	236.17	230.35	234.84	235.21	229.87	235.12	235.11	229.88						
2-Nov-20	232.57	229.59	235.20	234.05	229.19	234.75	234.54	229.27						
17-May-21	235.38	230.60	234.49	234.85	230.11	234.91	234.90	230.15						
1-Nov-21	235.34	230.84	235.33	235.39	230.36	235.16	235.05	230.42						
2-May-22	235.75	231.09	235.20	235.44	229.64	235.23	235.15	229.88						
1-Nov-22	232.72	230.76	234.88	234.62	230.28	234.76	234.56	230.37	235.07	234.56	231.24	237.52	235.31	230.39

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended CofA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

11) OW81-5, OW81-7 and OW81-27 installed in June 2019.

12) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, and OW84-31 installed in June 2022.

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW84-6	OW84-11	OW84-31	P1	P2	P3
T.O.P.	243.86	244.03	243.905	240.38	240.58	240.62
23-Mar-84						
12-Apr-84						
3-May-84						
29-Jun-84						
27-Jul-84						
10-Sep-84						
19-Oct-84						
27-Nov-84						
17-Dec-84						
1-Feb-85						
27-Feb-85						
26-Mar-85						
26-Apr-85						
21-May-85						
15-Jul-85						
10-Sep-85						
13-Mar-86						
8-Apr-86						
5-Sep-86						
25-Feb-87						
25-Mar-87						
29-Apr-87						
22-May-87						
26-May-88						
18-Aug-88						
2-Nov-88						
6-Jun-89						
25-Oct-89						
14-May-90						
14-Aug-90						
6-Dec-90						
15-May-91						
21-Aug-91						
15-Nov-91						
25-May-92						
10-Nov-92						
19-Apr-93						
13-Jun-93						
4-Dec-93						
10-May-94						
13-Dec-94						

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW84-6	OW84-11	OW84-31	P1	P2	P3
T.O.P.	243.86	244.03	243.905	240.38	240.58	240.62
9-Jun-95						
6-Nov-95						
6-May-96						
9-Dec-96						
12-May-97						
4-Dec-97						
3-Mar-98						
12-May-98						
21-Jul-98						
18-Dec-98						
13-Jan-99						
30-Mar-99						
1-Jun-99						
10-Nov-99						
21-Dec-99						
28-Mar-00						
19-Jun-00						
28-Nov-00						
5-Dec-00						
10-Apr-01						
20-Jun-01						
26-Nov-01						
21-May-02						
5-Jun-02						
22-Oct-02						
13-May-03						
12-Nov-03						
25-May-04						
21-Jun-04						
27-Sep-04						
26-Nov-04						
12-May-05						
29-Nov-05						
17-May-06						
22-Nov-06						
3-May-07						
15-Nov-07						
15-May-08						
4-Nov-08						
12-May-09						
16-Nov-09						

Table B-7
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW84-6	OW84-11	OW84-31	P1	P2	P3
T.O.P.	**243.86**	**244.03**	**243.905**	**240.38**	**240.58**	**240.62**
14-May-10						
9-Nov-10						
9-May-11						
1-Nov-11						
7-May-12						
5-Nov-12						
6-May-13						
4-Nov-13						
5-May-14						
23-May-14						
27-May-14						
17-Nov-14						
11-May-15						
10-Nov-15						
24-May-16						
14-Nov-16						
15-May-17						
6-Nov-17						
7-May-18						
5-Nov-18				239.11	239.32	239.31
13-May-19				239.14	239.37	239.36
4-Nov-19				239.13	239.34	239.34
4-May-20				238.85	238.95	239.03
2-Nov-20				237.98	238.20	238.20
17-May-21				238.69	238.76	238.85
1-Nov-21				239.11	239.11	239.27
2-May-22				239.08	239.15	239.29
1-Nov-22	239.59	239.71	232.46	239.59	239.95	240.01

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended CofA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

11) OW81-5, OW81-7 and OW81-27 installed in June 2019.

12) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, and OW84-31 installed in June 2022.

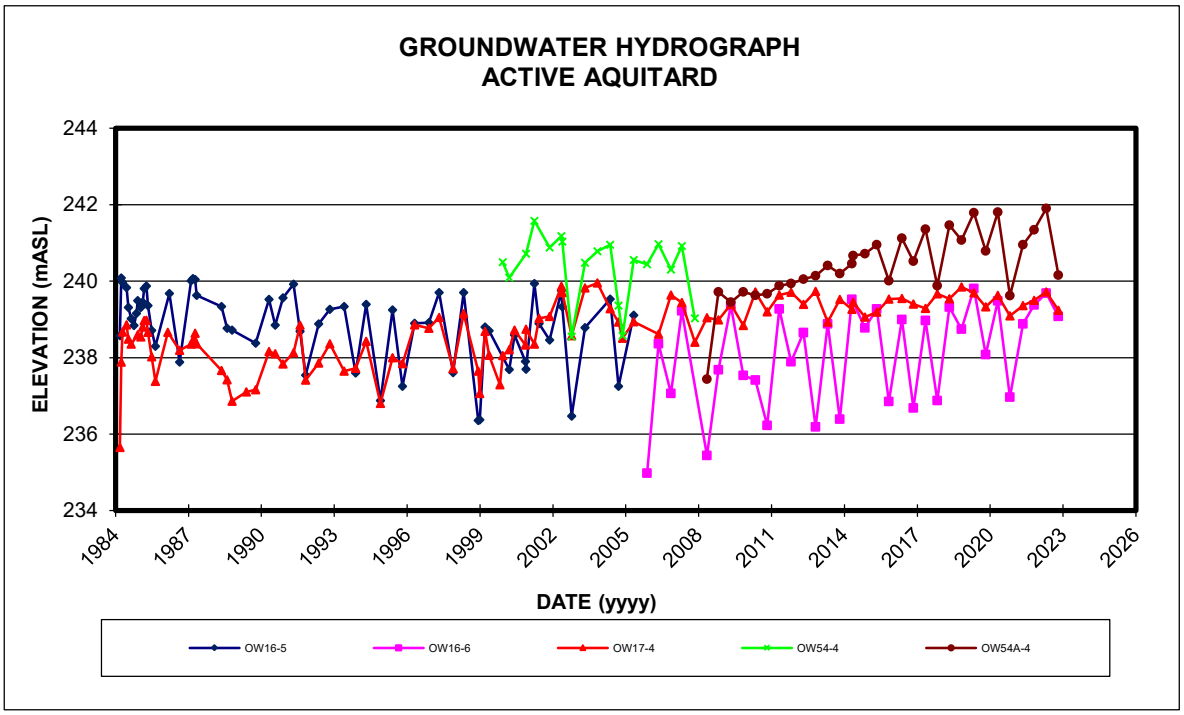


FIGURE B-19

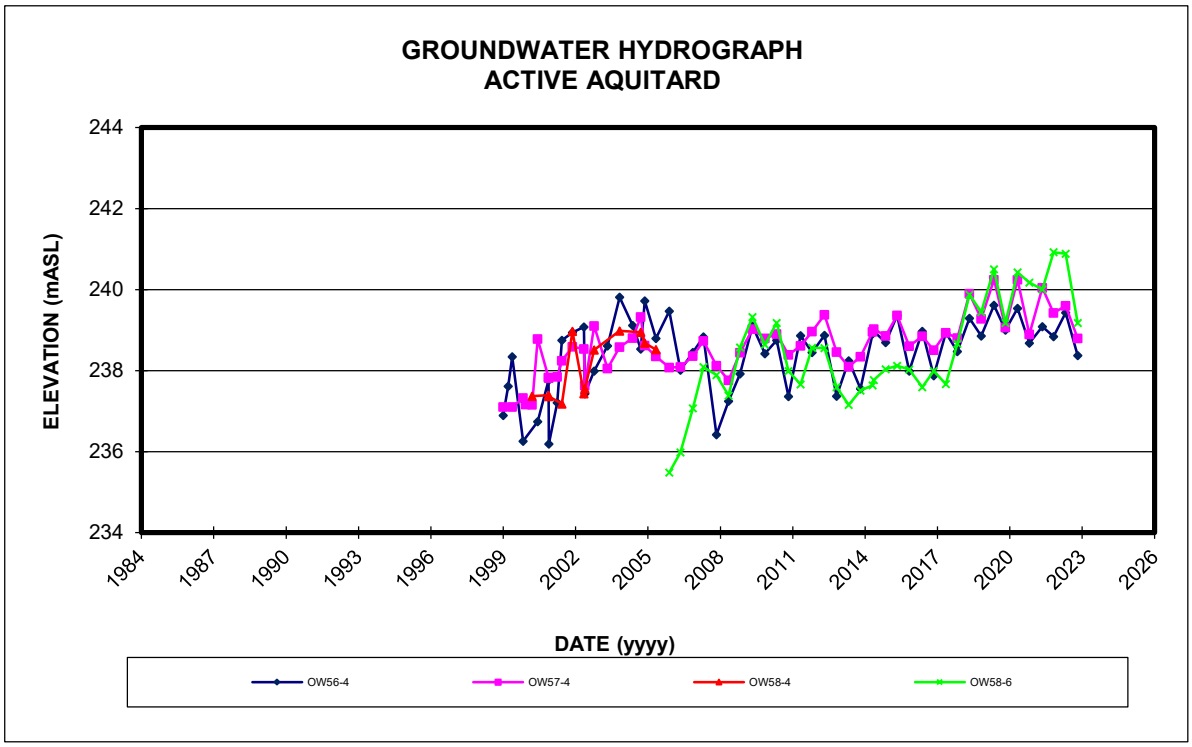


FIGURE B-20

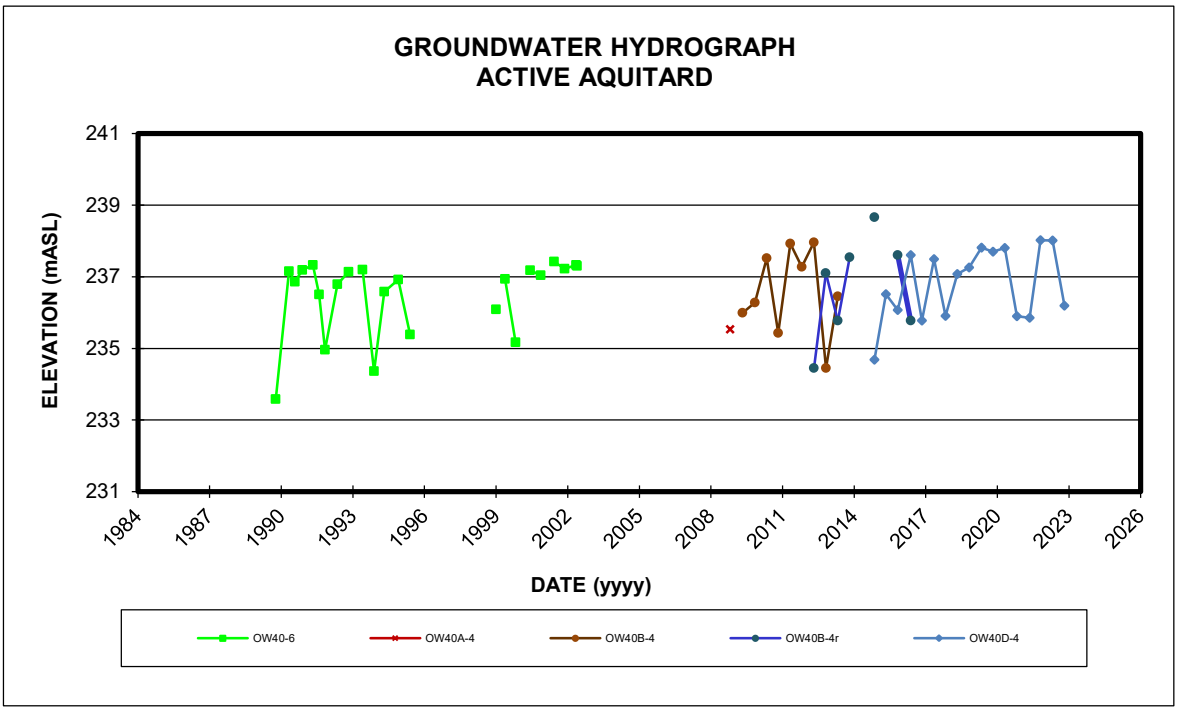


FIGURE B-21

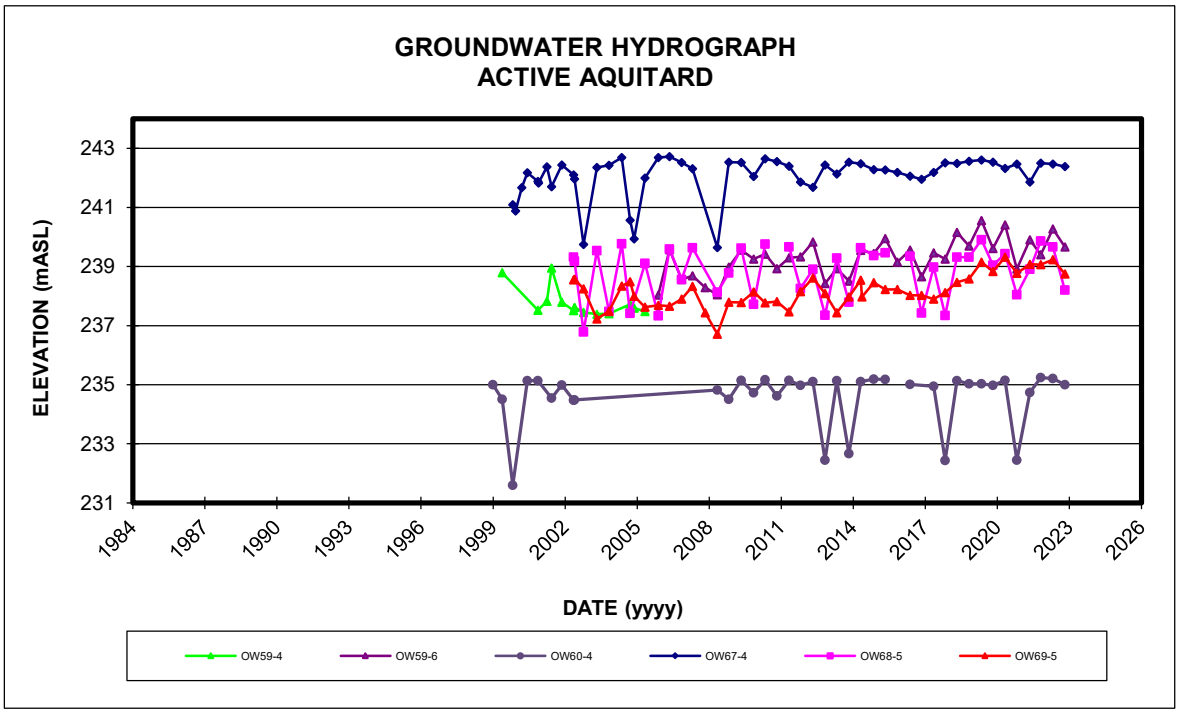


FIGURE B-22

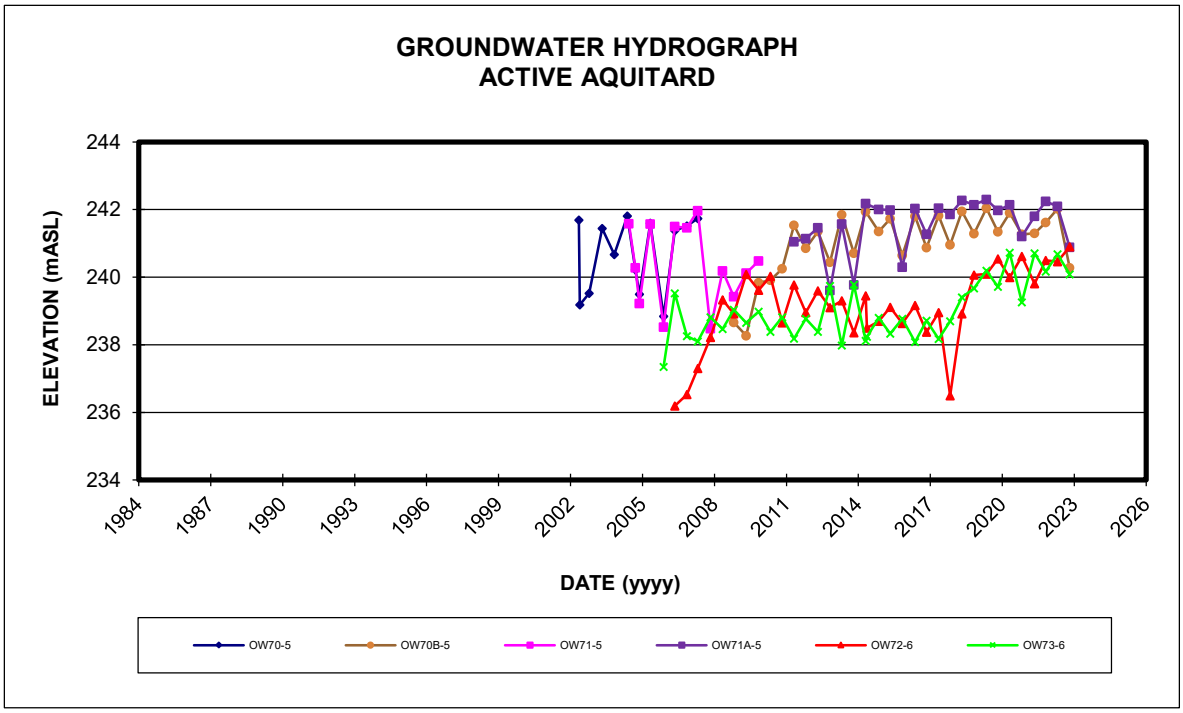


FIGURE B-23

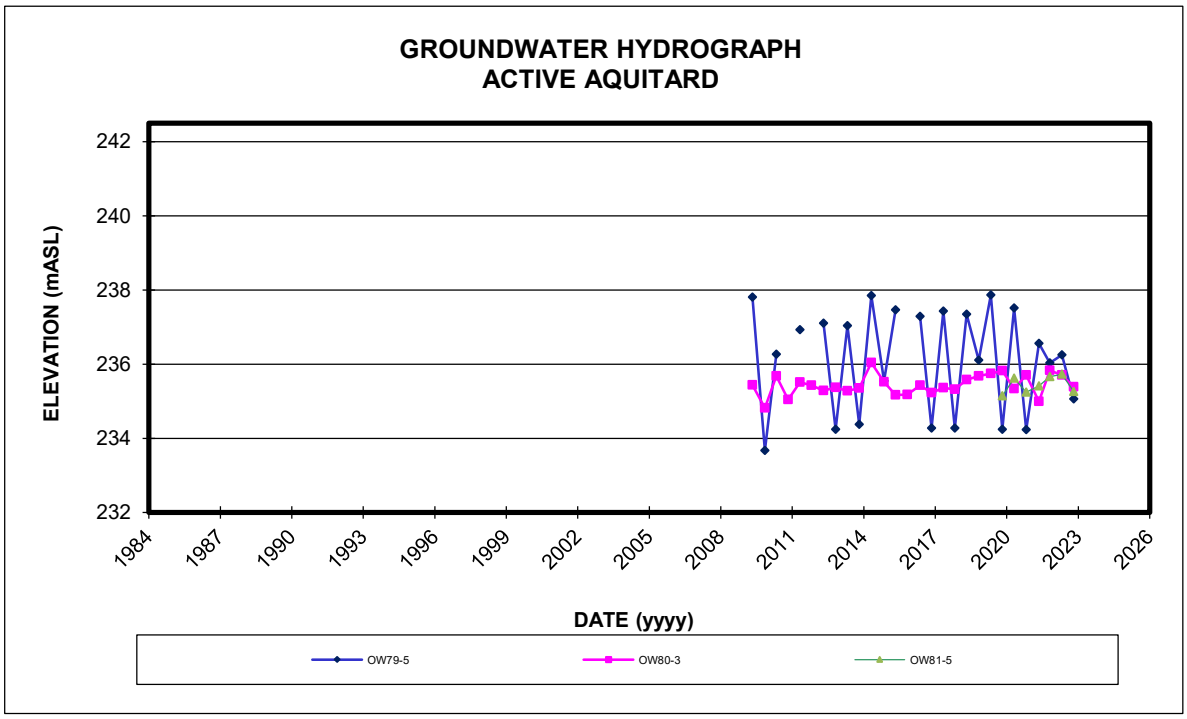


FIGURE B-24

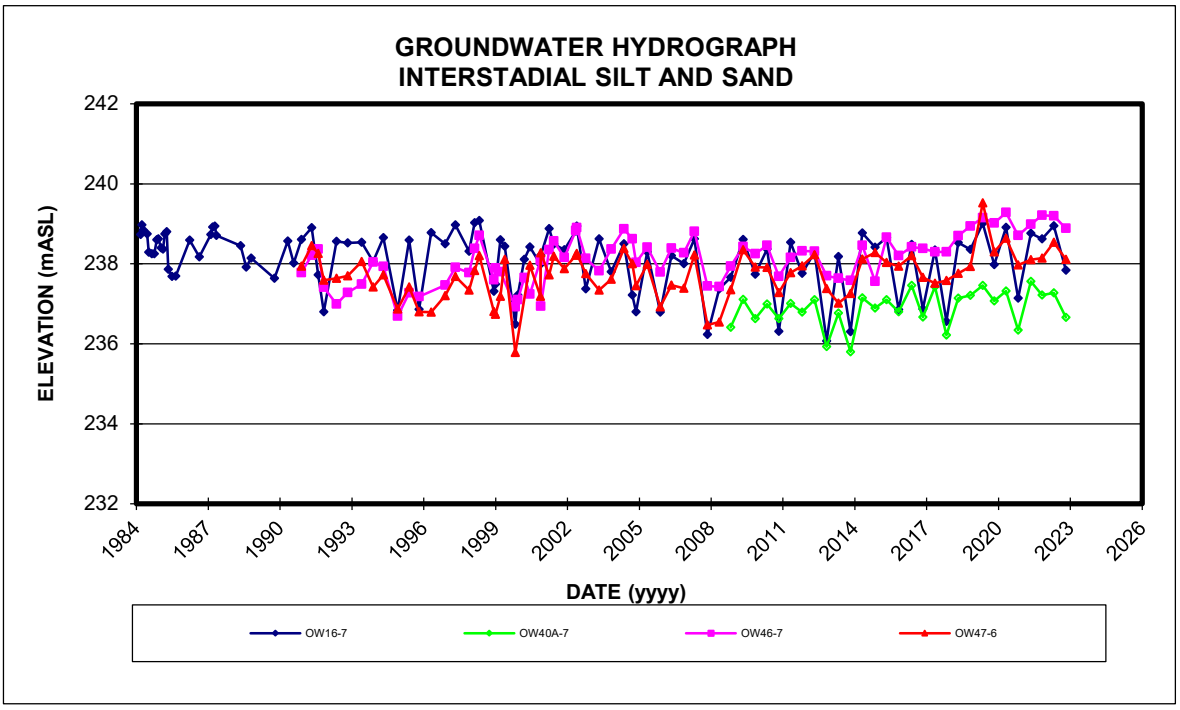


FIGURE B-25

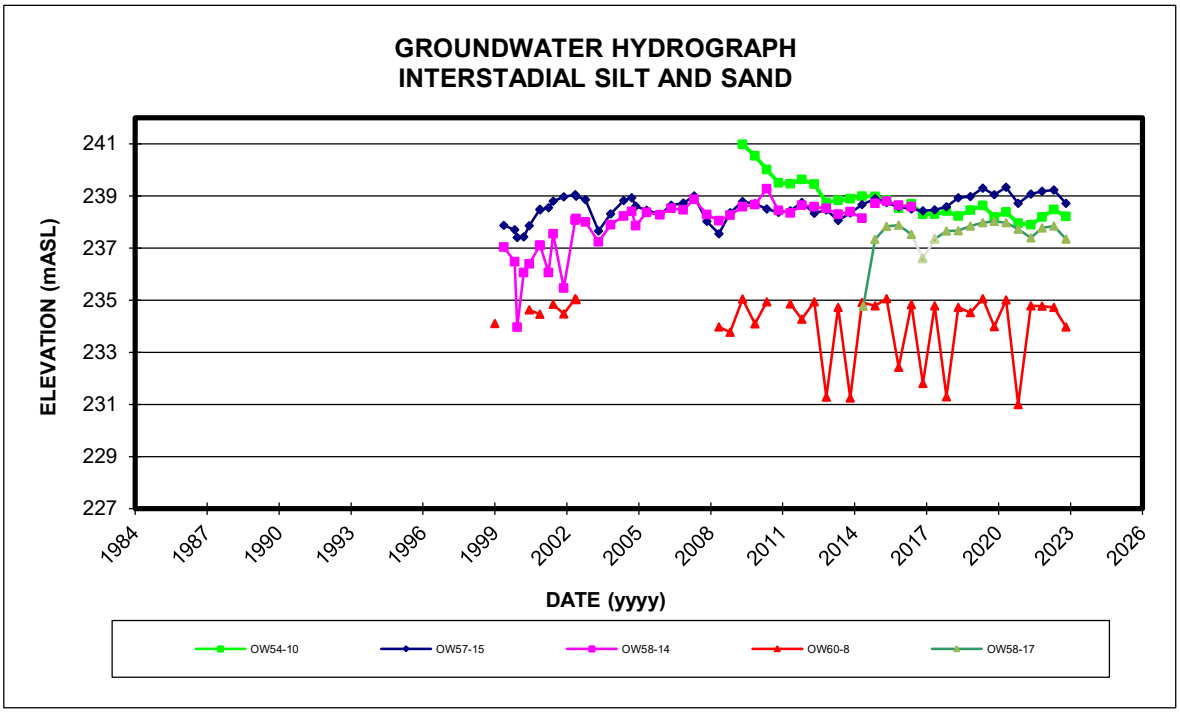


FIGURE B-26

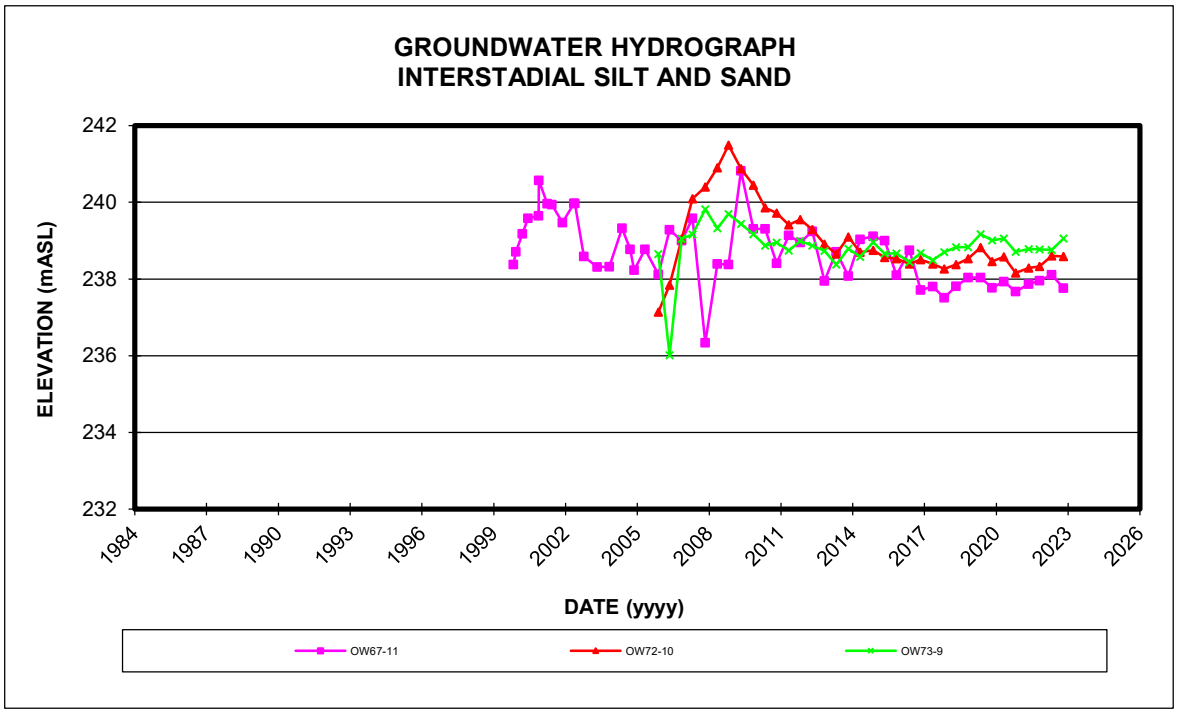


FIGURE B-27

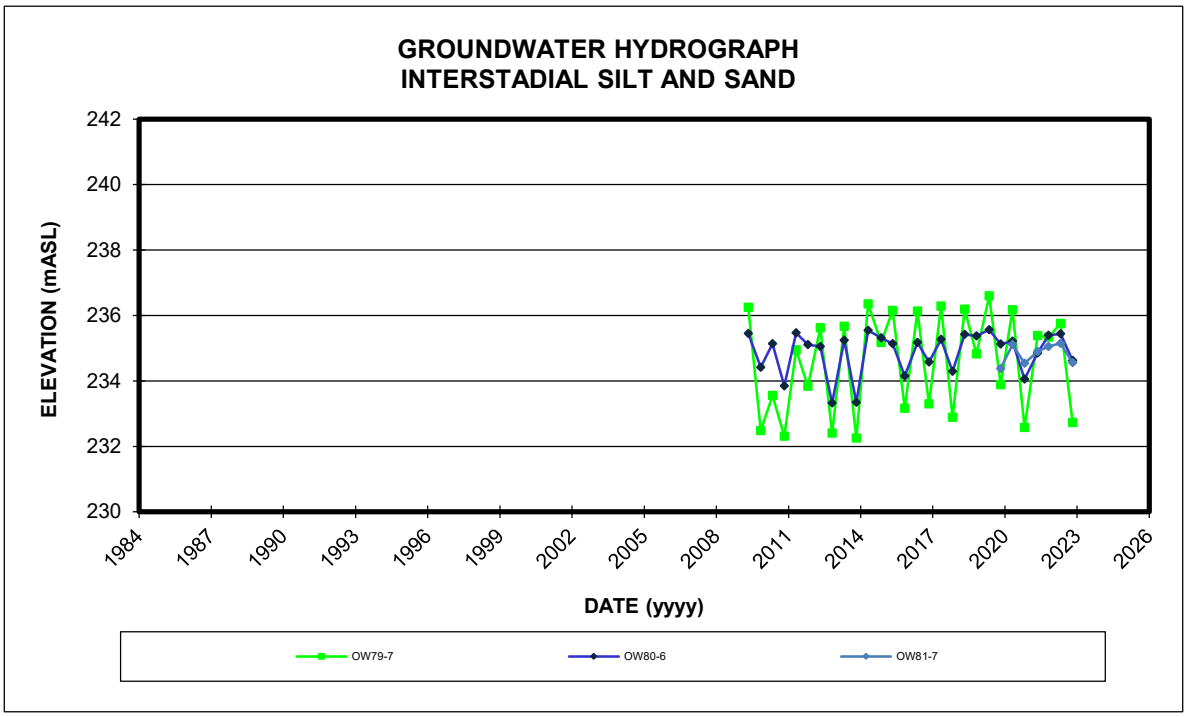


FIGURE B-28

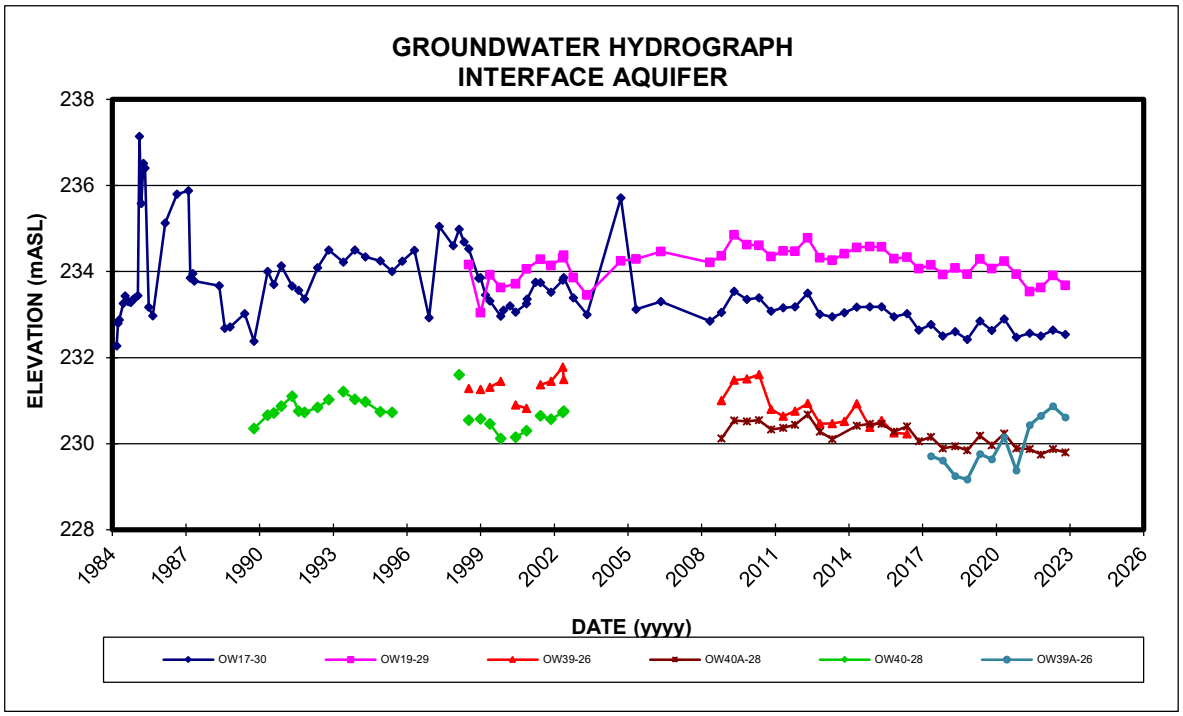


FIGURE B-29

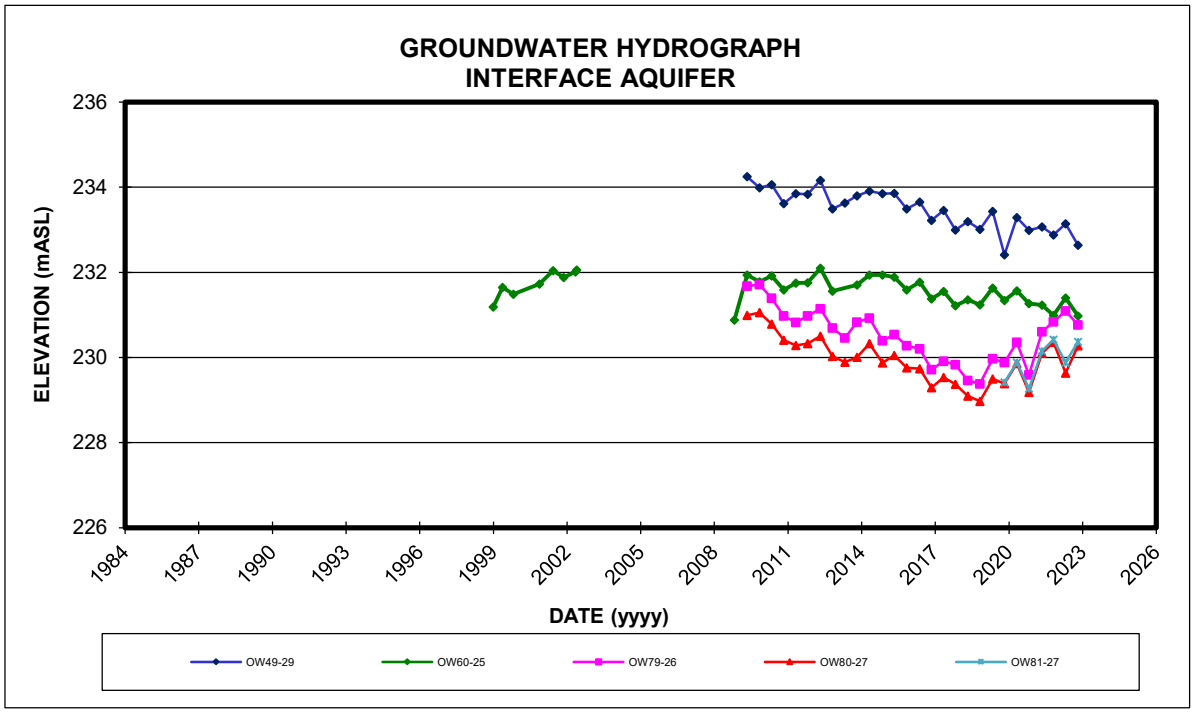


FIGURE B-30

Table B-8
Vertical Hydraulic Gradients
Twin Creeks Environmetnal Centre

May 2022 Groundwater Hydraulic Gradient Details												Historical Vertical Hydraulic Gradients								
	Upper Monitor					Lower Monitor														
Date	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Active Aquitard to Interstadial Silt and Sand																				
02-May-22	OW16-6	S	ACTIVE AQUITARD	234.76	239.68	OW16-7	P	INTERSTADIAL SILT AND SAND	234.00	238.95	0.966	0.165	0.749	1.045	1.044	-0.474	0.671	0.816	0.144	0.153
02-May-22	OW17-4	S	ACTIVE AQUITARD	235.00	239.72	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	239.20	0.347	0.247	0.233	0.360	0.560	0.660	0.753	0.353	0.148	0.254
02-May-22	OW40D-4	S	ACTIVE AQUITARD	233.83	238.01	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	237.27	0.297	-0.681	0.193	0.142	-0.027	0.024	0.056	-0.236	0.217	0.061
02-May-22	OW54A-4	S	ACTIVE AQUITARD	237.07	241.90	OW54-10	P	INTERSTADIAL SILT AND SAND	232.34	238.48	0.723	0.647	0.723	0.668	0.683	0.647	0.514	0.444	0.190	0.205
02-May-22	OW56-4	S	ACTIVE AQUITARD	236.00	239.43	OW47-6	P	INTERSTADIAL SILT AND SAND	233.50	238.54	0.355	0.395	0.357	0.037	0.613	0.568	0.308	0.532	0.156	0.278
02-May-22	OW57-4	S	ACTIVE AQUITARD	239.90	239.60	OW57-15	P	INTERSTADIAL SILT AND SAND	228.70	239.23	0.033	0.087	0.081	0.084	0.086	0.041	0.031	0.054	0.051	0.009
02-May-22	OW58-6	S	ACTIVE AQUITARD	235.24	240.88	OW58-17	P	INTERSTADIAL SILT AND SAND	226.90	237.85	0.364	0.314	0.293	0.302	0.264	0.038	0.008	-0.082	-0.052	-0.126
02-May-22	OW59-6	S	ACTIVE AQUITARD	235.23	240.28	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	238.66	0.592	0.498	0.466	0.421	0.402	0.260	0.311	0.381	*	*
02-May-22	OW60-4	S	ACTIVE AQUITARD	231.60	235.21	OW60-8	P	INTERSTADIAL SILT AND SAND	227.30	234.72	0.115	-0.009	0.033	-0.007	0.096	0.040	0.042	0.028	0.026	0.057
02-May-22	OW67-4	S	ACTIVE AQUITARD	238.90	242.47	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	238.11	0.623	0.570	0.627	0.652	0.668	0.627	0.473	0.467	0.344	0.353
02-May-22	OW72-6	S	ACTIVE AQUITARD	236.19	240.90	OW72-10	P	INTERSTADIAL SILT AND SAND	232.57	238.60	0.636	0.610	0.562	0.476	0.464	-0.022	-0.003	0.019	-0.039	-0.055
02-May-22	OW73-6	S	ACTIVE AQUITARD	235.87	240.68	OW73-9	P	INTERSTADIAL SILT AND SAND	232.69	238.76	0.605	0.607	0.524	0.322	0.180	-0.101	-0.113	-0.104	-0.094	-0.084
02-May-22	OW79-5	S	ACTIVE AQUITARD	232.99	235.75	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	235.75	0.000	0.267	0.328	0.302	0.257	0.255	0.259	0.318	0.153	0.152
02-May-22	OW80-3	S	ACTIVE AQUITARD	231.98	235.20	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	235.44	-0.107	-0.158	-0.164	-0.138	-0.151	-0.181	-0.106	-0.207	-0.079	-0.098
02-May-22	OW81-5	S	ACTIVE AQUITARD	230.30	235.23	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	235.15	0.040	0.005	0.006	-	-	-	-	-	-	-
Interstadial Silt and Sand to Interface Aquifer																				
02-May-22	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	237.27	OW40A-28	P	INTERFACE AQUIFER	210.12	229.88	0.348	0.362	0.334	0.343	0.339	0.343	0.333	0.313	0.318	0.314
02-May-22	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	238.11	OW49-29	P	INTERFACE AQUIFER	213.51	233.14	0.270	0.261	0.252	0.251	0.251	0.236	0.277	0.279	0.276	0.274
02-May-22	OW60-8	P	INTERSTADIAL SILT AND SAND	227.30	234.72	OW60-25	P	INTERFACE AQUIFER	210.20	231.40	0.194	0.208	0.201	0.201	0.197	0.189	0.179	0.185	0.181	0.313
02-May-22	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	239.2	OW17-30	P	INTERFACE AQUIFER	209.60	232.64	0.274	0.269	0.267	0.264	0.255	0.231	0.226	0.203	0.215	0.204
02-May-22	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	240.28	OW19-29	P	INTERFACE AQUIFER	212.20	233.91	0.314	0.247	0.241	0.252	0.245	0.227	0.216	0.214	0.225	0.263
02-May-22	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	235.75	OW79-26	P	INTERFACE AQUIFER	212.13	231.09	0.254	0.261	0.318	0.361	0.368	0.348	0.324	0.306	0.297	0.285
02-May-22	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	235.44	OW80-27	P	INTERFACE AQUIFER	208.78	229.64	0.278	0.227	0.256	0.290	0.302	0.274	0.259	0.243	0.249	0.256
02-May-22	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	235.15	OW81-27	P	INTERFACE AQUIFER	209.38	229.88	0.277	0.250	0.275	-	-	-	-	-	-	-

NOTES: 1) mASL - Metres Above Sea Level

2) P - denotes piezometer. The measuring point is the mid-point of the filter pack.
S - denotes standpipe. The measuring point is the groundwater table.

3) Negative (-) vertical hydraulic gradients are upward.

4) < denotes liquid elevation at either top of pump or dry well conditions.

5) -- denotes hydraulic gradient can not be calculated.

6) OW40B-4r was decomissioned in October 2014 and was replaced with OW40D.

7) OW58-14 was decomissioned in April 2014 and was replaced with OW58-17.

8) *' denotes monitoring location not assessed for vertical hydraulic gradient prior to 2015.

9) OW81-5, OW81-7 and OW81-27 installed in June 2019 and monitored beginning in November 2019.

10) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, OW84-31 installed in June 2022.

Table B-8
Vertical Hydraulic Gradients
Twin Creeks Environmetnal Centre

November 2022 Groundwater Hydraulic Gradient Details												Historical Vertical Hydraulic Gradients								
	Upper Monitor					Lower Monitor														
Date	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Active Aquitard to Interstadial Silt and Sand																				
01-Nov-22	OW16-6	S	ACTIVE AQUITARD	234.76	239.08	OW16-7	P	INTERSTADIAL SILT AND SAND	234.00	237.84	1.626	1.000	-0.225	0.130	0.505	0.421	-0.250	0.000	0.081	0.048
01-Nov-22	OW17-4	S	ACTIVE AQUITARD	235.00	239.24	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	238.89	0.233	0.193	0.253	0.207	0.607	0.913	0.680	0.887	0.288	0.342
01-Nov-22	OW40D-4	S	ACTIVE AQUITARD	233.83	236.19	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	236.66	-0.188	0.320	-0.176	0.253	0.019	-0.596	-0.360	-0.292	-0.744	-0.007
01-Nov-22	OW54A-4	S	ACTIVE AQUITARD	237.07	240.16	OW54-10	P	INTERSTADIAL SILT AND SAND	232.34	238.22	0.411	0.666	0.351	0.550	0.552	0.309	0.469	0.313	0.218	0.175
01-Nov-22	OW56-4	S	ACTIVE AQUITARD	236.00	238.37	OW47-6	P	INTERSTADIAL SILT AND SAND	233.50	238.11	0.106	0.280	0.283	0.281	0.370	0.024	0.084	0.020	0.085	0.078
01-Nov-22	OW57-4	S	ACTIVE AQUITARD	239.90	238.80	OW57-15	P	INTERSTADIAL SILT AND SAND	228.70	238.72	0.007	0.021	0.016	0.001	0.026	-0.073	0.006	0.001	-0.007	-0.002
01-Nov-22	OW58-6	S	ACTIVE AQUITARD	235.24	239.18	OW58-17	P	INTERSTADIAL SILT AND SAND	226.90	237.35	0.219	0.378	0.293	0.139	0.191	-0.026	0.167	-0.074	-0.068	-0.093
01-Nov-22	OW59-6	S	ACTIVE AQUITARD	235.23	239.66	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	237.73	0.708	0.330	0.146	0.210	0.168	-0.264	-0.033	0.128	*	*
01-Nov-22	OW67-4	S	ACTIVE AQUITARD	238.90	242.39	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	237.76	0.661	0.649	0.685	0.680	0.646	0.670	0.607	0.584	0.322	0.441
01-Nov-22	OW72-6	S	ACTIVE AQUITARD	236.19	240.89	OW72-10	P	INTERSTADIAL SILT AND SAND	232.57	238.59	0.635	0.588	0.455	0.423	0.431	-0.254	0.124	0.177	0.059	0.055
01-Nov-22	OW73-6	S	ACTIVE AQUITARD	235.87	240.08	OW73-9	P	INTERSTADIAL SILT AND SAND	232.69	239.06	0.322	0.440	0.171	0.222	0.265	-0.487	0.013	0.031	-0.029	0.152
01-Nov-22	OW79-5	S	ACTIVE AQUITARD	232.99	234.56	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	232.72	0.722	0.075	0.454	-0.057	0.309	--	0.188	--	-0.031	0.531
01-Nov-22	OW80-3	S	ACTIVE AQUITARD	231.98	234.88	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	234.62	0.114	-0.026	0.505	0.087	-0.085	-0.009	0.070	0.233	-0.059	0.317
01-Nov-22	OW81-5	S	ACTIVE AQUITARD	230.30	234.76	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	234.56	0.105	0.058	0.108	0.137	-	-	-	-	-	-
01-Nov-22	OW82-5	S	ACTIVE AQUITARD	230.72	235.07	OW82-14	P	INTERSTADIAL SILT AND SAND	222.47	234.56	0.062	-	-	-	-	-	-	-	-	-
01-Nov-22	OW83-5	S	ACTIVE AQUITARD	234.60	237.52	OW83-9	P	INTERSTADIAL SILT AND SAND	230.87	235.31	0.593	-	-	-	-	-	-	-	-	-
01-Nov-22	OW84-6	S	ACTIVE AQUITARD	236.70	239.59	OW84-11	P	INTERSTADIAL SILT AND SAND	232.37	239.71	-0.028	-	-	-	-	-	-	-	-	-
Interstadial Silt and Sand to Interface Aquifer																				
01-Nov-22	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	236.66	OW40A-28	P	INTERFACE AQUIFER	210.12	229.80	0.323	0.352	0.304	0.335	0.347	0.298	0.312	0.307	0.304	0.221
01-Nov-22	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	237.76	OW49-29	P	INTERFACE AQUIFER	213.51	232.64	0.278	0.276	0.254	0.291	0.273	0.245	0.244	0.251	0.283	0.231
01-Nov-22	OW60-8	P	INTERSTADIAL SILT AND SAND	227.30	233.97	OW60-25	P	INTERFACE AQUIFER	210.20	230.98	0.175	0.221	-0.016	0.155	0.192	0.004	0.025	0.049	0.172	-0.028
01-Nov-22	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	238.89	OW17-30	P	INTERFACE AQUIFER	209.60	232.54	0.266	0.281	0.261	0.267	0.273	0.243	0.240	0.220	0.190	0.197
01-Nov-22	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	239.66	OW19-29	P	INTERFACE AQUIFER	212.20	233.68	0.295	0.240	0.226	0.245	0.261	0.245	0.231	0.222	0.233	0.264
01-Nov-22	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	232.72	OW79-26	P	INTERFACE AQUIFER	212.13	230.76	0.107	0.246	0.163	0.218	0.297	0.167	0.196	0.157	0.261	0.078
01-Nov-22	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	234.62	OW80-27	P	INTERFACE AQUIFER	208.78	230.28	0.208	0.240	0.233	0.274	0.306	0.235	0.252	0.210	0.259	0.159
01-Nov-22	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	234.56	OW81-27	P	INTERFACE AQUIFER	209.38	230.37	0.220	0.243	0.277	0.261	-	-	-	-	-	-
01-Nov-22	OW82-14	P	INTERSTADIAL SILT AND SAND	222.47	234.56	OW82-28	P	INTERFACE AQUIFER	208.21	231.24	0.233	-	-	-	-	-	-	-	-	-
01-Nov-22	OW83-9	P	INTERSTADIAL SILT AND SAND	230.87	235.31	OW83-29	P	INTERFACE AQUIFER	210.59	230.39	0.242	-	-	-	-	-	-	-	-	-
01-Nov-22	OW84-11	P	INTERSTADIAL SILT AND SAND	232.37	239.71	OW84-31	P	INTERFACE AQUIFER	212.35	232.46	0.362	-	-	-	-	-	-	-	-	-

NOTES: 1) mASL - Metres Above Sea Level

2) P - denotes piezometer. The measuring point is the mid-point of the filter pack.
S - denotes standpipe. The measuring point is the groundwater table.

3) Negative (-) vertical hydraulic gradients are upward.

4) < denotes liquid elevation at either top of pump or dry well conditions.

5) -- denotes hydraulic gradient can not be calculated.

6) OW40B-4r was decomissioned in October 2014 and was replaced with OW40D.

7) OW58-14 was decomissioned in April 2014 and was replaced with OW58-17.

8) * denotes monitoring location not assessed for vertical hydraulic gradient prior to 2015.

9) OW81-5, OW81-7 and OW81-27 installed in June 2019 and monitored beginning in November 2019.

10) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, OW84-31 installed in June 2022.

C

Leachate Chemical Analytical Data

Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					23-May-08	21-May-09	20-May-10	10-May-11	08-May-12	07-May-13	07-May-14	19-May-15	30-May-16	26-May-17
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L		4500	290	7060	3847	2997	5770	6480	7060	4570	4300	940	5600	4700	4600	3900
Conductivity	umho/cm			880	16400	10265	8254	13100	15000	16400	10800	12000	2600	14000	13000	15000	11000
Dissolved Chloride (Cl)	mg/L	8625	2500	68	2600	1285	949	1300	1500	1800	1100	1400	200	1500	1800	2600	1500
Dissolved Organic Carbon	mg/L	13312	1500	25	462	230	176	435		462	265	273	49	330	330	300	230
Dissolved Sulphate (SO4)	mg/L	483	200	0.5	81	36	18	*10*	81	5	59	54	78	72	*0.5*	*10*	39
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0001	0.00006	0.00005	<0.0002	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
Nitrate (N)	mg/L			0.05	1.85	0.47	0.31	<0.1	<1	<1	<1	<2.0	<0.10	<0.50	<1.0	<1.0	<0.50
Nitrite (N)	mg/L			0.005	0.265	0.068	0.049	0.03	<0.1	<0.1	<0.1	<0.20	<0.010	<0.050	<0.10	<0.10	0.055
pH	units		7.2	7.3	8.0	7.7	7.7	7.6	8.0	7.7	7.6	7.7	7.5	7.8	7.8	7.5	7.6
Phenols-4AAP	mg/L	8.63	1	0.0018	0.1	0.05	0.03	0.10	0.07	0.08	0.06	0.05	0.01	0.08	0.05	0.07	<0.20
Total Ammonia-N	mg/L	2944	800	11.1	857	469	336	576	724	857	558	529	100	795	592	560	512
Total Arsenic (As)	mg/L	<0.11	<0.11	0.002	0.01	0.006	0.005	0.007	0.010	0.007	0.006	<0.01	0.003	0.010	0.010	<0.01	0.006
Total Barium (Ba)	mg/L	0.966	0.966	0.049	0.29	0.18	0.16	0.19	0.19	0.20	0.20	0.19	0.11	0.23	0.23	0.29	0.17
Total BOD	mg/L	27600	1750	5	200	77	51	200	140	200	74	81	14	94	60	88	63
Total Boron (B)	mg/L	7.13	50	1.3	70	28.1	17.0	70	58	56	28	20	2.0	17	43	49	25.0
Total Cadmium (Cd)	mg/L	0.12	0.12	0.00005	0.0005	0.00021	0.00014	<0.0001	<0.0001	<0.0005	<0.0005	<0.001	<0.0001	<0.0001	<0.0005	<0.001	<0.0001
Total Calcium (Ca)	mg/L	3795	200	76	150	108	106	100	100	85	110	140	96	130	110	130	95
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	63	1400	734	567	1200	1200	1400	850	860	180	1000	950	980	660
Total Chromium (Cr)	mg/L	0.92	0.5	0.006	1.6	0.61	0.25	1.5	1.2	1.1	0.4	0.4	0.0	0.3	1.6	1.5	0.56
Total Copper (Cu)	mg/L	0.064	0.1	0.001	0.01	0.006	0.005	<0.002	0.002	<0.01	<0.01	<0.02	0.005	<0.01	<0.02	<0.02	0.003
Total Dissolved Solids	mg/L		5200	525	9960	5176	4013	8000	9410	9960	6320	5110	1200	6210	6360	7400	4640
Total Iron (Fe)	mg/L	1150	8	2.2	54	10	6	7.9	5.2	5.2	3.5	2.9	5.9	5.1	7.4	24.0	3.4
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	11	930	502	351	720	810	930	570	600	100	860	630	580	530
Total Lead (Pb)	mg/L	1.38	1.38	0.0011	0.064	0.0101	0.0054	0.0082	0.0094	0.0080	0.0040	<0.005	0.0022	0.0034	0.0150	0.0640	0.0047
Total Magnesium (Mg)	mg/L	1380	350	22	390	222	177	240	390	340	300	290	60	330	270	310	210
Total Manganese (Mn)	mg/L	22.8	1	0.053	0.37	0.23	0.20	0.37	0.37	0.23	0.26	0.33	0.25	0.24	0.34	0.23	0.098
Total Nickel (Ni)	mg/L	1.84	0.5	0.011	1.1	0.48	0.27	1.10	0.96	0.93	0.44	0.42	0.05	0.35	0.96	0.92	0.360
Total Phosphorus	mg/L	18.61	3	0.24	5.8	2.1	1.5	3.5	5.2	5.8	2.3	1.8	<0.6	2.4	3.1	2.4	1.60
Total Potassium (K)	mg/L	2852	300	12	620	328	243	340	520	520	500	440	89	620	390	380	340
Total Sodium (Na)	mg/L	6578	500	57	2100	1122	822	1600	1800	1700	1200	1200	180	1300	1700	2100	1100
Total Suspended Solids	mg/L		150	12	270	73	44	20	14	15	64	20	120	29	12	97	20
Total Zinc (Zn)	mg/L	11.27	0.3	0.01	0.1	0.04	0.03	0.10	0.08	0.05	<0.05	<0.1	0.02	0.04	<0.05	<0.1	0.02
Un-ionized Ammonia	mg/L			0.028	29	5.53	2.19	3.3	5.4	8.2	2.4	9.7	0.2	29.0	12.0	2.3	3.10
Ion Percentage	mg/L			3.75	15.98	9.50	8.43	11.5	7.1	15.8	5.2	7.5	6.0	11.5	6.2	5.2	14.8

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The geometric and arithmetic means assume that any value below the RDL is equal to half of the value of the RDL.

Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)					
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					11-May-18	16-May-19	12-May-20	18-May-21	06-May-22					
Laboratory								Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas					
Alkalinity (Total as CaCO3)	mg/L		4500	290	7060	3847	2997	2800	290	2900	2900	900					
Conductivity	umho/cm			880	16400	10265	8254	7700	880	11000	8900	2600					
Dissolved Chloride (Cl)	mg/L	8625	2500	68	2600	1285	949	860	68	1900	1500	240					
Dissolved Organic Carbon	mg/L	13312	1500	25	462	230	176	150	25	180	140	52					
Dissolved Sulphate (SO4)	mg/L	483	200	0.5	81	36	18	40	58	23	0.5	15					
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0001	0.00006	0.00005	<0.0001	<0.0001	<0.00010	<0.00010	<0.0002					
Nitrate (N)	mg/L			0.05	1.85	0.47	0.31	<1.0	<0.10	1.85	<0.50	0.37					
Nitrite (N)	mg/L			0.005	0.265	0.068	0.049	<0.10	0.137	0.085	<0.050	0.265					
pH	units		7.2	7.3	8.0	7.7	7.7	7.6	7.8	7.6	7.3	8.0					
Phenols-4AAP	mg/L	8.63	1	0.0018	0.1	0.05	0.03	<0.080	<0.0040	0.085	<0.020	0.0018					
Total Ammonia-N	mg/L	2944	800	11.1	857	469	336	354	11.1	416	349	94.9					
Total Arsenic (As)	mg/L	<0.11	<0.11	0.002	0.01	0.006	0.005	<0.005	0.002	<0.01	<0.005	0.003					
Total Barium (Ba)	mg/L	0.966	0.966	0.049	0.29	0.18	0.16	0.11	0.05	0.2	0.24	0.063					
Total BOD	mg/L	27600	1750	5	200	77	51	43	5	49	37	7					
Total Boron (B)	mg/L	7.13	50	1.3	70	28.1	17.0	7.4	1.3	23	18	3.1					
Total Cadmium (Cd)	mg/L	0.12	0.12	0.00005	0.0005	0.00021	0.00014	<0.0005	<0.0001	<0.001	<0.0005	<0.0001					
Total Calcium (Ca)	mg/L	3795	200	76	150	108	106	95	76	120	150	80					
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	63	1400	734	567	480	63	570	450	160					
Total Chromium (Cr)	mg/L	0.92	0.5	0.006	1.6	0.61	0.25	0.11	0.01	0.19	0.12	0.015					
Total Copper (Cu)	mg/L	0.064	0.1	0.001	0.01	0.006	0.005	<0.01	0.006	<0.02	<0.01	0.006					
Total Dissolved Solids	mg/L		5200	525	9960	5176	4013	3050	525	4870	3560	1030					
Total Iron (Fe)	mg/L	1150	8	2.2	54	10	6	4.5	2.2	13	54	5.1					
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	11	930	502	351	330	11	420	340	96					
Total Lead (Pb)	mg/L	1.38	1.38	0.0011	0.064	0.0101	0.0054	<0.003	0.0011	0.019	0.006	0.0026					
Total Magnesium (Mg)	mg/L	1380	350	22	390	222	177	140	22	200	170	54					
Total Manganese (Mn)	mg/L	22.8	1	0.053	0.37	0.23	0.20	0.110	0.053	0.18	0.29	0.11					
Total Nickel (Ni)	mg/L	1.84	0.5	0.011	1.1	0.48	0.27	0.130	0.011	0.280	0.180	0.038					
Total Phosphorus	mg/L	18.61	3	0.24	5.8	2.1	1.5	0.97	0.24	1.00	1.20	0.36					
Total Potassium (K)	mg/L	2852	300	12	620	328	243	260	12	220	210	74					
Total Sodium (Na)	mg/L	6578	500	57	2100	1122	822	640	57	1100	930	220					
Total Suspended Solids	mg/L		150	12	270	73	44	41	52	88	270	230					
Total Zinc (Zn)	mg/L	11.27	0.3	0.01	0.1	0.04	0.03	<0.05	0.01	<0.10	<0.05	0.02					
Un-ionized Ammonia	mg/L			0.028	29	5.53	2.19	1.10	0.03	0.92	0.69	4.7					
Ion Percentage	mg/L			3.75	15.98	9.50	8.43	16.0	3.8	14.1	13.9	3.9					

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The geometric and arithmetic means assume that any value below the RDL is equal to half of the value of the RDL.

Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					23-May-08	20-May-09	20-May-10	10-May-11	08-May-12	07-May-13	07-May-14	19-May-15	30-May-16	26-May-17
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L		4500	160	18300	5555	1637	18300	189	160	186	270	850	17000	240	16000	13000
Conductivity	umho/cm			501	31100	10060	3897	31100	640	501	653	950	2400	30000	660	27000	23000
Dissolved Chloride (Cl)	mg/L	8625	2500	11	850	269	118	850	22	11	21	34	110	700	18	600	540
Dissolved Organic Carbon	mg/L	13312	1500	8.3	1480	297	86	1480.0	70.3	8.9	12.0	12.2	94.0	64.0	8.3	1100.0	810
Dissolved Sulphate (SO4)	mg/L	483	200	10	230	107	68	*10*	97	78	110	170	230	*10*	72	*10*	20
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.015	0.00121	0.00013	<0.03	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.0015	<0.00010	<0.002	<0.0001
Nitrate (N)	mg/L			0.05	1.44	0.56	0.43	<1.0	0.6	0.1	0.5	0.74	<0.10	<1.0	1.44	<1.0	<1.0
Nitrite (N)	mg/L			0.005	0.51	0.109	0.056	0.10	0.37	0.03	0.04	0.51	<0.010	<0.10	0.03	<0.10	<0.10
pH	units		7.2	7.6	8.2	7.9	7.9	7.80	7.60	8.00	7.99	8.01	8.05	7.81	8.24	7.78	7.8
Phenols-4AAP	mg/L	8.63	1	0.0005	0.6	0.11	0.02	0.60	0.03	<0.001	<0.001	0.0012	0.024	0.35	0.001	0.37	<0.20
Total Ammonia-N	mg/L	2944	800	8	3540	899	187	2860.0	13.7	8.0	11.5	29.0	164.0	3540.0	13.5	2550.0	1720
Total Arsenic (As)	mg/L	<0.11	<0.11	0.0005	0.16	0.029	0.008	0.110	0.002	0.001	0.001	0.002	0.006	0.160	<0.001	<0.1	0.04
Total Barium (Ba)	mg/L	0.966	0.966	0.01	0.71	0.16	0.08	0.350	0.027	0.037	0.023	0.038	0.066	0.710	0.010	<0.5	0.31
Total BOD	mg/L	27600	1750	1	1800	402	52	1800	59	<2	<2	22	120	1500	<2.0	1300	720
Total Boron (B)	mg/L	7.13	50	0.67	560	107.5	19.3	260.0	0.9	0.7	1.0	2.1	12.0	560.0	1.1	290.0	210
Total Cadmium (Cd)	mg/L	0.12	0.12	0.00005	0.005	0.0005	0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.01	<0.0005
Total Calcium (Ca)	mg/L	3795	200	19	110	66	60	19	61	56	65	79	80	58	62	31	40
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	20	4400	1106	273	4400	34	33	41	33	310	3700	20	3600	1900
Total Chromium (Cr)	mg/L	0.92	0.5	0.0025	0.51	0.10	0.02	0.290	<0.005	0.006	<0.005	<0.005	0.014	0.510	<0.005	<0.5	0.18
Total Copper (Cu)	mg/L	0.064	0.1	0.001	0.1	0.016	0.007	0.030	0.003	0.004	0.004	<0.002	0.004	<0.1	0.003	<0.2	<0.01
Total Dissolved Solids	mg/L		5200	334	20000	4485	1861	20000	412	334	416	494	1150	11600	360	10900	8740
Total Iron (Fe)	mg/L	1150	8	0.14	5	2	1	1.0	1.7	3.3	2.3	1.3	1.9	<1.0	0.1	<10.0	<0.5
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	11	3500	965	199	3500	14	11	12	33	160	3500	16	2500	2200
Total Lead (Pb)	mg/L	1.38	1.38	0.00025	0.028	0.006	0.002	0.0280	0.0013	0.0015	0.0011	0.0007	0.0013	0.0200	<0.0005	<0.05	0.006
Total Magnesium (Mg)	mg/L	1380	350	19	450	109	67	220	21	19	22	28	40	450	21	220	170
Total Manganese (Mn)	mg/L	22.8	1	0.005	0.33	0.12	0.07	0.030	0.089	0.036	0.030	0.073	0.080	0.050	0.005	<0.2	0.03
Total Nickel (Ni)	mg/L	1.84	0.5	0.002	0.46	0.10	0.03	0.300	0.004	0.005	0.005	0.004	0.017	0.460	0.002	0.200	0.17
Total Phosphorus	mg/L	18.61	3	0.12	7.8	2.0	0.8	4.30	0.12	<0.3	0.17	0.18	<0.6	7.80	0.94	5.40	4.50
Total Potassium (K)	mg/L	2852	300	6.7	1100	218	63	540.0	7.9	7.0	6.7	14.0	31.0	1100.0	7.0	540.0	400
Total Sodium (Na)	mg/L	6578	500	19	6300	1254	306	3200	26	19	28	48	200	6300	25	3100	2400
Total Suspended Solids	mg/L		150	3	66	23	18	66	22	25	16	18	30	21	3	6	18
Total Zinc (Zn)	mg/L	11.27	0.3	0.005	0.5	0.06	0.02	0.10	<0.01	0.02	<0.01	<0.01	<0.01	<0.1	<0.01	<1	<0.05
Un-ionized Ammonia	mg/L			0.09	220	35.42	4.56	110.00	0.41	0.23	0.09	0.22	3.40	220.00	0.62	77.00	45
Ion Percentage	mg/L			0.96	29.99	14.23	9.74	30.0	3.6	8.6	4.5	1.0	12.6	7.5	1.9	24.1	26.6

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
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5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
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Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)					
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					11-May-18	16-May-19	12-May-20	18-May-21	06-May-22					
Laboratory								Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas					
Alkalinity (Total as CaCO3)	mg/L		4500	160	18300	5555	1637	6800	960	3700	5000	670					
Conductivity	umho/cm			501	31100	10060	3897	13000	2600	7700	9000	1700					
Dissolved Chloride (Cl)	mg/L	8625	2500	11	850	269	118	450	140	240	250	46					
Dissolved Organic Carbon	mg/L	13312	1500	8.3	1480	297	86	290	70	170	240	22					
Dissolved Sulphate (SO4)	mg/L	483	200	10	230	107	68	84	230	200	100	180					
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.015	0.00121	0.00013	<0.0001	<0.0001	<0.00010	<0.0015	<0.0002					
Nitrate (N)	mg/L			0.05	1.44	0.56	0.43	<2.0	<0.10	<0.50	<0.50	1.00					
Nitrite (N)	mg/L			0.005	0.51	0.109	0.056	<0.20	0.031	<0.050	<0.050	0.223					
pH	units		7.2	7.6	8.2	7.9	7.9	7.8	8.0	8.0	8.1	8.2					
Phenols-4AAP	mg/L	8.63	1	0.0005	0.6	0.11	0.02	<0.20	<0.020	0.056	0.078	0.0016					
Total Ammonia-N	mg/L	2944	800	8	3540	899	187	935	112	638	826	61.8					
Total Arsenic (As)	mg/L	<0.11	<0.11	0.0005	0.16	0.029	0.008	0.02	<0.01	0.02	0.02	0.002					
Total Barium (Ba)	mg/L	0.966	0.966	0.01	0.71	0.16	0.08	0.21	0.12	0.09	0.06	0.042					
Total BOD	mg/L	27600	1750	1	1800	402	52	190	6	130	180	6					
Total Boron (B)	mg/L	7.13	50	0.67	560	107.5	19.3	97	34	61	75	8.1					
Total Cadmium (Cd)	mg/L	0.12	0.12	0.00005	0.005	0.0005	0.0001	<0.001	<0.001	<0.001	<0.001	<0.0001					
Total Calcium (Ca)	mg/L	3795	200	19	110	66	60	100	110	75	44	110					
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	20	4400	1106	273	930	130	650	750	57					
Total Chromium (Cr)	mg/L	0.92	0.5	0.0025	0.51	0.10	0.02	0.09	<0.05	0.06	0.06	0.005					
Total Copper (Cu)	mg/L	0.064	0.1	0.001	0.1	0.016	0.007	<0.02	<0.02	<0.02	<0.02	<0.002					
Total Dissolved Solids	mg/L		5200	334	20000	4485	1861	4540	1280	3230	3070	745					
Total Iron (Fe)	mg/L	1150	8	0.14	5	2	1	2.0	3.0	1.0	<1	1.4					
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	11	3500	965	199	870	99	670	830	60					
Total Lead (Pb)	mg/L	1.38	1.38	0.00025	0.028	0.006	0.002	<0.005	<0.005	<0.005	<0.005	<0.0005					
Total Magnesium (Mg)	mg/L	1380	350	19	450	109	67	130	77	94	82	38					
Total Manganese (Mn)	mg/L	22.8	1	0.005	0.33	0.12	0.07	0.32	0.33	0.25	0.07	0.27					
Total Nickel (Ni)	mg/L	1.84	0.5	0.002	0.46	0.10	0.03	0.10	0.04	0.07	0.08	0.007					
Total Phosphorus	mg/L	18.61	3	0.12	7.8	2.0	0.8	2.80	0.31	1.70	1.7	0.2					
Total Potassium (K)	mg/L	2852	300	6.7	1100	218	63	220	80	140	150	20					
Total Sodium (Na)	mg/L	6578	500	19	6300	1254	306	1200	450	810	900	100					
Total Suspended Solids	mg/L		150	3	66	23	18	24	57	12	13	11					
Total Zinc (Zn)	mg/L	11.27	0.3	0.005	0.5	0.06	0.02	<0.1	<0.1	<0.1	<0.1	<0.01					
Un-ionized Ammonia	mg/L			0.09	220	35.42	4.56	7	3	20	43	1.3					
Ion Percentage	mg/L			0.96	29.99	14.23	9.74	25.6	15.9	16.8	26.7	8.0					

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
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5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
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Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					23-May-08	21-May-09	20-May-10	10-May-11	08-May-12	07-May-13	07-May-14	19-May-15	30-May-16	26-May-17
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L		4500	1300	4520	3085	2932	4100	4520	2930	4330	4100	3400	3000	2300	2300	3400
Conductivity	umho/cm			3600	10800	7809	7451	10400	10800	8730	10800	10000	8900	7100	6400	6000	8000
Dissolved Chloride (Cl)	mg/L	8625	2500	250	1000	675	621	1000	980	850	960	1000	720	580	440	470	680
Dissolved Organic Carbon	mg/L	13312	1500	64	935	295	215	793	935	305	467	268	440	180	150	110	190
Dissolved Sulphate (SO4)	mg/L	483	200	53	410	189	166	292	*100*	410	190	260	150	120	130	280	53
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0001	0.00006	0.00005	<0.0002	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001
Nitrate (N)	mg/L			0.05	6.7	1.28	0.66	<0.1	<1	<1	<1	<2.0	<1.0	<0.5	2.9	6.7	<1.0
Nitrite (N)	mg/L			0.005	1.73	0.289	0.115	<0.01	<0.1	<0.1	<0.1	<0.20	<0.10	<0.05	1.73	0.44	0.100
pH	units		7.2	7.6	7.9	7.7	7.7	7.70	7.60	7.80	7.71	7.83	7.62	7.77	7.87	7.59	7.7
Phenols-4AAP	mg/L	8.63	1	0.004	0.36	0.11	0.05	0.360	0.072	0.210	0.200	0.093	0.240	0.038	0.018	<0.020	<0.080
Total Ammonia-N	mg/L	2944	800	150	724	404	380	411	724	385	521	495	512	380	381	264	396
Total Arsenic (As)	mg/L	<0.11	<0.11	0.0025	0.018	0.009	0.008	0.014	0.014	0.017	0.011	0.010	0.012	0.008	0.008	<0.005	0.006
Total Barium (Ba)	mg/L	0.966	0.966	0.098	0.26	0.20	0.19	0.19	0.19	0.23	0.22	0.25	0.26	0.24	0.19	0.17	0.20
Total BOD	mg/L	27600	1750	28	1700	329	129	1200	1700	330	480	120	600	130	63	35	76
Total Boron (B)	mg/L	7.13	50	3	15	7.8	7.1	6.4	7.7	6.6	8.2	15.0	14.0	6.9	5.5	6.2	7.9
Total Cadmium (Cd)	mg/L	0.12	0.12	0.00005	0.0018	0.00043	0.00025	0.0018	0.0014	0.0004	<0.0005	<0.001	0.0003	0.0001	<0.0005	<0.0005	<0.0001
Total Calcium (Ca)	mg/L	3795	200	110	380	207	191	380	370	360	230	200	220	190	140	160	110
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	180	2500	925	671	2400	2500	1100	1600	910	1700	570	460	340	550
Total Chromium (Cr)	mg/L	0.92	0.5	0.013	0.21	0.06	0.04	0.070	0.100	0.059	0.070	0.050	0.057	0.032	0.040	<0.03	0.039
Total Copper (Cu)	mg/L	0.064	0.1	0.003	0.08	0.014	0.009	0.080	0.025	0.033	0.010	<0.02	0.008	<0.01	<0.01	<0.01	0.003
Total Dissolved Solids	mg/L		5200	1450	6930	3864	3469	6670	6930	5540	6420	4630	4140	3120	2590	2690	3280
Total Iron (Fe)	mg/L	1150	8	2.4	33	12	8	27.0	26.0	33.0	17.0	8.0	19.0	7.4	3.2	3.5	2.4
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	140	810	426	394	530	810	400	550	490	580	410	410	250	460
Total Lead (Pb)	mg/L	1.38	1.38	0.001	0.02	0.006	0.004	0.0180	0.0083	0.0200	0.0050	0.0050	0.0060	0.0025	0.0040	<0.003	0.001
Total Magnesium (Mg)	mg/L	1380	350	95	400	224	204	310	350	340	320	400	240	200	150	170	180
Total Manganese (Mn)	mg/L	22.8	1	0.2	3.3	0.93	0.62	3.30	2.50	2.30	1.10	0.74	0.74	0.35	0.32	0.31	0.20
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.25	0.13	0.11	0.240	0.210	0.180	0.220	0.250	0.120	0.110	0.087	0.064	0.110
Total Phosphorus	mg/L	18.61	3	0.5	5.2	1.6	1.4	1.0	5.2	2.5	2.3	1.5	2.2	1.2	1.5	<1.5	1.20
Total Potassium (K)	mg/L	2852	300	68	390	222	198	320	340	250	350	390	260	220	180	150	210
Total Sodium (Na)	mg/L	6578	500	270	1400	709	639	960	1000	830	1100	1400	740	700	490	460	660
Total Suspended Solids	mg/L		150	8	830	104	46	86	78	830	21	8	18	86	46	26	17
Total Zinc (Zn)	mg/L	11.27	0.3	0.02	17	1.4	0.1	17.00	2.40	0.37	0.88	0.20	0.27	0.07	0.10	0.07	0.03
Un-ionized Ammonia	mg/L			0.55	8.9	4.08	3.13	5.5	5.4	6.1	2.9	6.1	6.0	8.9	7.6	1.9	2.20
Ion Percentage	mg/L			1.4	24.57	8.63	6.67	2.9	1.4	5.2	3.1	6.6	5.7	3.9	7.0	10.0	15.9

Notes: 1) Blank denotes parameter not analysed.
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Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp					
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					11-May-18	16-May-19	12-May-20	18-May-21	06-May-22					
Laboratory								Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas					
Alkalinity (Total as CaCO3)	mg/L		4500	1300	4520	3085	2932	2800	1300	3200	2900	1700					
Conductivity	umho/cm			3600	10800	7809	7451	6800	3600	9100	6300	4200					
Dissolved Chloride (Cl)	mg/L	8625	2500	250	1000	675	621	450	250	850	590	300					
Dissolved Organic Carbon	mg/L	13312	1500	64	935	295	215	140	64	200	110	70					
Dissolved Sulphate (SO4)	mg/L	483	200	53	410	189	166	230	220	93	190	110					
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0001	0.00006	0.00005	<0.0001	<0.0001	<0.00010	<0.00010	<0.0002					
Nitrate (N)	mg/L			0.05	6.7	1.28	0.66	<1.0	1.55	2.54	0.13	1.12					
Nitrite (N)	mg/L			0.005	1.73	0.289	0.115	0.240	0.163	0.422	0.095	0.821					
pH	units		7.2	7.6	7.9	7.7	7.7	7.6	7.7	7.8	7.6	7.8					
Phenols-4AAP	mg/L	8.63	1	0.004	0.36	0.11	0.05	<0.080	<0.0080	<0.040	<0.020	0.042					
Total Ammonia-N	mg/L	2944	800	150	724	404	380	412	150	495	302	233					
Total Arsenic (As)	mg/L	<0.11	<0.11	0.0025	0.018	0.009	0.008	<0.005	0.003	<0.01	0.018	0.005					
Total Barium (Ba)	mg/L	0.966	0.966	0.098	0.26	0.20	0.19	0.17	0.10	0.22	0.22	0.11					
Total BOD	mg/L	27600	1750	28	1700	329	129	38	38	62	38	28					
Total Boron (B)	mg/L	7.13	50	3	15	7.8	7.1	5.0	3.0	12	8.6	3.4					
Total Cadmium (Cd)	mg/L	0.12	0.12	0.00005	0.0018	0.00043	0.00025	<0.0005	<0.0001	<0.001	<0.0005	<0.0001					
Total Calcium (Ca)	mg/L	3795	200	110	380	207	191	140	140	150	180	130					
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	180	2500	925	671	430	180	610	330	200					
Total Chromium (Cr)	mg/L	0.92	0.5	0.013	0.21	0.06	0.04	0.030	0.013	0.21	0.05	0.019					
Total Copper (Cu)	mg/L	0.064	0.1	0.003	0.08	0.014	0.009	<0.01	0.004	<0.02	0.01	0.003					
Total Dissolved Solids	mg/L		5200	1450	6930	3864	3469	2530	1630	3940	2400	1450					
Total Iron (Fe)	mg/L	1150	8	2.4	33	12	8	2.5	2.5	8.0	11	3.4					
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	140	810	426	394	350	140	470	300	240					
Total Lead (Pb)	mg/L	1.38	1.38	0.001	0.02	0.006	0.004	<0.003	0.001	0.009	0.005	0.0013					
Total Magnesium (Mg)	mg/L	1380	350	95	400	224	204	120	110	200	170	95					
Total Manganese (Mn)	mg/L	22.8	1	0.2	3.3	0.93	0.62	0.63	0.30	0.42	0.46	0.26					
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.25	0.13	0.11	0.078	0.029	0.16	0.089	0.03					
Total Phosphorus	mg/L	18.61	3	0.5	5.2	1.6	1.4	0.87	0.50	1.80	1.2	0.63					
Total Potassium (K)	mg/L	2852	300	68	390	222	198	140	75	220	150	68					
Total Sodium (Na)	mg/L	6578	500	270	1400	709	639	400	270	820	540	270					
Total Suspended Solids	mg/L		150	8	830	104	46	20	23	77	180	46					
Total Zinc (Zn)	mg/L	11.27	0.3	0.02	17	1.4	0.1	<0.05	0.02	<0.1	<0.05	0.03					
Un-ionized Ammonia	mg/L			0.55	8.9	4.08	3.13	1.30	0.55	4	1.9	0.9					
Ion Percentage	mg/L			1.4	24.57	8.63	6.67	24.6	4.6	8.5	14.4	15.6					

Notes: 1) Blank denotes parameter not analysed.
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Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					02-Mar-10	31-May-10	21-Sep-10	19-Nov-10	28-Feb-11	10-May-11	10-Aug-11	09-Nov-11	01-Mar-12	15-May-12
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as $CaCO_3$)	mg/L		4500	1820	10000	7158	5907		1820		3090		5460		3360		5500
Conductivity	umho/cm			2000	26000	16750	13287		4390		7220		13000		8020		15000
Dissolved Chloride (Cl)	mg/L	8625	2500	330	3400	1906	1539		330		510		1300		750		1800
Dissolved Organic Carbon	mg/L	13312	1500	170	4500	775	929	308	958	547	2430	3110	3020	1250	762	634	468
Dissolved Sulphate (SO_4)	mg/L	483	200	10	220	48	24		<20		<50		25		*10*		<20
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00023	0.00009		<0.0001		<0.0001		<0.0001		<0.0001		<0.00010
Nitrate (N)	mg/L			0.05	2.5	0.98	0.57		<0.1		<0.1		<1		<1		<1.0
Nitrite (N)	mg/L			0.02	0.25	0.112	0.077		0.03		0.02		<0.1		<0.1		<0.10
pH	units		7.2	7.0	8.1	7.8	7.7	7.00	7.50	7.30	7.37	7.60	7.44	7.38	7.34	7.53	7.74
Phenols-4AAP	mg/L	8.63	1	0.076	3.9	0.38	0.51		0.80		1.00		3.90		1.31		0.55
Total Ammonia-N	mg/L	2944	800	57	2000	1077	728		57		128		489		368		663
Total Arsenic (As)	mg/L	<0.11	<0.11	0.006	0.54	0.140	0.060		0.006		0.012		0.032		0.022		0.044
Total Barium (Ba)	mg/L	0.966	0.966	0.21	0.75	0.34	0.34		0.25		0.60		0.51		0.25		0.27
Total BOD	mg/L	27600	1750	46	8200	484	790	370	920	650	3800	1600	3800	2400	1100	460	350
Total Boron (B)	mg/L	7.13	50	1.3	28	14.3	8.5		1.3		1.3		4.8		3.3		7.7
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0001	0.0025	0.00040	0.00038		0.0001		0.0002		0.0005		0.0002		0.0008
Total Calcium (Ca)	mg/L	3795	200	79	1400	136	243		530		1000		1000		460		180
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	250	14000	2188	3162		2600		14000		12000		2400		1900
Total Chromium (Cr)	mg/L	0.92	0.5	0.036	0.76	0.39	0.24		0.048		0.036		0.190		0.100		0.14
Total Copper (Cu)	mg/L	0.064	0.1	0.005	0.35	0.073	0.023		0.005		0.008		<0.01		0.010		0.020
Total Dissolved Solids	mg/L		5200	2720	13600	7093	7077		2720		4010		7410		4540		7170
Total Iron (Fe)	mg/L	1150	8	1.6	120	4	6		9.5		12.0		5.7		4.2		2.8
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	26	2700	1318	779	26	66	70	140	400	580	330	330	520	700
Total Lead (Pb)	mg/L	1.38	1.38	0.0013	0.011	0.006	0.003		0.0013		0.0020		<0.003		0.0022		0.0030
Total Magnesium (Mg)	mg/L	1380	350	130	530	224	278		200		250		460		230		490
Total Manganese (Mn)	mg/L	22.8	1	0.1	14	0.46	0.79		3.3		8.1		4.8		1.5		0.19
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.79	0.30	0.26		0.029		0.074		0.190		0.110		0.28
Total Phosphorus	mg/L	18.61	3	0.13	23	7.0	5.2	0.79	2.70	1.10	7.00	6.00	5.50	2.50	2.40	4.60	4.0
Total Potassium (K)	mg/L	2852	300	81	900	547	481		81		150		500		270		590
Total Sodium (Na)	mg/L	6578	500	270	2700	1667	1385		270		410		1200		670		1600
Total Suspended Solids	mg/L		150	13	420	85	73		56		76		67		39		56
Total Zinc (Zn)	mg/L	11.27	0.3	0.1	3.6	0.3	0.3		0.14		0.16		0.24		0.15		0.36
Un-ionized Ammonia	mg/L			0.07	63	24.46	9.10		0.07		0.17		5.80		1.50		6.7
Ion Percentage	mg/L			1.78	31.06	20.00	11.34		19.0		17.8		10.1		1.8		1.9

Notes: 1) Blank denotes parameter not analysed.
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Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					01-Aug-12	05-Nov-12	22-Feb-13	13-May-13	21-Aug-13	13-Nov-13	11-Mar-14	05-May-14	28-Jul-14	19-Nov-14
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as $CaCO_3$)	mg/L		4500	1820	10000	7158	5907		6500		6500		6500		4900		5300
Conductivity	umho/cm			2000	26000	16750	13287		2000		15000		18000		13000		16000
Dissolved Chloride (Cl)	mg/L	8625	2500	330	3400	1906	1539		1600		1900		2400		1300		1900
Dissolved Organic Carbon	mg/L	13312	1500	170	4500	775	929	234	1070	460	450	550	530	2200	3000	3700	1900
Dissolved Sulphate (SO_4)	mg/L	483	200	10	220	48	24		88		*10*		*10*		25		20
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00023	0.00009		<0.00010		<0.00010		<0.00010		<0.00010		<0.00010
Nitrate (N)	mg/L			0.05	2.5	0.98	0.57		<2.0		<1.0		<1.0		<2.0		<1.0
Nitrite (N)	mg/L			0.02	0.25	0.112	0.077		<0.20		<0.10		<0.10		<0.20		0.13
pH	units		7.2	7.0	8.1	7.8	7.7	7.45	7.67	7.50	7.80	7.76	7.94	7.28	7.70	7.53	7.70
Phenols-4AAP	mg/L	8.63	1	0.076	3.9	0.38	0.51		0.81		0.13		0.19		1.00		1.10
Total Ammonia-N	mg/L	2944	800	57	2000	1077	728		715		859		924		676		772
Total Arsenic (As)	mg/L	<0.11	<0.11	0.006	0.54	0.140	0.060		0.040		0.040		0.046		0.050		0.05
Total Barium (Ba)	mg/L	0.966	0.966	0.21	0.75	0.34	0.34		0.37		0.22		0.31		0.75		0.28
Total BOD	mg/L	27600	1750	46	8200	484	790	460	1600	480	240	200	120	5200	5500	7500	3300
Total Boron (B)	mg/L	7.13	50	1.3	28	14.3	8.5		6.5		6.5		8.3		9.7		9.6
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0001	0.0025	0.00040	0.00038		0.0002		<0.001		<0.0005		*<0.001*		*<0.001*
Total Calcium (Ca)	mg/L	3795	200	79	1400	136	243		300		110		79		1400		480
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	250	14000	2188	3162		4900		1600		1800		12000		5800
Total Chromium (Cr)	mg/L	0.92	0.5	0.036	0.76	0.39	0.24		0.18		0.15		0.20		0.45		0.29
Total Copper (Cu)	mg/L	0.064	0.1	0.005	0.35	0.073	0.023		0.013		<0.02		<0.01		0.030		*<0.02*
Total Dissolved Solids	mg/L		5200	2720	13600	7093	7077		7860		7280		8460		8430		8620
Total Iron (Fe)	mg/L	1150	8	1.6	120	4	6		5.2		2.2		2.0		120.0		14
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	26	2700	1318	779	300	760	730	910	1000	1100	660	770	1000	1000
Total Lead (Pb)	mg/L	1.38	1.38	0.0013	0.011	0.006	0.003		0.0023		<0.005		<0.003		0.0090		*<0.005*
Total Magnesium (Mg)	mg/L	1380	350	130	530	224	278		420		390		370		530		250
Total Manganese (Mn)	mg/L	22.8	1	0.1	14	0.46	0.79		0.71		0.10		0.10		14.00		3.4
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.79	0.30	0.26		0.33		0.32		0.34		0.79		0.34
Total Phosphorus	mg/L	18.61	3	0.13	23	7.0	5.2	1.8	5.2	3.3	3.3	5.7	4.8	10.0	23.0	9.5	7.6
Total Potassium (K)	mg/L	2852	300	81	900	547	481		520		620		670		760		590
Total Sodium (Na)	mg/L	6578	500	270	2700	1667	1385		1700		1600		1800		2000		1600
Total Suspended Solids	mg/L		150	13	420	85	73		27		22		13		360		190
Total Zinc (Zn)	mg/L	11.27	0.3	0.1	3.6	0.3	0.3		0.20		0.20		0.15		3.60		0.60
Un-ionized Ammonia	mg/L			0.07	63	24.46	9.10		5.1		6.6		25.0		19.0		9.5
Ion Percentage	mg/L			1.78	31.06	20.00	11.34		5.1		12.5		14.1		31.1		3.7

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The geometric and arithmetic means assume that any value below the RDL is equal to half of the value of the RDL.

Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					05-Mar-15	27-May-15	30-Jul-15	18-Nov-15	15-Mar-16	30-May-16	25-Jul-16	03-Nov-16	27-Mar-17	30-May-17
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as $CaCO_3$)	mg/L		4500	1820	10000	7158	5907		7700		7000		8100		6100		8200
Conductivity	umho/cm			2000	26000	16750	13287		20000		19000		18000		14000		20000
Dissolved Chloride (Cl)	mg/L	8625	2500	330	3400	1906	1539		2300		2200		1900		1400		2300
Dissolved Organic Carbon	mg/L	13312	1500	170	4500	775	929	1800	4500	4400	1000	2000	2000	830	1000	480	710
Dissolved Sulphate (SO_4)	mg/L	483	200	10	220	48	24		*50*		50		*10*		*25*		50
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00023	0.00009		<0.0020		*<0.00010*		<0.0002		<0.0002		<0.0002
Nitrate (N)	mg/L			0.05	2.5	0.98	0.57		<5.0		<5.0		<2.0		*<1.0*		<5.0
Nitrite (N)	mg/L			0.02	0.25	0.112	0.077		<0.50		<0.50		<0.20		<0.10		<0.50
pH	units		7.2	7.0	8.1	7.8	7.7	7.41	7.87	7.61	7.42	7.73	7.71	7.60	7.80	7.74	8.03
Phenols-4AAP	mg/L	8.63	1	0.076	3.9	0.38	0.51		2.40		1.50		1.92		0.660		0.233
Total Ammonia-N	mg/L	2944	800	57	2000	1077	728		1130		1130		939		821		1150
Total Arsenic (As)	mg/L	<0.11	<0.11	0.006	0.54	0.140	0.060		0.05		0.06		0.05		0.048		0.080
Total Barium (Ba)	mg/L	0.966	0.966	0.21	0.75	0.34	0.34		0.37		0.31		0.33		0.27		0.44
Total BOD	mg/L	27600	1750	46	8200	484	790	3700	7600	8200	6300	3600	3900	960	1600	440	350
Total Boron (B)	mg/L	7.13	50	1.3	28	14.3	8.5		11.0		11.0		10.0		6.7		11.0
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0001	0.0025	0.00040	0.00038		<0.001		<0.0005		<0.001		<0.005		<0.001
Total Calcium (Ca)	mg/L	3795	200	79	1400	136	243		960		800		480		270		110
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	250	14000	2188	3162		14000		9400		7000		3400		2500
Total Chromium (Cr)	mg/L	0.92	0.5	0.036	0.76	0.39	0.24		0.37		0.35		0.28		0.19		0.33
Total Copper (Cu)	mg/L	0.064	0.1	0.005	0.35	0.073	0.023		0.12		<0.02		0.05		0.04		0.35
Total Dissolved Solids	mg/L		5200	2720	13600	7093	7077		13600		12000		10700		7030		8580
Total Iron (Fe)	mg/L	1150	8	1.6	120	4	6		25		28		12		7.1		4.0
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	26	2700	1318	779	920	1200	1400	1200	840	1000	1000	1200	1000	1200
Total Lead (Pb)	mg/L	1.38	1.38	0.0013	0.011	0.006	0.003		0.006		<0.003		<0.005		<0.003		0.009
Total Magnesium (Mg)	mg/L	1380	350	130	530	224	278		380		380		380		300		340
Total Manganese (Mn)	mg/L	22.8	1	0.1	14	0.46	0.79		7.8		5.6		3.0		1.10		0.18
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.79	0.30	0.26		0.45		0.45		0.38		0.27		0.39
Total Phosphorus	mg/L	18.61	3	0.13	23	7.0	5.2	7.5	10.0	11.0	7.4	5.0	5.8	6.5	4.0	5.9	8.1
Total Potassium (K)	mg/L	2852	300	81	900	547	481		680		700		630		460		630
Total Sodium (Na)	mg/L	6578	500	270	2700	1667	1385		1900		1800		1800		1300		2000
Total Suspended Solids	mg/L		150	13	420	85	73		110		420		240		56		70
Total Zinc (Zn)	mg/L	11.27	0.3	0.1	3.6	0.3	0.3		0.80		0.41		0.30		0.21		0.40
Un-ionized Ammonia	mg/L			0.07	63	24.46	9.10		26.0		13.0		10.0		11.0		21.0
Ion Percentage	mg/L			1.78	31.06	20.00	11.34		2.8		2.3		10.0		12.9		18.3

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
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Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					10-Aug-17	20-Oct-17	22-Mar-18	28-May-18	17-Aug-18	08-Nov-18	08-Jan-19	11-Apr-19	23-Jul-19	07-Nov-19
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas
Alkalinity (Total as $CaCO_3$)	mg/L		4500	1820	10000	7158	5907		5100		7900		6200		9900		3900
Conductivity	umho/cm			2000	26000	16750	13287		12000		19000		14000		21000		10000
Dissolved Chloride (Cl)	mg/L	8625	2500	330	3400	1906	1539		1400		2600		1500		2600		1200
Dissolved Organic Carbon	mg/L	13312	1500	170	4500	775	929	880	530	290	820	1000	650	670	890	1000	550
Dissolved Sulphate (SO_4)	mg/L	483	200	10	220	48	24		38		<20		60		72		220
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00023	0.00009		<0.0002		<0.0004		<0.0002		<0.0002		<0.0002
Nitrate (N)	mg/L			0.05	2.5	0.98	0.57		<0.10		<2.0		<1.0		<5.0		0.061
Nitrite (N)	mg/L			0.02	0.25	0.112	0.077		0.039		<0.20		<0.10		<0.50		<0.10
pH	units		7.2	7.0	8.1	7.8	7.7	7.78	7.84	7.92	7.81	8.04	7.94	7.88	7.86	7.99	7.47
Phenols-4AAP	mg/L	8.63	1	0.076	3.9	0.38	0.51		0.790		0.110		0.430		0.240		0.077
Total Ammonia-N	mg/L	2944	800	57	2000	1077	728		700		1300		970		1200		620
Total Arsenic (As)	mg/L	<0.11	<0.11	0.006	0.54	0.140	0.060		0.540		0.100		0.062		0.11		0.07
Total Barium (Ba)	mg/L	0.966	0.966	0.21	0.75	0.34	0.34		0.29		0.46		0.23		0.32		0.28
Total BOD	mg/L	27600	1750	46	8200	484	790	410	540	170	240	610	620	220	330	210	520
Total Boron (B)	mg/L	7.13	50	1.3	28	14.3	8.5		14.0		18.0		14.0		12.0		6.8
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0001	0.0025	0.00040	0.00038		<0.0005		<0.001		<0.0005		<0.0005		<0.001
Total Calcium (Ca)	mg/L	3795	200	79	1400	136	243		140		96		96		91		280
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	250	14000	2188	3162		1700		2300		1900		2800		1200
Total Chromium (Cr)	mg/L	0.92	0.5	0.036	0.76	0.39	0.24		0.20		0.45		0.24		0.45		0.26
Total Copper (Cu)	mg/L	0.064	0.1	0.005	0.35	0.073	0.023		0.06		0.05		0.08		0.12		0.07
Total Dissolved Solids	mg/L		5200	2720	13600	7093	7077		5330		6850		6300		8410		5010
Total Iron (Fe)	mg/L	1150	8	1.6	120	4	6		5.6		4.0		3.0		4.2		5.0
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	26	2700	1318	779	1400	630	970	1300	1400	980	1300	1400	1800	600
Total Lead (Pb)	mg/L	1.38	1.38	0.0013	0.011	0.006	0.003		0.003		<0.005		0.007		0.007		0.006
Total Magnesium (Mg)	mg/L	1380	350	130	530	224	278		180		290		200		230		140
Total Manganese (Mn)	mg/L	22.8	1	0.1	14	0.46	0.79		0.26		0.18		0.24		0.22		1.70
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.79	0.30	0.26		0.19		0.37		0.23		0.31		0.23
Total Phosphorus	mg/L	18.61	3	0.13	23	7.0	5.2	10.0	4.7	5.1	8.4	7.2	3.7	0.1	8.9	11.0	4.0
Total Potassium (K)	mg/L	2852	300	81	900	547	481		340		680		460		670		380
Total Sodium (Na)	mg/L	6578	500	270	2700	1667	1385		1100		2200		1400		2000		1100
Total Suspended Solids	mg/L		150	13	420	85	73		83		100		47		120		70
Total Zinc (Zn)	mg/L	11.27	0.3	0.1	3.6	0.3	0.3		0.13		0.20		0.55		0.31		0.30
Un-ionized Ammonia	mg/L			0.07	63	24.46	9.10		7.7		28.0		19.0		24.0		4.2
Ion Percentage	mg/L			1.78	31.06	20.00	11.34		21.9		17.3		20.5		29.4		9.8

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
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NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
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Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					22-Jan-20	12-May-20	11-Aug-20	11-Nov-20	12-Jan-21	19-May-21	11-Aug-21	04-Nov-21	19-Jan-22	24-May-22
Laboratory								Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as $CaCO_3$)	mg/L		4500	1820	10000	7158	5907		9300		4600		10000		6400		9000
Conductivity	umho/cm			2000	26000	16750	13287		26000		12000		21000		13000		19000
Dissolved Chloride (Cl)	mg/L	8625	2500	330	3400	1906	1539		3400		1300		2200		970		2000
Dissolved Organic Carbon	mg/L	13312	1500	170	4500	775	929	1200	1500	1500	540	750	800	850	760	580	760
Dissolved Sulphate (SO_4)	mg/L	483	200	10	220	48	24		*25*		*10*		*10*		*25*		*25*
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00023	0.00009		<0.0002		<0.0002		<0.003		<0.0002		<0.0002
Nitrate (N)	mg/L			0.05	2.5	0.98	0.57		<1.0		<1.0		<1.0		<0.50		<1.0
Nitrite (N)	mg/L			0.02	0.25	0.112	0.077		0.12		<0.10		<0.10		<0.050		0.11
pH	units		7.2	7.0	8.1	7.8	7.7	7.60	7.90	7.98	8.07	7.5	7.8	7.84	7.70	7.63	7.86
Phenols-4AAP	mg/L	8.63	1	0.076	3.9	0.38	0.51		1.000		0.11		0.26		0.87		0.08
Total Ammonia-N	mg/L	2944	800	57	2000	1077	728		2000		830		1800		705		666
Total Arsenic (As)	mg/L	<0.11	<0.11	0.006	0.54	0.140	0.060		0.16		0.08		0.12		0.077		0.14
Total Barium (Ba)	mg/L	0.966	0.966	0.21	0.75	0.34	0.34		0.41		0.21		0.38		0.36		0.42
Total BOD	mg/L	27600	1750	46	8200	484	790	1500	1200	1300	230	510	410	240	790	170	170
Total Boron (B)	mg/L	7.13	50	1.3	28	14.3	8.5		18.0		7.8		24		8.2		28
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0001	0.0025	0.00040	0.00038		<0.001		<0.001		<0.0005		<0.0005		<0.001
Total Calcium (Ca)	mg/L	3795	200	79	1400	136	243		150		85		89		210		82
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	250	14000	2188	3162		4600		1400		2600		2300		250
Total Chromium (Cr)	mg/L	0.92	0.5	0.036	0.76	0.39	0.24		0.76		0.36		0.53		0.22		0.46
Total Copper (Cu)	mg/L	0.064	0.1	0.005	0.35	0.073	0.023		0.08		<0.02		<0.01		0.01		<0.02
Total Dissolved Solids	mg/L		5200	2720	13600	7093	7077		11700		4910		8280		6500		7710
Total Iron (Fe)	mg/L	1150	8	1.6	120	4	6		4.0		2		3.2		1.6		2
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	26	2700	1318	779	1000	2700	2700	940	1400	1500	1700	930	1400	2000
Total Lead (Pb)	mg/L	1.38	1.38	0.0013	0.011	0.006	0.003		0.011		<0.005		0.005		0.004		0.005
Total Magnesium (Mg)	mg/L	1380	350	130	530	224	278		280		130		280		210		250
Total Manganese (Mn)	mg/L	22.8	1	0.1	14	0.46	0.79		0.55		0.22		0.17		0.48		0.16
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.79	0.30	0.26		0.46		0.21		0.35		0.2		0.3
Total Phosphorus	mg/L	18.61	3	0.13	23	7.0	5.2	7.0	12.0	9.5	5.1	6.8	9.5	10	4.6	6.4	9.7
Total Potassium (K)	mg/L	2852	300	81	900	547	481		900		390		660		400		600
Total Sodium (Na)	mg/L	6578	500	270	2700	1667	1385		2700		1200		2000		1100		1800
Total Suspended Solids	mg/L		150	13	420	85	73		270		29		45		44		37
Total Zinc (Zn)	mg/L	11.27	0.3	0.1	3.6	0.3	0.3		0.20		0.1		0.23		0.34		0.20
Un-ionized Ammonia	mg/L			0.07	63	24.46	9.10		63.0		40		32		5.6		31
Ion Percentage	mg/L			1.78	31.06	20.00	11.34		18.0		18.0		25.9		20.7		26.1

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The geometric and arithmetic means assume that any value below the RDL is equal to half of the value of the RDL.

Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	Equalization Tank	Equalization Tank								
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					25-Jul-22	07-Nov-22								
Laboratory								Bureau Veritas	Bureau Veritas								
Alkalinity (Total as $CaCO_3$)	mg/L		4500	1820	10000	7158	5907		5400								
Conductivity	umho/cm			2000	26000	16750	13287		14000								
Dissolved Chloride (Cl)	mg/L	8625	2500	330	3400	1906	1539		1400								
Dissolved Organic Carbon	mg/L	13312	1500	170	4500	775	929	170	730								
Dissolved Sulphate (SO_4)	mg/L	483	200	10	220	48	24		25								
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00023	0.00009		<0.0002								
Nitrate (N)	mg/L			0.05	2.5	0.98	0.57		<5.0								
Nitrite (N)	mg/L			0.02	0.25	0.112	0.077		<0.50								
pH	units		7.2	7.0	8.1	7.8	7.7	7.70	7.71								
Phenols-4AAP	mg/L	8.63	1	0.076	3.9	0.38	0.51		0.34								
Total Ammonia-N	mg/L	2944	800	57	2000	1077	728		983								
Total Arsenic (As)	mg/L	<0.11	<0.11	0.006	0.54	0.140	0.060		0.14								
Total Barium (Ba)	mg/L	0.966	0.966	0.21	0.75	0.34	0.34		0.27								
Total BOD	mg/L	27600	1750	46	8200	484	790	46	400								
Total Boron (B)	mg/L	7.13	50	1.3	28	14.3	8.5		9.9								
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0001	0.0025	0.00040	0.00038		<0.001								
Total Calcium (Ca)	mg/L	3795	200	79	1400	136	243		200								
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	250	14000	2188	3162		2700								
Total Chromium (Cr)	mg/L	0.92	0.5	0.036	0.76	0.39	0.24		0.39								
Total Copper (Cu)	mg/L	0.064	0.1	0.005	0.35	0.073	0.023		0.03								
Total Dissolved Solids	mg/L		5200	2720	13600	7093	7077		5530								
Total Iron (Fe)	mg/L	1150	8	1.6	120	4	6		10								
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	26	2700	1318	779	460	910								
Total Lead (Pb)	mg/L	1.38	1.38	0.0013	0.011	0.006	0.003		0.007								
Total Magnesium (Mg)	mg/L	1380	350	130	530	224	278		160								
Total Manganese (Mn)	mg/L	22.8	1	0.1	14	0.46	0.79		1.2								
Total Nickel (Ni)	mg/L	1.84	0.5	0.029	0.79	0.30	0.26		0.29								
Total Phosphorus	mg/L	18.61	3	0.13	23	7.0	5.2	2.1	7.5								
Total Potassium (K)	mg/L	2852	300	81	900	547	481		450								
Total Sodium (Na)	mg/L	6578	500	270	2700	1667	1385		1400								
Total Suspended Solids	mg/L		150	13	420	85	73		110								
Total Zinc (Zn)	mg/L	11.27	0.3	0.1	3.6	0.3	0.3		0.2								
Un-ionized Ammonia	mg/L			0.07	63	24.46	9.10		18								
Ion Percentage	mg/L			1.78	31.06	20.00	11.34		14.1								

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
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Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	PS1	PS1	PS1	PS1	PS1	PS1	PS1	PS1	PS1	
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					07-May-14	19-May-15	31-May-16	26-May-17	11-May-18	15-May-19	12-May-20	18-May-21	10-May-22	
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	
Alkalinity (Total as CaCO3)	mg/L		4500	1600	11000	6084	6435	1600	4300	11000	6600	8600	8400	8300	7800	8100	
Conductivity	umho/cm			4800	25000	15261	17753	4800	11000	23000	19000	25000	25000	24000	23000	22000	
Dissolved Chloride (Cl)	mg/L	8625	2500	440	3500	1984	2210	440	1100	2800	2700	3000	3300	3500	3300	3000	
Dissolved Organic Carbon	mg/L	13312	1500	110	1000	987	647	590	110	730	630	930	1000	950	890	850	
Dissolved Sulphate (SO4)	mg/L	483	200	10	310	68	67	*10*	160	10	100	310	150	50	50	150	
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00029	0.00019	<0.00010	<0.00010	<0.002	<0.0001	<0.0001	<0.002	<0.00010	<0.0015	<0.003	
Nitrate (N)	mg/L			0.25	11.7	1.44	1.18	<0.50	<1.0	<2.0	<5.0	<5.0	<2.0	<1.0	<2.0	11.7	
Nitrite (N)	mg/L			0.025	0.35	0.113	0.136	<0.050	0.16	<0.20	<0.50	<0.50	<0.20	0.18	<0.20	0.35	
pH	pH		7.2	7.5	8.1	7.6	7.8	7.5	8.0	7.7	7.9	7.8	8.1	7.9	7.6	8.0	
Phenols-4AAP	mg/L	8.63	1	0.046	0.57	0.64	0.18	0.480	0.390	0.570	<0.40	<0.20	<0.040	<0.040	0.046	0.064	
Total Ammonia-N	mg/L	2944	800	379	1780	947	1187	559	379	1590	1240	1610	1520	1650	1780	1560	
Total Arsenic (As)	mg/L	<0.11	<0.11	0.04	3.1	0.533	0.596	0.04	1.30	0.94	0.39	0.49	0.32	1.6	0.64	3.1	
Total Barium (Ba)	mg/L	0.966	0.966	0.63	13	2.15	2.15	0.6	9.7	2.3	0.9	1.2	0.9	3.6	1.5	13	
Total BOD	mg/L	27600	1750	260	3800	1315	860	1800	840	760	260	560	390	1100	940	3800	
Total Boron (B)	mg/L	7.13	50	6	18	9.2	12.3	8	6	16	12	14	18	15	13	14	
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0005	0.031	0.0052	0.0045	<0.001	0.028	0.007	0.002	0.002	0.002	0.010	0.003	0.031	
Total Calcium (Ca)	mg/L	3795	200	170	17000	1710	790	1100	17000	480	170	230	190	960	380	4900	
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	1700	9800	5676	5502	7700	1700	7300	9800	6100	5000	9400	4100	4200	
Total Chromium (Cr)	mg/L	0.92	0.5	0.37	27	2.41	1.70	0.37	4.60	1.20	0.60	0.91	0.87	1.80	2.5	27	
Total Copper (Cu)	mg/L	0.064	0.1	0.03	3.8	0.48	0.30	0.03	3.80	0.33	0.10	0.18	0.08	0.64	0.23	2.7	
Total Dissolved Solids	mg/L		5200	4080	11900	7583	8616	4080		9390	8600	9030	11800	11900	8920	8150	
Total Iron (Fe)	mg/L	1150	8	100	4200	645	563	100	4200	1200	310	330	130	1000	250	3400	
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	440	2500	870	1375	650	440	1700	1400	1600	1400	2100	2200	2500	
Total Lead (Pb)	mg/L	1.38	1.38	0.007	2	0.21	0.12	0.007	2.000	0.180	0.044	0.072	0.035	0.280	0.091	0.91	
Total Magnesium (Mg)	mg/L	1380	350	220	4200	648	506	430	4200	330	230	220	270	520	300	1700	
Total Manganese (Mn)	mg/L	22.8	1	0.85	92	9.95	4.86	12.00	92.00	3.00	0.90	1.20	0.85	5.60	2.8	32	
Total Nickel (Ni)	mg/L	1.84	0.5	0.57	8.9	1.51	1.57	0.63	7.40	2.10	0.78	0.85	0.57	1.50	1.2	8.9	
Total Phosphorus	mg/L	18.61	3	11	150	24.1	47.1	11	53	26	29	51	130	150	65	40	
Total Potassium (K)	mg/L	2852	300	600	980	604	751	640	600	850	600	710	980	920	760	800	
Total Sodium (Na)	mg/L	6578	500	890	2900	1667	2023	1700	890	2400	1800	2200	2900	2700	2400	2100	
Total Suspended Solids	mg/L		150	42	190000	16365	5447	42	190000	1300	8800	6200	6000	1500	18000	46000	
Total Zinc (Zn)	mg/L	11.27	0.3	1.1	20	3.3	4.0	2.9	9.6	7.2	1.6	2.6	1.1	7.6	2	20	
Un-ionized Ammonia	mg/L			17	130	29.53	42.38	17	66	39	46	26	130	54	25	48	
Ion Percentage	mg/L			0.26	84.8	21.10	16.17	65.0	84.8	18.2	20.7	23.1	11.7	0.3	13.4	39.1	

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The geometric and arithmetic means assume that any value below the RDL is equal to half of the value of the RDL.

Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	PS3	PS3	PS3	PS3	PS3	PS3	PS3	PS3	PS3	
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					07-May-14	27-May-15	31-May-16	26-May-17	11-May-18	15-May-19	12-May-20	19-May-21	10-May-22	
Laboratory								Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	
Alkalinity (Total as CaCO3)	mg/L		4500	4400	16000	9420	10712	4400	8000	12000	11000	9800	16000	14000	14000	13000	
Conductivity	umho/cm			12000	31000	20867	22861	12000	24000	23000	22000	21000	31000	31000	20000	29000	
Dissolved Chloride (Cl)	mg/L	8625	2500	840	3600	2269	2375	840	3000	2000	2100	2000	2900	3200	3600	3400	
Dissolved Organic Carbon	mg/L	13312	1500	420	4400	1873	976	840	760	4400	490	420	810	1100	1200	1300	
Dissolved Sulphate (SO4)	mg/L	483	200	0.1	1000	157	62	380	1000	10	100	140	0.1	50	170	320	
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0048	0.00071	0.00044	0.0048	<0.0020	<0.002	<0.0001	<0.0001	<0.002	<0.00010	<0.0015	<0.003	
Nitrate (N)	mg/L			0.25	2.5	1.28	1.05	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	
Nitrite (N)	mg/L			0.025	51.4	3.602	0.224	<0.05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1.12	51.4	
pH	pH		7.2	6.1	8.2	7.6	7.6	6.1	7.5	7.2	7.8	7.9	7.7	7.9	8.1	8.2	
Phenols-4AAP	mg/L	8.63	1	0.07	3.3	1.05	0.26	1.90	0.09	3.30	1.39	<0.20	<0.20	0.09	0.07	0.097	
Total Ammonia-N	mg/L	2944	800	449	2790	1445	1604	449	1460	1320	1400	1410	2210	2690	2790	2480	
Total Arsenic (As)	mg/L	<0.11	<0.11	0.05	1.9	0.264	0.215	1.90	0.24	0.70	0.07	0.05	0.15	0.18	0.19	0.17	
Total Barium (Ba)	mg/L	0.966	0.966	0.1	17	1.80	0.50	17.00	1.30	5.40	0.14	0.14	0.32	0.2	0.14	0.1	
Total BOD	mg/L	27600	1750	160	13000	3742	588	7700	240	13000	260	160	540	340	230	200	
Total Boron (B)	mg/L	7.13	50	8	23	12.2	13.0	8	14	8	11	9.2	16	16	23	20	
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0005	0.03	0.0034	0.0013	0.030	0.003	0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Total Calcium (Ca)	mg/L	3795	200	94	24000	2474	535	24000	1000	6600	210	210	350	130	120	94	
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	1500	23000	7887	4595	22000	2700	23000	2100	1500	3300	3400	4400	4300	
Total Chromium (Cr)	mg/L	0.92	0.5	0.26	6.8	1.08	0.94	6.80	0.86	2.70	0.32	0.26	0.72	0.70	1.0	0.87	
Total Copper (Cu)	mg/L	0.064	0.1	0.03	5.5	0.55	0.15	5.50	0.34	1.80	0.06	0.05	0.10	0.04	0.03	0.04	
Total Dissolved Solids	mg/L		5200	7590	16900	10997	11320	8680	11200	16900	9600	7590	12500	12600	13600	11900	
Total Iron (Fe)	mg/L	1150	8	64	6800	700	272	6800	420	2400	190	92	170	94	64	66	
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	1100	3400	1497	1889	1100	1700	1400	1400	1300	2100	3400	2900	3100	
Total Lead (Pb)	mg/L	1.38	1.38	0.013	3	0.279	0.071	3.000	0.170	0.850	0.026	0.022	0.045	0.023	0.013	0.014	
Total Magnesium (Mg)	mg/L	1380	350	290	5600	849	680	5600	520	1700	690	520	470	390	330	290	
Total Manganese (Mn)	mg/L	22.8	1	0.39	140	15.29	2.99	140.0	6.1	42.0	1.5	1.3	1.9	0.6	0.58	0.39	
Total Nickel (Ni)	mg/L	1.84	0.5	0.81	10	1.66	1.49	10.00	1.30	5.60	1.00	0.90	0.92	0.81	0.88	0.85	
Total Phosphorus	mg/L	18.61	3	4.8	130	20.2	15.7	130.0	12.0	110.0	5.8	4.8	15.0	12.0	9.7	6.8	
Total Potassium (K)	mg/L	2852	300	680	1200	821	923	780	900	680	850	690	1100	1200	1200	1100	
Total Sodium (Na)	mg/L	6578	500	1000	3500	2120	2228	1000	2500	1400	2300	1900	2900	2900	3500	3000	
Total Suspended Solids	mg/L		150	870	210000	17930	4219	210000	1000	43000	1500	2400	5200	1200	2400	870	
Total Zinc (Zn)	mg/L	11.27	0.3	2.4	18	3.8	4.6	18.0	7.5	2.9	4.6	2.8	5.4	4.7	2.4	3.1	
Un-ionized Ammonia	mg/L			13	370	68.17	59.14	78	14	80	13	18	64	87	210	370	
Ion Percentage	mg/L			2.07	88.83	20.84	19.42	88.8	2.1	37.6	11.5	17.1	23.4	23.6	20.9	25.0	

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The geometric and arithmetic means assume that any value below the RDL is equal to half of the value of the RDL.

Table C-1
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	D&O Anticipated Raw Leachate Quality		Min	Max	Arithmetic Mean	Geomean	PS5	PS5	PS5							
Date		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality					12-May-20	19-May-21	10-May-22							
Laboratory								Bureau Veritas	Bureau Veritas	Bureau Veritas							
Alkalinity (Total as CaCO3)	mg/L		4500	6400	7700	7000	6980	6400	7700	6900							
Conductivity	umho/cm			15000	16220	15407	15396	15000	16220	15000							
Dissolved Chloride (Cl)	mg/L	8625	2500	860	1400	1187	1161	860	1400	1300							
Dissolved Organic Carbon	mg/L	13312	1500	280	4100	1593	771	4100	280	400							
Dissolved Sulphate (SO4)	mg/L	483	200	10	89	51	37	89	10	55							
Mercury (Hg)	mg/L	0.021	0.005	0.00005	0.0015	0.00053	0.00016	<0.00010	<0.00010	<0.003							
Nitrate (N)	mg/L			0.25	0.5	0.42	0.40	<0.50	<1.0	<1.0							
Nitrite (N)	mg/L			0.025	0.05	0.042	0.040	<0.050	<0.10	<0.10							
pH	pH		7.2	7.4	8.0	7.7	7.7	7.4	7.6	8.0							
Phenols-4AAP	mg/L	8.63	1	0.03	4.33	1.47	0.17	4.33	0.04	0.03							
Total Ammonia-N	mg/L	2944	800	1040	1080	1060	1060	1060	1080	1040							
Total Arsenic (As)	mg/L	<0.11	<0.11	0.04	0.07	0.057	0.055	0.04	0.06	0.07							
Total Barium (Ba)	mg/L	0.966	0.966	0.31	0.49	0.38	0.37	0.49	0.31	0.33							
Total BOD	mg/L	27600	1750	63	230	147	120	>8500	230	63							
Total Boron (B)	mg/L	7.13	50	5.8	9	7.4	7.3	5.8	7.5	9.0							
Total Cadmium (Cd)	mg/L	0.12	0.12	0.0005	0.0005	0.0005	0.0005	<0.001	<0.001	<0.001							
Total Calcium (Ca)	mg/L	3795	200	98	730	319	210	730	130	98							
Total Chemical Oxygen Demand (COD)	mg/L	50600	3500	1400	12000	5000	2996	12000	1600	1400							
Total Chromium (Cr)	mg/L	0.92	0.5	0.09	0.12	0.11	0.11	0.09	0.11	0.12							
Total Copper (Cu)	mg/L	0.064	0.1	0.01	0.01	0.01	0.01	<0.02	<0.02	<0.02							
Total Dissolved Solids	mg/L		5200	5210	9980	6900	6592	9980	5510	5210							
Total Iron (Fe)	mg/L	1150	8	24	30	26	26	30	24	25							
Total Kjeldahl Nitrogen (TKN)	mg/L	3450	960	1000	1600	1300	1277	1300	1000	1600							
Total Lead (Pb)	mg/L	1.38	1.38	0.007	0.01	0.008	0.008	0.007	0.007	0.01							
Total Magnesium (Mg)	mg/L	1380	350	380	400	390	390	390	380	400							
Total Manganese (Mn)	mg/L	22.8	1	0.27	3.4	1.33	0.67	3.4	0.33	0.27							
Total Nickel (Ni)	mg/L	1.84	0.5	0.22	0.38	0.31	0.30	0.22	0.32	0.38							
Total Phosphorus	mg/L	18.61	3	5.4	6.3	5.9	5.9	6.3	5.9	5.4							
Total Potassium (K)	mg/L	2852	300	420	590	507	502	420	510	590							
Total Sodium (Na)	mg/L	6578	500	960	1500	1287	1263	960	1400	1500							
Total Suspended Solids	mg/L		150	190	740	403	340	740	280	190							
Total Zinc (Zn)	mg/L	11.27	0.3	0.2	0.7	0.5	0.4	0.2	0.7	0.6							
Un-ionized Ammonia	mg/L			4.3	13	10.10	8.99	4.3	13	13							
Ion Percentage	mg/L			3.08	18.81	11.12	8.72	3.1	18.8	11.5							

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The geometric and arithmetic means assume that any value below the RDL is equal to half of the value of the RDL.

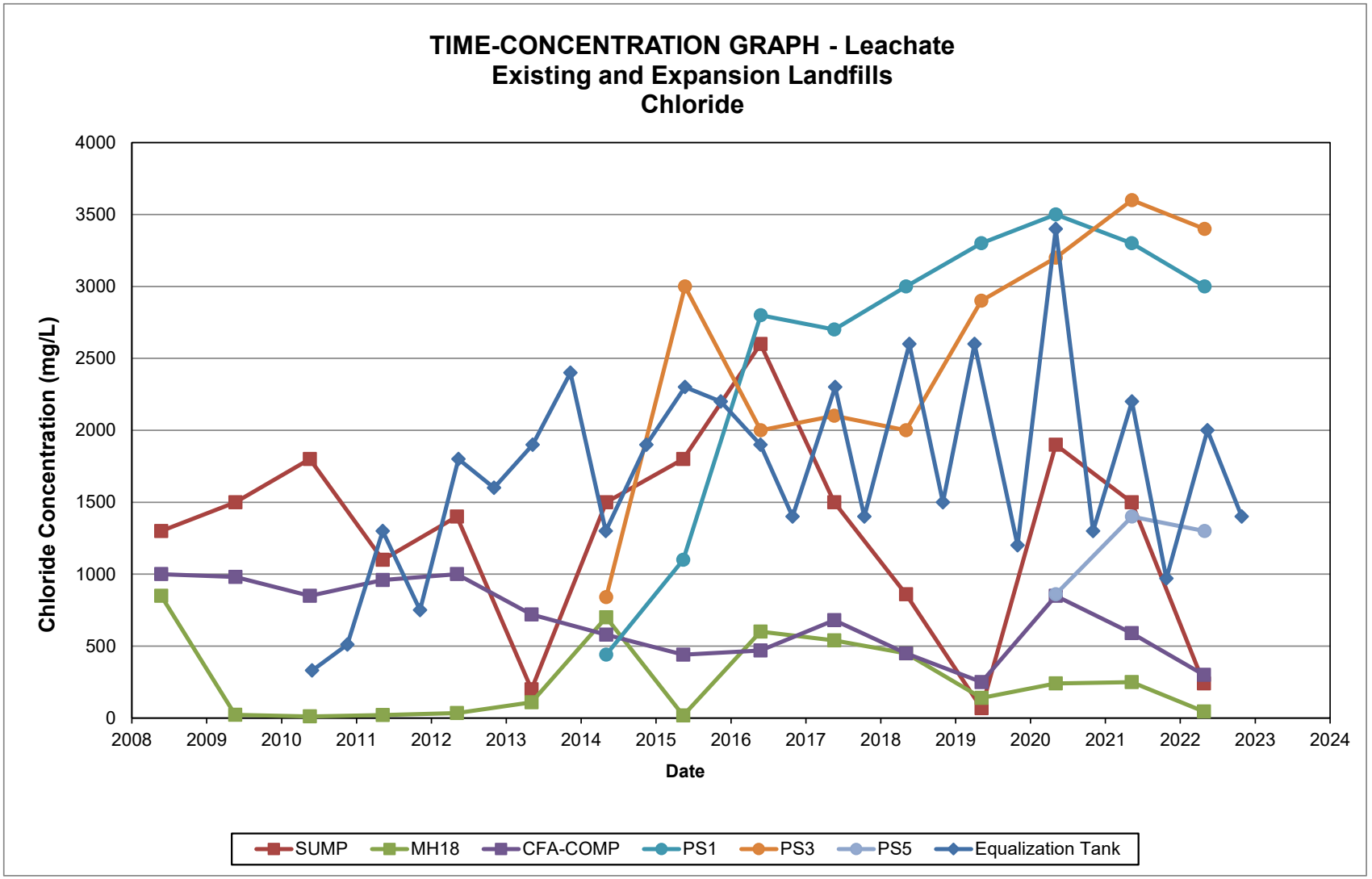

TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Chloride
Chloride Concentration (mg/L)
4000
3500
3000
2500
2000
1500
1000
500
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE C-1

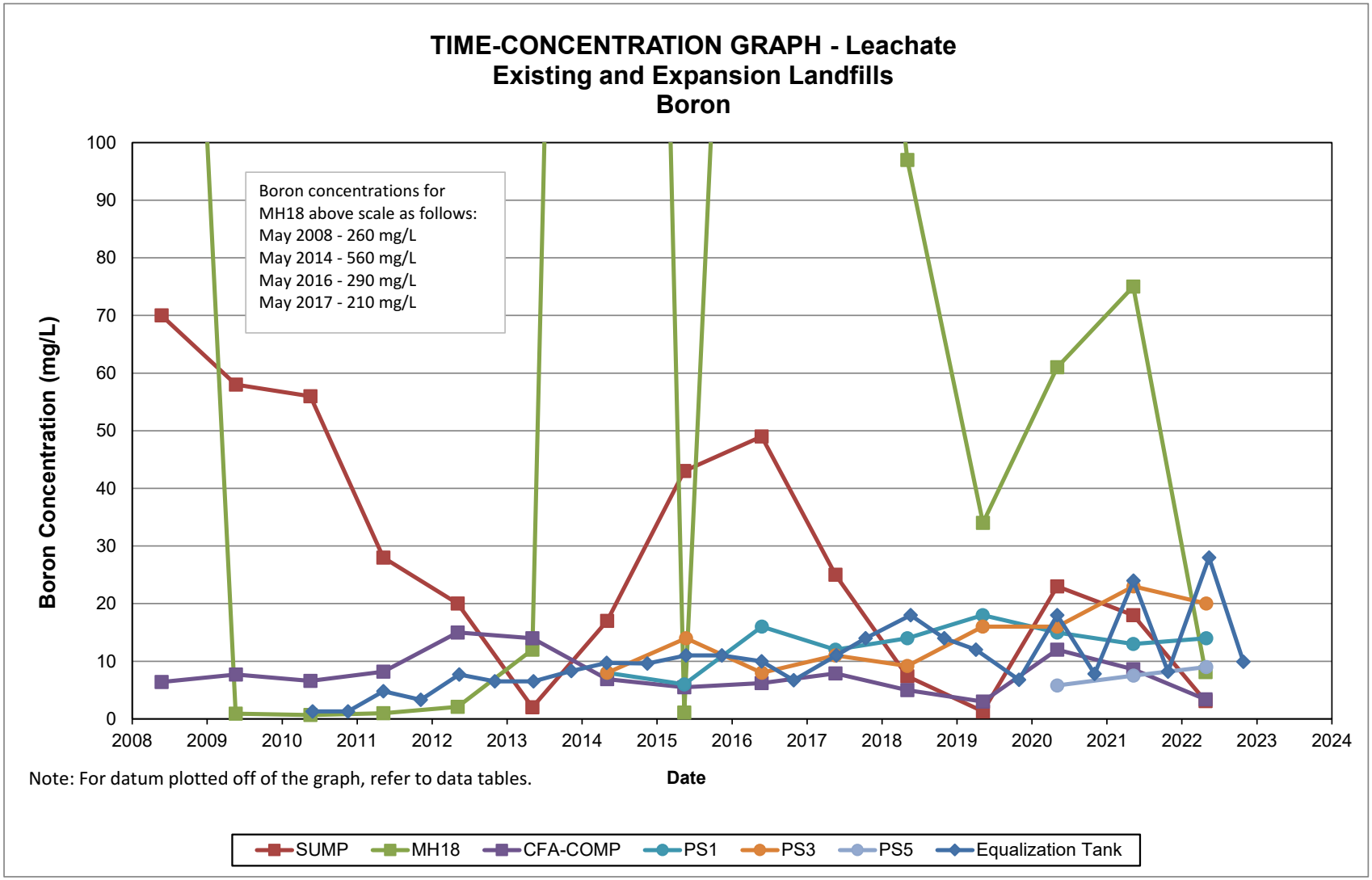

TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Boron
Boron concentrations for
MH18 above scale as follows:
May 2008 - 260 mg/L
May 2014 - 560 mg/L
May 2016 - 290 mg/L
May 2017 - 210 mg/L
Boron Concentration (mg/L)
100
90
80
70
60
50
40
30
20
10
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Note: For datum plotted off of the graph, refer to data tables.
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE C-2

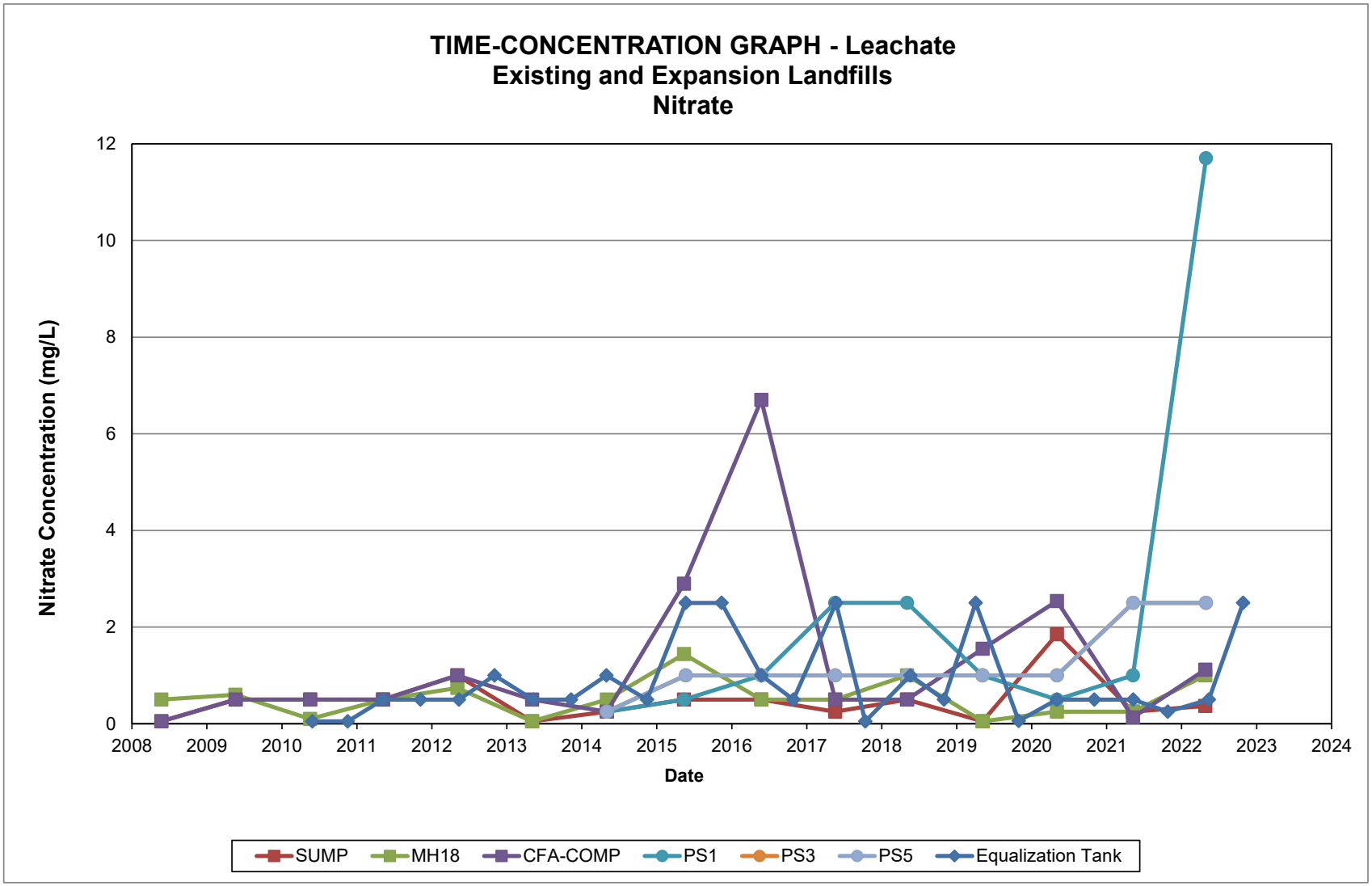

TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Nitrate
Nitrate Concentration (mg/L)
12
10
8
6
4
2
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE C-3

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)
Date		25-May-04	06-Apr-05	27-Mar-06	04-Apr-07	23-May-08	21-May-09	20-May-10	10-May-11	08-May-12	07-May-13	07-May-14	19-May-15
Laboratory		Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzo(a)pyrene	µg/L					<2	<1	<1	<0.8	<2	<0.8	<2	<1.0
1,2-Dichlorobenzene	µg/L					<5	<3	<3	<2	<5	<2	<5	<2.5
1,3-Dichlorobenzene	µg/L					<5	<3	<3	<2	<5	<2	<5	<2.5
1,4-Dichlorobenzene	µg/L					<5	<3	<3	3	<5	<2	<5	<2.5
Hexachlorobenzene	µg/L					<5	<3	<3	<2	<5	<2	<5	<2.5
1,2,4-Trichlorobenzene	µg/L					<5	<3	<3	<2	<5	<2	<5	<2.5
2,4-Dichlorophenol	µg/L					<3	<2	<2	<1	<3	<1	<3	<1.5
Pentachlorophenol	µg/L					<10	<5	<5	<4	<10	<4	<30	<5.0
Phenol	µg/L					<5	<3	<3	<2	<5	<2	<5	13
2,4,6-Trichlorophenol	µg/L					<5	<3	<3	<2	<5	<2	<5	<2.5
Di-N-butyl phthalate	µg/L					<20	<10	<10	<8	<20	<8	<20	<10
Diethyl phthalate	µg/L					16.0	8.0	7.0	6.0	<10	<4	<10	7.7
Dimethyl phthalate	µg/L					<10	<5	<5	<4	<10	<4	<10	<5.0
Benzene	µg/L	361	96	30	50	87	58	58	41	49	<5.0	34	100
1,4-Dichlorobenzene	µg/L					<20	<20	<10	<20	<10	<10	<4.0	<10
Ethylbenzene	µg/L	318.0	40.3	103.0	171.0	200.0	86.0	180.0	71.0	140.0	<5.0	17.0	160.0
Methylene Chloride(Dichloromethane)	µg/L					<50	<50	<30	<50	<25	<25	<10	<25
Toluene	µg/L	782	<32	15	32	110	<20	27	<20	29	<10	12	50
Vinyl Chloride	µg/L					<20	<20	<10	<20	<10	<10	<4.0	<10
p+m-Xylene	µg/L	1990.0	916.0	339.0	607.0	880.0	520.0	680.0	280.0	520.0	9.1	200.0	640.0
o-Xylene	µg/L	1140.0	493.0	160.0	329.0	430.0	260.0	330.0	200.0	250.0	<5.0	130.0	300.0
Xylene (Total)	µg/L					1300.0	780.0	1000.0	480.0	770.0	9.1	340.0	940.0

Parameter	Units	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)	Sump (Central Fill Area)					
Date		30-May-16	26-May-17	11-May-18	16-May-19	12-May-20	18-May-21	06-May-22					
Laboratory		MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas					
Benzo(a)pyrene	µg/L	<0.80	<1.6	<0.80	<0.20	<20	<0.80	<0.80					
1,2-Dichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0					
1,3-Dichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0					
1,4-Dichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	2.2	<2.0					
Hexachlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0					
1,2,4-Trichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0					
2,4-Dichlorophenol	µg/L	<1.2	<2.4	<1.2	<0.30	<30	<1.2	<1.2					
Pentachlorophenol	µg/L	<10	<8.0	<28	<6.0	<100	<4.0	<4.0					
Phenol	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0					
2,4,6-Trichlorophenol	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0					
Di-N-butyl phthalate	µg/L	<8.0	<16	<8.0	<2.0	<200	<8.0	<8.0					
Diethyl phthalate	µg/L	5.0	<8.0	<4.0	<1.0	<100	<4.0	<4.0					
Dimethyl phthalate	µg/L	<4.0	<8.0	<4.0	<1.0	<100	<4.0	<4.0					
Benzene	µg/L	21.0	<2.5	<10	<0.20	110	64	3.2					
1,4-Dichlorobenzene	µg/L	<20	<5.0	<2.0	<0.50	7.8	<20	<2.0					
Ethylbenzene	µg/L	<10	<2.5	<10	0.34	190	110	3.8					
Methylene Chloride(Dichloromethane)	µg/L	<50	<13	<100	<2.0	<20	<100	<10					
Toluene	µg/L	21.0	<5.0	<10	<0.20	220	<10	<1.0					
Vinyl Chloride	µg/L	<20	<5.0	<10	<0.20	<2.0	<10	<1.0					
p+m-Xylene	µg/L	740.00	82.00	18.00	0.81	1500	120	15					
o-Xylene	µg/L	93	<2.5	<10	<0.20	620	23	4.9					
Xylene (Total)	µg/L	830.00	82.00	18.00	0.81	2100	140	20					

Notes: 1) µg/L denotes micrograms per litre.
2) Accutest denotes chemical analytical testing was completed by Accutest Laboratories.
3) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	MH-18 (South Fill Area)	MH-18 (South Fill Area)	MH-18 (South Fill Area)	MH-18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)
Date		25-May-04	06-Apr-05	27-Mar-06	04-Apr-07	23-May-08	20-May-09	20-May-10	10-May-11	08-May-12	07-May-13	07-May-14	19-May-15
Laboratory		Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzo(a)pyrene	µg/L					<2	<0.2	<0.2	<0.2	<0.2	<0.8	<8	<0.20
1,2-Dichlorobenzene	µg/L					<5	<0.5	<0.5	<0.5	<0.5	<2	<20	<0.50
1,3-Dichlorobenzene	µg/L					<5	<0.5	<0.5	<0.5	<0.5	<2	<20	<0.50
1,4-Dichlorobenzene	µg/L					<5	<0.5	<0.5	<0.5	<0.5	<2	<20	<0.50
Hexachlorobenzene	µg/L					<5	<0.5	<0.5	<0.5	<0.5	<2	<20	<0.50
1,2,4-Trichlorobenzene	µg/L					<5	<0.5	<0.5	<0.5	<0.5	<2	<20	<0.50
2,4-Dichlorophenol	µg/L					<3	<0.3	<0.3	<0.3	<0.3	<1	<10	<0.30
Pentachlorophenol	µg/L					<10	<1	<1	<1	<1	<4	<100	<1.0
Phenol	µg/L					89	<0.5	<0.5	<0.5	<0.5	<2	34	<0.50
2,4,6-Trichlorophenol	µg/L					<5	<0.5	<0.5	<0.5	<0.5	<2	<20	<0.50
Di-N-butyl phthalate	µg/L					<20	<2	<2	<2	<2	<8	<80	<2.0
Diethyl phthalate	µg/L					25	<1	<1	<1	<1	<4	<40	<1.0
Dimethyl phthalate	µg/L					<10	<1	<1	<1	<1	<4	<40	<1.0
Benzene	µg/L	12.0	5.4	9.0	<0.5	9.0	0.3	<0.1	<0.1	<0.10	<5.0	<10	<0.10
1,4-Dichlorobenzene	µg/L					<10	<0.2	<0.2	<0.2	<0.20	<10	<20	0.45
Ethylbenzene	µg/L	891.0	257.0	41.0	<0.5	52.0	0.8	<0.1	<0.1	0.3	<5.0	46.0	<0.10
Methylene Chloride(Dichloromethane)	µg/L					<30	<0.5	<0.5	<0.5	<0.50	<25	<50	<0.50
Toluene	µg/L	90.5	23.3	343.0	<0.5	550.0	8.7	<0.2	<0.2	0.3	<10	450.0	<0.20
Vinyl Chloride	µg/L					14.0	<0.2	<0.2	<0.2	<0.20	<10	<20	<0.20
p+m-Xylene	µg/L	200.0	68.7	135.0	<1.0	190.0	2.6	<0.1	<0.1	1.9	<5.0	140.0	<0.10
o-Xylene	µg/L	97.4	28.0	53.0	<0.5	66.0	1.0	<0.1	<0.1	0.6	<5.0	60.0	<0.10
Xylene (Total)	µg/L					250.0	3.6	<0.1	<0.1	2.5	<5.0	200.0	<0.10

Parameter	Units	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)	MH18 (South Fill Area)					
Date		30-May-16	26-May-17	11-May-18	16-May-19	12-May-20	18-May-21	06-May-22					
Laboratory		MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas					
Benzo(a)pyrene	µg/L	<0.80	<1.6	<2.0	<0.20	<20	<0.80	<0.80					
1,2-Dichlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0					
1,3-Dichlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0					
1,4-Dichlorobenzene	µg/L	2.1	<4.0	<5.0	<0.50	<50	<2.0	<2.0					
Hexachlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0					
1,2,4-Trichlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0					
2,4-Dichlorophenol	µg/L	<1.2	<2.4	<3.0	<0.30	<30	<1.2	<1.2					
Pentachlorophenol	µg/L	<10	<8.0	<70	<6.0	<100	<4.0	<4.0					
Phenol	µg/L	17.0	16.0	8.8	<0.50	<50	11	<2.0					
2,4,6-Trichlorophenol	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0					
Di-N-butyl phthalate	µg/L	<8.0	<16	<20	<2.0	<200	<8.0	<8.0					
Diethyl phthalate	µg/L	11.0	21.0	11.0	<1.0	<100	6.6	<4.0					
Dimethyl phthalate	µg/L	<4.0	<8.0	<10	<1.0	<100	<4.0	<4.0					
Benzene	µg/L	10.0	10.0	<10	0.2	3.4	<10	<1.0					
1,4-Dichlorobenzene	µg/L	<10	<25	<5.0	<0.50	<4.0	<20	<2.0					
Ethylbenzene	µg/L	49.0	58.0	25.0	0.6	17	14	<1.0					
Methylene Chloride(Dichloromethane)	µg/L	<25	<100	<100	<2.0	<20	<100	<10					
Toluene	µg/L	520.0	500.0	230.0	<0.20	150	140	<1.0					
Vinyl Chloride	µg/L	17.0	19.0	<16	0.4	3.1	<10	<1.0					
p+m-Xylene	µg/L	160.0	170.0	73.0	<0.20	53	40	<1.0					
o-Xylene	µg/L	60.0	70.0	30.0	0.7	20	15	<1.0					
Xylene (Total)	µg/L	220.0	240.0	100.0	0.7	73	55	<1.0					

Notes: 1) µg/L denotes micrograms per litre.
2) Accutest denotes chemical analytical testing was completed by Accutest Laboratories.
3) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp
Date		23-May-08	21-May-09	20-May-10	10-May-11	08-May-12	07-May-13	07-May-14	19-May-15	30-May-16	26-May-17	11-May-18	16-May-19
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Benzo(a)pyrene	µg/L	<2	<1	<1	<4	<2	<0.8	<1	<1.0	<0.80	<0.80	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	<5	<3	<3	<10	<5	<2	<3	<2.5	<2.0	<2.0	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	<5	<3	<3	<10	<5	<2	<3	<2.5	<2.0	<2.0	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	<5	<3	<3	<10	<5	<2	<3	<2.5	<2.0	<2.0	1.1	<0.50
Hexachlorobenzene	µg/L	<5	<3	<3	<10	<5	<2	<3	<2.5	<2.0	<2.0	<0.50	<0.50
1,2,4-Trichlorobenzene	µg/L	<5	<3	<3	<10	<5	<2	<3	<2.5	<2.0	<2.0	<0.50	<0.50
2,4-Dichlorophenol	µg/L	<3		<2	<6	<3	<1	<2	<1.5	<1.2	<1.2	<0.30	<0.30
Pentachlorophenol	µg/L	<10	<5	<5	<20	<10	<4	<10	<5.0	<10	<4.0	<7.0	<6.0
Phenol	µg/L	76.0	110.0	32.0	22.0	6.0	23.0	<3	<2.5	<2.0	<2.0	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	<5	<3	<3	<10	<5	<2	<3	<2.5	<2.0	<2.0	<0.50	<0.50
Di-N-butyl phthalate	µg/L	<20	<10	<10	<40	<20	<8	<10	<10	<8.0	<8.0	<2.0	<2.0
Diethyl phthalate	µg/L	12.0	23.0	9.0	<20	<10	9.0	<5	<5.0	<4.0	<4.0	<1.0	<1.0
Dimethyl phthalate	µg/L	10.0	<5	<5	<20	<10	<4	<5	<5.0	<4.0	<4.0	<1.0	<1.0
Benzene	µg/L	3.0	4.0	2.0	<3	3.1	3.1	2.3	1.8	<1.0	<2.0	<10	1.3
1,4-Dichlorobenzene	µg/L	<4	<4	<4	<5	3.3	<2.0	<2.0	1.3	<2.0	<4.0	1.1	0.7
Ethylbenzene	µg/L	25.0	23.0	19.0	17.0	22.0	21.0	22.0	15.0	<1.0	<2.0	<10	1.2
Methylene Chloride(Dichloromethane)	µg/L	25.0	39.0	<10	<10	<5.0	<5.0	<5.0	<2.5	<5.0	<10	<100	<2.0
Toluene	µg/L	43.0	49.0	53.0	60.0	27.0	39.0	5.9	5.0	<2.0	<4.0	<10	0.8
Vinyl Chloride	µg/L	<4	<4	<4	<5	<2.0	<2.0	<2.0	<1.0	<2.0	<4.0	<10	<0.20
p+m-Xylene	µg/L	51.0	50.0	34.0	34.0	49.0	36.0	38.0	25.0	7.7	7.9	<10	3.6
o-Xylene	µg/L	18.0	17.0	13.0	20.0	24.0	17.0	16.0	14.0	<1.0	6.5	<10	1.9
Xylene (Total)	µg/L	69.0	67.0	47.0	54.0	72.0	53.0	54.0	39.0	7.7	14.0	<10	5.5

Parameter	Units	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp	CFA-Comp
Date		12-May-20	18-May-21	06-May-22									
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas									
Benzo(a)pyrene	µg/L	<20	<0.80	<0.80									
1,2-Dichlorobenzene	µg/L	<50	<2.0	<2.0									
1,3-Dichlorobenzene	µg/L	<50	<2.0	<2.0									
1,4-Dichlorobenzene	µg/L	<50	<2.0	<2.0									
Hexachlorobenzene	µg/L	<50	<2.0	<2.0									
1,2,4-Trichlorobenzene	µg/L	<50	<2.0	<2.0									
2,4-Dichlorophenol	µg/L	<30	<1.2	<1.2									
Pentachlorophenol	µg/L	<100	<4.0	<4.0									
Phenol	µg/L	<50	<2.0	5.7									
2,4,6-Trichlorophenol	µg/L	<50	<2.0	<2.0									
Di-N-butyl phthalate	µg/L	<200	<8.0	<8.0									
Diethyl phthalate	µg/L	<100	<4.0	<4.0									
Dimethyl phthalate	µg/L	<100	<4.0	<4.0									
Benzene	µg/L	<2.0	<10	3.4									
1,4-Dichlorobenzene	µg/L	<4.0	<20	<2.0									
Ethylbenzene	µg/L	<2.0	<10	7.6									
Methylene Chloride(Dichloromethane)	µg/L	<20	<100	<10									
Toluene	µg/L	<2.0	<10	6.9									
Vinyl Chloride	µg/L	<2.0	<10	<1.0									
p+m-Xylene	µg/L	14	<10	21									
o-Xylene	µg/L	8.8	<10	9.6									
Xylene (Total)	µg/L	23	<10	30									

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		02-Mar-10	31-May-10	21-Sep-10	19-Nov-10	28-Feb-11	10-May-11	10-Aug-11	09-Nov-11	01-Mar-12	15-May-12	01-Aug-12	05-Nov-12
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Benzo(a)pyrene	µg/L		<8		<20		<40		<4		<2		<8
1,2-Dichlorobenzene	µg/L		<20		<50		<100		<10		<5		<20
1,3-Dichlorobenzene	µg/L		<20		<50		<100		<10		<5		<20
1,4-Dichlorobenzene	µg/L		<20		<50		<100		<10		<5		<20
Hexachlorobenzene	µg/L		<20		<50		<100		<10		<5		<20
1,2,4-Trichlorobenzene	µg/L		<20		<50		<100		<10		<5		<20
2,4-Dichlorophenol	µg/L		<10		<30		<60		<6		<3		<10
Pentachlorophenol	µg/L		<40		<100		<200		<20		<10		<40
Phenol	µg/L		150		340		1100		180		<20		110
2,4,6-Trichlorophenol	µg/L		<20		<50		<100		<10		<5		<20
Di-N-butyl phthalate	µg/L		<80		<200		<400		<40		<20		<80
Diethyl phthalate	µg/L		<40		<100		<200		<20		<10		<40
Dimethyl phthalate	µg/L		<40		<100		<200		<20		<10		<40
Benzene	µg/L	1.6	2.0	1.1	<10	<1	<30	2.7	<5	6.9	5.3	7.7	6.0
Ethylbenzene	µg/L	9.0	10.0	6.0	<10	9.0	<30	11.0	13.0	15.0	11.0	20.0	15.0
o-Xylene	µg/L	10.0	9.0	6.4	<10	7.0	<30	8.7	10.0	12.0	6.7	16.0	11.0
p+m-Xylene	µg/L	27.0	24.0	19.0	11.0	20.0	<30	27.0	29.0	32.0	21.0	46.0	32.0
Toluene	µg/L	85.0	76.0	180.0	53.0	88.0	92.0	160.0	270.0	330.0	270.0	230.0	97.0
Dichloromethane	µg/L		160.0		85.0		<100		<30		<13		<25
Vinyl Chloride	µg/L		<2		<20		<50		<10		<5.0		<10

Parameter	Units	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		22-Feb-13	13-May-13	21-Aug-13	13-Nov-13	11-Mar-14	05-May-14	28-Jul-14	14-Nov-14	05-Mar-15	27-May-15	30-Jul-15	18-Nov-15
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Benzo(a)pyrene	µg/L		<0.8		<0.8		<40		<20		<100		<80
1,2-Dichlorobenzene	µg/L		<2		<2		<100		<50		<250		<200
1,3-Dichlorobenzene	µg/L		<2		<2		<100		<50		<250		<200
1,4-Dichlorobenzene	µg/L		<2		<2		<100		<50		<250		<200
Hexachlorobenzene	µg/L		<2		<2		<100		<50		<250		<200
1,2,4-Trichlorobenzene	µg/L		<2		<2		<100		<50		<250		<200
2,4-Dichlorophenol	µg/L		<1		<1		<60		<30		<150		<120
Pentachlorophenol	µg/L		<4		<4		<500		<100		<500		<400
Phenol	µg/L		<5		<8		300		110		510		280
2,4,6-Trichlorophenol	µg/L		<2		<2		<100		<50		<250		<200
Di-N-butyl phthalate	µg/L		<8		<8		<400		<200		<1000		<800
Diethyl phthalate	µg/L		6		<4		<200		<100		<500		<400
Dimethyl phthalate	µg/L		<4		<4		<200		<100		<500		<400
Benzene	µg/L	5.5	7.9	8.2	6.6	3.4	3.0	1.2	2.5	3.0	<10	2.0	<10
Ethylbenzene	µg/L	11.0	16.0	18.0	14.0	14.0	13.0	3.4	6.6	11.0	<10	4.3	<10
o-Xylene	µg/L	8.1	11.0	14.0	12.0	13.0	14.0	3.7	6.7	13.0	<10	4.6	<10
p+m-Xylene	µg/L	23.0	35.0	41.0	36.0	36.0	40.0	7.5	16.0	27.0	16.0	10.0	13.0
Toluene	µg/L	47.0	57.0	40.0	20.0	73.0	120.0	25.0	61.0	110.0	67.0	30.0	66.0
Dichloromethane	µg/L		<13		<13		100		<13		<50		<50
Vinyl Chloride	µg/L		<5.0		<5.0		<4.0		<5.0		<20		<20

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		15-Mar-16	30-May-16	25-Jul-16	03-Nov-16	27-Mar-17	30-May-17	10-Aug-17	20-Oct-17	22-Mar-18	28-May-18	17-Aug-18	08-Nov-18
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Benzo(a)pyrene	µg/L		<0.80		<80		<4.0		<40		<40		<20
1,2-Dichlorobenzene	µg/L		<2.0		<200		<10		<100		<100		<50
1,3-Dichlorobenzene	µg/L		<2.0		<200		<10		<100		<100		<50
1,4-Dichlorobenzene	µg/L		<2.0		<200		<10		<100		<100		<50
Hexachlorobenzene	µg/L		<2.0		<200		<10		<100		<100		<50
1,2,4-Trichlorobenzene	µg/L		<2.0		<200		<10		<100		<100		<50
2,4-Dichlorophenol	µg/L		<1.2		<120		<6.0		<60		<60		<30
Pentachlorophenol	µg/L		<10		<400		<20		<200		<200		<100
Phenol	µg/L		230		<200		14.0		<100		<100		<50
2,4,6-Trichlorophenol	µg/L		<2.0		<200		<10		<100		<100		<50
Di-N-butyl phthalate	µg/L		<8.0		<800		<40		<400		<400		<200
Diethyl phthalate	µg/L		5.6		<400		<20		<200		<200		<100
Dimethyl phthalate	µg/L		<4.0		<400		<20		<200		<200		<100
Benzene	µg/L	1.5	<5.0	4.0	<5.0	3.5	<5.0	3.3	<5.0	<10	3.8	3.3	2.0
Ethylbenzene	µg/L	3.7	5.1	8.6	<5.0	6.4	10.0	8.7	<5.0	<10	10.0	10.0	8.0
o-Xylene	µg/L	5.3	6.1	6.4	<5.0	7.5	11.0	10.0	5.1	<10	11.0	11.0	6.8
p+m-Xylene	µg/L	11.0	14.0	20.0	8.5	17.0	27.0	24.0	11.0	16.0	26.0	24.0	15.0
Toluene	µg/L	84.0	110.0	120.0	210.0	63.0	56.0	56.0	23.0	33.0	51.0	65.0	20.0
Dichloromethane	µg/L		<25		<25		<25				<2.0		<4.0
Vinyl Chloride	µg/L		<10		<10		<10				1.5		<0.40

Parameter	Units	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		08-Jan-19	11-Apr-19	23-Jul-19	07-Nov-19	22-Jan-20	15-May-20	11-Aug-20	11-Nov-20	12-Jan-21	19-May-21	11-Aug-21	04-Nov-21
Laboratory		Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzo(a)pyrene	µg/L		<20		<2.0		<20		<2.0		<2.0		<2.0
1,2-Dichlorobenzene	µg/L		<50		<5.0		<50		<5.0		<5.0		<5.0
1,3-Dichlorobenzene	µg/L		<50		<5.0		<50		<5.0		<5.0		<5.0
1,4-Dichlorobenzene	µg/L		<50		<5.0		<50		<5.0		<5.0		<5.0
Hexachlorobenzene	µg/L		<50		<5.0		<50		<5.0		<5.0		<5.0
1,2,4-Trichlorobenzene	µg/L		<50		<5.0		<50		<5.0		<5.0		<5.0
2,4-Dichlorophenol	µg/L		<30		<3.0		<30		<3.0		<3.0		<3.0
Pentachlorophenol	µg/L		<100		<10		<100		<10		<10		<10
Phenol	µg/L		<50		9.7		69		21		7.1		39
2,4,6-Trichlorophenol	µg/L		<50		<5.0		<50		<5.0		<5.0		<5.0
Di-N-butyl phthalate	µg/L		<200		<20		<200		<20		<20		<20
Diethyl phthalate	µg/L		<100		<10		<100		<10		<10		<10
Dimethyl phthalate	µg/L		<100		13.0		<100		<10		<10		<10
Benzene	µg/L	3.4	4.6	4.9	2.6	<10	6.1	3.5	2.4	6.5	<10	<10	6.1
Ethylbenzene	µg/L	8.5	16.0	13.0	7.4	17.0	16	9.8	6.6	21	18	13	18
o-Xylene	µg/L	9.2	15.0	15.0	9.3	18.0	21.0	9.7	8.0	22	17	13	16
p+m-Xylene	µg/L	21.0	32.0	35.0	22.0	42.0	45.0	22.0	17.0	48	41	30	39
Toluene	µg/L	34.0	56.0	70.0	57.0	90.0	73.0	93.0	78.0	910	2400	160	200
Dichloromethane	µg/L		<20		94		<20		<20		<100		<20
Vinyl Chloride	µg/L		<2.0		<2.0		<2.0		<2.0		<10		2.6

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank								
Date		19-Jan-22	24-May-22	25-Jul-22	07-Nov-22								
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas								
Benzo(a)pyrene	µg/L		<2.0		<8.0								
1,2-Dichlorobenzene	µg/L		<5.0		<20								
1,3-Dichlorobenzene	µg/L		<5.0		<20								
1,4-Dichlorobenzene	µg/L		<5.0		<20								
Hexachlorobenzene	µg/L		<5.0		<20								
1,2,4-Trichlorobenzene	µg/L		<5.0		<20								
2,4-Dichlorophenol	µg/L		<3.0		<12								
Pentachlorophenol	µg/L		<10		<40								
Phenol	µg/L		<5.0		<20								
2,4,6-Trichlorophenol	µg/L		<5.0		<20								
Di-N-butyl phthalate	µg/L		<20		<80								
Diethyl phthalate	µg/L		<10		<40								
Dimethyl phthalate	µg/L		<10		<40								
Benzene	µg/L	<10	5.2	2.6	<10								
Ethylbenzene	µg/L	16	17	<1.0	11								
o-Xylene	µg/L	13	18	1.1	12								
p+m-Xylene	µg/L	27	40	2.5	27								
Toluene	µg/L	71	49	4.2	55								
Dichloromethane	µg/L		<2.0		<100								
Vinyl Chloride	µg/L		1.7		<10								

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS1	PS1	PS1	PS1	PS1	PS1	PS1	PS1	PS1			
Date		07-May-14	19-May-15	31-May-16	26-May-17	11-May-18	15-May-19	12-May-20	18-May-21	10-May-22			
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas			
Benzo(a)pyrene	µg/L	<8	<4.0	<4.0	<2.0	<4.0	<4.0	<20	<0.80	<2.0			
1,2-Dichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0			
1,3-Dichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0			
1,4-Dichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0			
Hexachlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0			
1,2,4-Trichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0			
2,4-Dichlorophenol	µg/L	<10	<6.0	<6.0	<3.0	<6.0	<6.0	<50	<1.2	<3.0			
Pentachlorophenol	µg/L	<100	<50	<50	<10	<14	<120	<30	<4.0	<10			
Phenol	µg/L	170	<10	<10	<5.0	16.0	<10	<100	7.2	<5.0			
2,4,6-Trichlorophenol	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0			
Di-N-butyl phthalate	µg/L	<80	<40	<40	<20	<40	<40	<50	<8.0	<20			
Diethyl phthalate	µg/L	<40	<20	<20	<10	<20	<20	<200	<4.0	<10			
Dimethyl phthalate	µg/L	<40	<20	<20	<10	<20	<20	<100	<4.0	<10			
Benzene	µg/L	<2.0	<0.50	2.8	<10	<10	<2.0	<2.0	<10	2.5			
Ethylbenzene	µg/L	4.9	<0.50	5.5	<10	11.0	2.8	2.4	<10	3.2			
o-Xylene	µg/L	<2.0	<0.50	6.3	<10	12.0	2.6	2.5	<10	2.8			
p+m-Xylene	µg/L	2.8	<0.50	15	<10	25.0	9.0	6.3	<10	5.2			
Toluene	µg/L	20.0	5.0	37.0	12.0	44.0	7.7	6.3	16	11			
Dichloromethane	µg/L	40.0	<2.5	<13	<100	<100	<20	<20	<100	<20			
Vinyl Chloride	µg/L	<4.0	<1.0	<5.0	<10	<10	<2.0	<2.0	<10	<2.0			

Parameter	Units	PS3	PS3	PS3	PS3	PS3	PS3	PS3	PS3	PS3			
Date		07-May-14	27-May-15	31-May-16	26-May-17	11-May-18	15-May-19	12-May-20	19-May-21	10-May-22			
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas			
Benzo(a)pyrene	µg/L	<3	<10	<4.0	<2.0	<2.0	<0.80	<20	<2.0	<2.0			
1,2-Dichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0			
1,3-Dichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0			
1,4-Dichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0			
Hexachlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0			
1,2,4-Trichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0			
2,4-Dichlorophenol	µg/L	<5	<15	<6.0	<3.0	<3.0	<1.2	<30	<3.0	<3.0			
Pentachlorophenol	µg/L	<20	<50	<50	<10	<70	<25	<100	<10	<10			
Phenol	µg/L	290.0	<25	490.0	<5.0	<5.0	<2.0	<50	<5.0	<5.0			
2,4,6-Trichlorophenol	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0			
Di-N-butyl phthalate	µg/L	<30	<100	<40	<20	<20	<8.0	<200	<20	<20			
Diethyl phthalate	µg/L	43.0	<50	24.0	<10	<10	<4.0	<100	<10	<10			
Dimethyl phthalate	µg/L	<20	<50	<20	<10	<10	<4.0	<2.0	<10	<10			
Benzene	µg/L	<5.0	4.9	<25	<10	<10	4.3	<2.0	<10	<10			
Ethylbenzene	µg/L	<5.0	9.3	<25	<10	<10	3.6	<2.0	<10	<10			
o-Xylene	µg/L	6.6	12.0	<25	<10	<10	3.7	<2.0	<10	<10			
p+m-Xylene	µg/L	13.0	24.0	26.0	<10	<10	7.2	<2.0	<10	<10			
Toluene	µg/L	120.0	52.0	180.0	<10	<10	68.0	2.4	<10	<10			
Dichloromethane	µg/L	470.0	<5.0	<130	<100	<100	<20	<20	<100	<100			
Vinyl Chloride	µg/L	<10	3.4	<50	<10	<10	<2.0	<2.0	<10	<10			

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table C-2
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS5	PS5	PS5									
Date		12-May-20	19-May-21	10-May-22									
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas									
Benzo(a)pyrene	µg/L	<20	<0.20	<2.0									
1,2-Dichlorobenzene	µg/L	<50	<0.50	<5.0									
1,3-Dichlorobenzene	µg/L	<50	<0.50	<5.0									
1,4-Dichlorobenzene	µg/L	<50	<1.0	<5.0									
Hexachlorobenzene	µg/L	<50	<0.50	<5.0									
1,2,4-Trichlorobenzene	µg/L	<50	<0.50	<5.0									
2,4-Dichlorophenol	µg/L	<30	<0.30	<3.0									
Pentachlorophenol	µg/L	<100	<1.0	<10									
Phenol	µg/L	800	<3.0	<5.0									
2,4,6-Trichlorophenol	µg/L	<50	<0.50	<5.0									
Di-N-butyl phthalate	µg/L	<200	<2.0	<20									
Diethyl phthalate	µg/L	<100	1	<10									
Dimethyl phthalate	µg/L	<100	<1.0	<10									
Benzene	µg/L	2.5	4.3	<2.0									
Ethylbenzene	µg/L	7.3	10	<2.0									
o-Xylene	µg/L	9.2	9.2	2.3									
p+m-Xylene	µg/L	19	22	6.3									
Toluene	µg/L	87	1700	6.1									
Dichloromethane	µg/L	<20	<20	<20									
Vinyl Chloride	µg/L	<2.0	2.2	<2.0									

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

D

Groundwater Chemical Analytical Data

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5
Date			23-Mar-84	4-Jul-84	24-Jul-84	18-Sep-84	26-Mar-85	11-Sep-85	30-Apr-86	8-Sep-86	30-Apr-87	27-May-88	3-Nov-88	7-Jun-89	1-Nov-89
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean
Alkalinity (Total as CaCO3)	mg/L	30-500***		496					506		500	488	498	467	539
Dissolved Boron (B)	mg/L	5.0*													
Dissolved Calcium (Ca)	mg/L		145	115	84	80	114	118	113	123	128	102	145	105	140
Dissolved Chloride (Cl)	mg/L	250**	13	36	14	27	1	1	1	1	29	44	45	44	40
Dissolved Iron (Fe)	mg/L	0.30**	<0.04	<0.04	<0.04	<0.04	<0.03	<0.04	<0.02	0.47	<0.02	<0.02	0.05	<0.01	0.08
Dissolved Magnesium (Mg)	mg/L		121	120	113	132	106	111	110	116	115	107	126	110	130
Dissolved Organic Carbon	mg/L	5**	3.3	3.3	2.3	2.4	2.1	1.8	2.4	1.8	2.6	2	1.8	2.3	1.7
Dissolved Potassium (K)	mg/L		10	3.7	9.7	3.9	4.3	2.7	1.9	2.8	4.4	2.86	8.8	2.2	47
Dissolved Sodium (Na)	mg/L	200**	80	50	77	60	50	53	43	57	56	45.4	58	72	67
Dissolved Sulphate (SO4)	mg/L	500**	400	338	385	390	330	330	270	360	330	270	289	320	267
Nitrate (N)	mg/L	10.0*													
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*	0.33	0.18	0.42	0.75	0.7	0.96	0.69	0.5	0.45	0.67	0.3	0.28	0.53
Total Ammonia-N	mg/L			0.01	0.23	0.02	0.02	0.07	0.01	0.01	0.01	0.02	0.03	0.01	0.01
Total Kjeldahl Nitrogen (TKN)	mg/L			0.45	0.3	0.2	0.26	0.49	0.22	3.2	0.4	1.68	0.4	0.3	0.12
Ion Percentage	%			5.3					9.1		7.7	3.9	14.1	6.1	17.3

Parameter	Units	ODWQS	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5
Date			27-May-90	11-Dec-90	22-May-91	14-Nov-91	29-May-92	12-Nov-92	17-Jun-93	16-Dec-93	12-May-94	6-Jun-95	2-Nov-95	8-May-96	11-Dec-96
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Zenon	Zenon	Zenon	Zenon
Alkalinity (Total as CaCO3)	mg/L	30-500***	484	466	508	506	462	480	444	451	453	570	510	470	510
Dissolved Boron (B)	mg/L	5.0*								0.22	0.08	0.16	0.19	0.2	
Dissolved Calcium (Ca)	mg/L		119	97	121	96	86.1	119	104	105	97.6	93	99	95	100
Dissolved Chloride (Cl)	mg/L	250**	43	43	25	31	27	52	42	34	34	37	31	32	31
Dissolved Iron (Fe)	mg/L	0.30**			0.03	<0.02	<0.02	<0.02	<0.02	0.08	0.02	<0.01	<0.01	<0.01	0.07
Dissolved Magnesium (Mg)	mg/L		142	101	111	103	100	128	114	111	108	100	110	100	110
Dissolved Organic Carbon	mg/L	5**	2	1.6	3.3	2.3	2.7	2.7	2						
Dissolved Potassium (K)	mg/L		2.8	2.71	2.74	3.38	2.28	3.03	2.91	4.84	2.79	2.3	3	2.5	3
Dissolved Sodium (Na)	mg/L	200**		56.1	63.4	57.8	54.2	58.2	52.3	62.4	53.3	47	54	54	59
Dissolved Sulphate (SO4)	mg/L	500**	270	310	380	340	350	320	370	340	230	300	330	330	330
Nitrate (N)	mg/L	10.0*													
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*	0.4	0.28	0.26	0.33	0.25	0.01	0.02	0.33	0.13	0.12	0.091	0.16	0.19
Total Ammonia-N	mg/L		0.11		0.06	0.04	0.01	0.01	0.43	0.01	<0.01	0.05	<0.03	0.04	<0.03
Total Kjeldahl Nitrogen (TKN)	mg/L		0.33	0.3	0.33	3.03	0.21	0.15	0.43	0.3	0.21	0.56	0.18	0.51	0.27
Ion Percentage	%			1.4	3.3	0.9	2.0	9.1	2.5	5.7	10.5	4.9	1.3	0.0	2.1

Parameter	Units	ODWQS	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5
Date			14-May-97	4-Dec-97	13-May-98	29-Mar-00	5-Dec-00	8-May-01	28-Nov-01	23-May-02	14-May-03	12-Nov-03	25-May-04	26-Nov-04	13-May-05
Laboratory			Zenon	Zenon	Zenon	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	470	520	480	514	464	403	435	424	392	455	365	404	339
Dissolved Boron (B)	mg/L	5.0*							0.19	0.18	0.18	0.25	0.15	0.23	0.16
Dissolved Calcium (Ca)	mg/L		100	110	110	94	93	88	78	93	81	100	103	100	105
Dissolved Chloride (Cl)	mg/L	250**	30	23	24	16	22	23	19	24	19	18	33	28	38
Dissolved Iron (Fe)	mg/L	0.30**	<0.010	<0.01	0.015	0.97	1.67	0.14	<0.01	<0.01	0.17	0.42	<0.01	0.02	<0.01
Dissolved Magnesium (Mg)	mg/L		100	110	110	101	102	88	78	93	80	104	107	102	105
Dissolved Organic Carbon	mg/L	5**							2.1	2.2	2.0	1.6	2.7	3.0	2.9
Dissolved Potassium (K)	mg/L		3.3	4.2	3.4	4	4	2	3	2	3	6	2	4	2
Dissolved Sodium (Na)	mg/L	200**	54	64	56	57	54	45	46	48	45	56	55	54	50
Dissolved Sulphate (SO4)	mg/L	500**	310	330	310	282	298	251	206	265	232	261	354	321	404
Nitrate (N)	mg/L	10.0*		0.11	0.71	0.20	0.13	<0.1	<0.10	<0.10	<0.10	<0.10	0.13	<0.10	0.18
Nitrite (N)	mg/L	1.0*		<0.05	<0.05	<0.10	<0.1	<0.1							
NO3+NO2	mg/L	10.0*	0.4	0.11	0.71	0.20	0.13	<0.1							
Total Ammonia-N	mg/L		<0.03	0.04	<0.03	0.08	<0.2	0.05	0.05	0.02	0.03	0.20	0.16	<0.02	0.21
Total Kjeldahl Nitrogen (TKN)	mg/L		0.48	0.28	0.19	0.2	0.58	0.13	0.23	0.16	0.19	0.25	0.20	0.52	0.20
Ion Percentage	%		2.4	4.5	6.8	3.1	3.8	4.8	2.2	5.0	3.9	9.6	7.0	6.0	3.5

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6
Date			30-Nov-05	19-May-06	24-Nov-06	5-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	18-Nov-09	20-May-10	23-Nov-10	11-May-11	3-Nov-11
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	502	540	529	534	546	561	561	557	564	592	582	580	596
Conductivity	umho/cm							1600	1590	1550	1600	1820	1820	1850	1850
Dissolved Barium (Ba)	mg/L	1*						0.015	0.017	0.016	0.017	0.017	0.019	0.016	0.016
Dissolved Boron (B)	mg/L	5.0*	0.16	0.13	0.15	0.17	0.16	0.13	0.17	0.15	0.17	0.15	0.18	0.16	0.16
Dissolved Cadmium (Cd)	mg/L	0.005*						<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		118	116	121	128	125	130	120	130	130	130	130	130	130
Dissolved Chloride (Cl)	mg/L	250**	22	33	31	33	28	31	33	33	33	32	32	33	31
Dissolved Iron (Fe)	mg/L	0.30**	0.18	<0.03	0.72	<0.03	<0.03	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*						0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		90	97	101	101	101	110	100	110	120	110	120	110	110
Dissolved Organic Carbon	mg/L	5**	5.6	5.0	3.4	3.6	3.7	2.3	2.3	3.5	3.0	2.5	3.0	2.9	3
Dissolved Potassium (K)	mg/L		6	5	5	5	5	5.2	5.1	5	5.3	4.9	5.3	4.8	5.2
Dissolved Sodium (Na)	mg/L	200**	32	41	41	50	45	64	86	85	110	140	130	140	150
Dissolved Sulphate (SO4)	mg/L	500**	256	309	260	253	231	340	368	340	330	410	380	410	410
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	0.9	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pH	(pH units)	6.5-8.5						8.0	8.0	8.0	7.7	8.1	7.8	8.0	7.6
Total Ammonia-N	mg/L		0.28	0.07	0.08	<0.02	0.04	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500						965	1000	975	1040	1170	1130	1070	1280
Total Kjeldahl Nitrogen (TKN)	mg/L		0.41	0.29	0.08	0.20	<0.10	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		2.7	1.3	4.6	6.9	7.2	4.0	1.1	6.4	11.4	6.6	9.6	7.0	1.7

Parameter	Units	ODWQS	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6
Date			15-May-12	8-Nov-12	9-May-13	5-Nov-13	6-May-14	24-Nov-14	13-May-15	11-Nov-15	25-May-16	16-Nov-16	16-May-17	7-Nov-17	8-May-18
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L	30-500***	680	650	630	630	670	670	690	670	660	660	660	660	660
Conductivity	umho/cm		2300	2200	2100	2100	2300	2300	2500	2300	2200	2200	2300	2100	2200
Dissolved Barium (Ba)	mg/L	1*	0.02	0.017	0.014	0.014	0.014	0.015	0.013	0.01	0.01	0.01	0.01	0.013	0.012
Dissolved Boron (B)	mg/L	5.0*	0.19	0.19	0.16	0.17	0.17	0.22	0.18	0.17	0.19	0.19	0.19	0.2	0.18
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		140	130	140	140	140	120	110	110	110	120	120	120	120
Dissolved Chloride (Cl)	mg/L	250**	36	35	36	35	42	41	77	63	47	47	48	47	44
Dissolved Iron (Fe)	mg/L	0.30**	<0.10	<0.10	<0.10	<0.10	<0.10	0.83	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		120	120	120	120	120	100	100	92	99	110	100	110	110
Dissolved Organic Carbon	mg/L	5**	4.1	3.1	2.8	3.3	5.6	3.7	3.7	3.7	3.1	3.4	3.7	3.3	3.3
Dissolved Potassium (K)	mg/L		5	5.2	4.9	5.1	4.9	5.7	6.7	5.1	7.0	5.5	6.2	5.5	5.3
Dissolved Sodium (Na)	mg/L	200**	250	230	190	200	280	180	330	310	300	280	260	250	240
Dissolved Sulphate (SO4)	mg/L	500**	590	510	530	510	560	530	500	510	510	460	530	480	440
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	0.11	<0.10	<0.10	0.14	<0.10	0.58	<0.10	0.71	0.24	0.28	0.12
pH	(pH units)	6.5-8.5	7.7	7.8	8.0	7.2	7.2	7.9	8.1	7.7	7.9	7.8	7.7	7.6	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1510	1470	1420	1360	1530	1480	1600	1550	1480	1450	1490	1460	1320
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		1.4	3.5	0.9	2.7	5.1	7.9	3.1	6.7	8.3	11.6	5.2	8.3	9.6

Parameter	Units	ODWQS	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6
Date			14-Nov-18	14-May-19	7-Nov-19	7-May-20	4-Nov-20	19-May-21	2-Nov-21	4-May-22	2-Nov-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	620	630	630	630	630	610	610	630	650
Conductivity	umho/cm		2100	2100	2000	2000	2000	2000	1900	1900	2000
Dissolved Barium (Ba)	mg/L	1*	0.012	0.012	0.012	0.012	0.014	0.012	0.013	0.013	0.012
Dissolved Boron (B)	mg/L	5.0*	0.2	0.16	0.18	0.16	0.18	0.18	0.16	0.16	0.18
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	120	120	110	120	120	120	130	120
Dissolved Chloride (Cl)	mg/L	250**	46	49	48	46	45	48	45	48	45
Dissolved Iron (Fe)	mg/L	0.30**	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.2
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		110	100	100	98	110	110	100	110	100
Dissolved Organic Carbon	mg/L	5**	3.3	3.1	3.1	3.4	3.4	2.9	2.9	3.0	4.7
Dissolved Potassium (K)	mg/L		5	4.6	4.9	4.4	4.8	4.8	4.7	4.7	7.2
Dissolved Sodium (Na)	mg/L	200**	230	230	220	200	210	210	190	190	180
Dissolved Sulphate (SO4)	mg/L	500**	460	450	430	390	430	410	410	410	390
Nitrate (N)	mg/L	10.0*	0.64	<0.10	<0.10	<0.10	0.1	<0.10	<0.10	<0.10	0.15
pH	(pH units)	6.5-8.5	7.8	7.7	7.7	8.0	7.8	7.8	7.9	8.0	7.7
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.050	<0.15	0.32	6.64
Total Dissolved Solids	mg/L	500	1230	1370	1280	1250	1330	1080	1230	1130	1090
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	0.1	<0.7	0.8	7.1
Ion Percentage	%		10.1	7.3	7.5	6.4	8.5	10.2	6.8	8.6	5.4

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			20-Mar-84	4-Jul-84	27-Jul-84	18-Sep-84	26-Mar-85	11-Sep-85	9-Apr-86	8-Sep-86	30-Apr-87	27-May-88	3-Nov-88	7-Jun-89	1-Nov-89
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean
Alkalinity (Total as CaCO3)	mg/L	30-500***		508					522		494	488	481	488	478
Dissolved Boron (B)	mg/L	5.0*													
Dissolved Calcium (Ca)	mg/L		110	109	84	71	114	114	123	121	123	111	136	105	120
Dissolved Chloride (Cl)	mg/L	250**	4	3	2	5	1	1	1	1	5	3	8	8	5
Dissolved Iron (Fe)	mg/L	0.30**	0.12	<0.04	<0.04	<0.04	<0.03	0.04	0.02	3.88	<0.02	0.85	0.02	<0.01	<0.02
Dissolved Magnesium (Mg)	mg/L		67	86	78	90	77	87	83	80	80	81	89	79	90
Dissolved Organic Carbon	mg/L	5**	4.8	2.4	2.2	0.5	1.7	1.7	1.7	2.3	2.5	1.3	2.7	2.1	1.9
Dissolved Potassium (K)	mg/L		8	4.8	7.7	3.9	6.6	3.1	3.3	5.1	5.1	4	58	3.7	4.7
Dissolved Sodium (Na)	mg/L	200**	50	63	65	46	65	51	49	57	54	50.6	61	83	82
Dissolved Sulphate (SO4)	mg/L	500**	230	283	241	232	244	240	200	250	222	220	266	250	258
Nitrate (N)	mg/L	10.0*													
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*	0.09	0.02	0.02	0.04	0.06	0.04	0.03	3.11	0.16	0.1	0.09	0.13	0.03
Total Ammonia-N	mg/L			0.2	0.27	0.21	0.18	0.28	0.17	2.74	0.79	0.7	0.51	0.43	0.57
Total Kjeldahl Nitrogen (TKN)	mg/L			0.64	0.43	0.43	0.26	0.39	0.26	3.6	0.99	0.82	0.77	0.76	0.58
Ion Percentage	%			4.0					9.3		8.8	7.3		7.4	12.6

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			24-May-90	7-Dec-90	22-May-91	14-Nov-91	29-May-92	12-Nov-92	17-Jun-93	16-Dec-93	12-May-94	14-Dec-94	6-Jun-95	2-Nov-95	8-May-96
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Zenon	Zenon	Zenon
Alkalinity (Total as CaCO3)	mg/L	30-500***	491	470	505	500	498	494	480	495	471	520	530	510	490
Dissolved Boron (B)	mg/L	5.0*								0.22	0.12	0.25	0.24	0.2	0.22
Dissolved Calcium (Ca)	mg/L		111	116	128	86.9	99.5	126	122	110	108	120	110	100	110
Dissolved Chloride (Cl)	mg/L	250**	6	3	2	2	1	1	3	4	2	3.2	3.3	3.1	3.1
Dissolved Iron (Fe)	mg/L	0.30**		0.03	0.03	<0.02	<0.02	0.02	<0.02	0.02	0.02	0.053	<0.01	<0.01	0.1
Dissolved Magnesium (Mg)	mg/L		85	79.2	77	74.1	71.9	69.5	88.9	81.8	80.9	80	78	74	78
Dissolved Organic Carbon	mg/L	5**	1.8	1.6	1.8	2.1	1.7	1.8	1.7						
Dissolved Potassium (K)	mg/L		3.7	4.53	3.07	3.87	3.68	4.1	3.98	4.56	3.98	4	3.7	3.4	3.4
Dissolved Sodium (Na)	mg/L	200**		62	61.6	<61.1	<58.7	53.3	50.1	57.6	52.8	66	64	59	50
Dissolved Sulphate (SO4)	mg/L	500**	210	210	250	280	280	240	3000	250	240	330	270	260	240
Nitrate (N)	mg/L	10.0*													
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*	0.28	0.12	0.26	0.06	0.06	0.01	0.02	0.15	0.05	0.046	0.17	0.27	0.052
Total Ammonia-N	mg/L		0.26	0.42	0.39	0.49	0.4	0.37	0.46	0.38	0.25	0.28	0.24	0.03	0.34
Total Kjeldahl Nitrogen (TKN)	mg/L		0.37	0.43	0.43	0.66	0.49	0.39	0.55	0.54	0.49	0.44	0.43	<0.16	0.97
Ion Percentage	%			11.3	7.1			5.2	63.8	5.4	6.6	0.5	1.7	0.0	4.3

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			11-Dec-96	14-May-97	4-Dec-97	11-Mar-98	13-May-98	22-Dec-99	29-Mar-00	5-Dec-00	8-May-01	28-Nov-01	22-May-02	6-Nov-02	14-May-03
Laboratory			Zenon	Zenon	Zenon	Maxxam	Zenon	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	510	470	510	505	500	503	514	487	503	509	498	502	477
Dissolved Boron (B)	mg/L	5.0*										0.20	0.28	0.21	0.23
Dissolved Calcium (Ca)	mg/L		100	110	120	106	120	113	118	99	121	105	117	114	99
Dissolved Chloride (Cl)	mg/L	250**	3.9	3	2.8	2.8	2.9	3	3	3	4	4	3	4	4
Dissolved Iron (Fe)	mg/L	0.30**	0.13	0.067	0.77	2.32	0.59	3.09	0.05	2.3	0.01	0.61	1.28	0.04	0.67
Dissolved Magnesium (Mg)	mg/L		75	79	83	80.9	83	80	87	69	82	82	87	78	77
Dissolved Organic Carbon	mg/L	5**										2.2	1.8	2.1	1.6
Dissolved Potassium (K)	mg/L		3.5	3.9	4.4	4	3.9	3	4	4	4	4	4	5	4
Dissolved Sodium (Na)	mg/L	200**	48	48	52	44	51		48	43	55	44	44	56	60
Dissolved Sulphate (SO4)	mg/L	500**	240	240	230	223	230	218	206	221	234	210	218	222	241
Nitrate (N)	mg/L	10.0*			<0.05	0.1	<0.05	<0.10	<0.10	<0.1	0.25	<0.10	<0.10	0.03	<0.10
Nitrite (N)	mg/L	1.0*			<0.05	<0.1	<0.05	<0.10	<0.10	<0.1	<0.1				
NO3+NO2	mg/L	10.0*	<0.5	0.067	<0.5	0.1	<0.5	<0.10	<0.10	<0.1	0.25				
Total Ammonia-N	mg/L		0.37	0.28	0.35		0.24	0.29	0.26	0.24	0.04	0.24	0.38	0.03	0.10
Total Kjeldahl Nitrogen (TKN)	mg/L		0.79	0.48	0.38		0.25	0.37	0.26	0.37	0.07	0.43	0.49	0.22	0.20
Ion Percentage	%		0.0	5.6	7.4	4.1	7.8	1.7	9.2	0.2	7.7	4.9	8.5	6.7	4.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			12-Nov-03	26-May-04	26-Nov-04	13-May-05	30-Nov-05	18-May-06	24-Nov-06	4-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	18-Nov-09
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	485	473	447	472	492	490	486	439	437	479	496	452	460
Conductivity	umho/cm											1240	1290	1220	1260
Dissolved Barium (Ba)	mg/L	1*										0.014	0.016	0.014	0.016
Dissolved Boron (B)	mg/L	5.0*	0.24	0.25	0.26	0.30	0.26	0.25	0.26	0.27	0.28	0.27	0.26	0.27	0.28
Dissolved Cadmium (Cd)	mg/L	0.005*										<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		109	103	94	114	98	103	111	90	92	100	110	100	110
Dissolved Chloride (Cl)	mg/L	250**	4	4	4	4	4	4	4	4	4	4	4	4	4
Dissolved Iron (Fe)	mg/L	0.30**	1.08	0.46	1.13	1.52	0.74	0.47	1.13	0.66	0.56	0.5	1.2	0.2	2.1
Dissolved Lead (Pb)	mg/L	0.01*										<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		87	83	85	81	72	76	81	80	78	82	77	88	82
Dissolved Organic Carbon	mg/L	5**	1.5	1.7	1.8	2.2	2.0	2.2	1.4	2.6	2.5	1.7	1.6	2.7	2.5
Dissolved Potassium (K)	mg/L		5	5	4	4	4	4	4	4	4	4.1	4	4	4.1
Dissolved Sodium (Na)	mg/L	200**	63	70	64	68	56	61	63	66	61	64	62	70	69
Dissolved Sulphate (SO4)	mg/L	500**	231	248	235	245	235	239	256	238	247	241	275	270	280
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	0.10	0.10	0.11	0.20	0.23	0.32	<0.1	<0.1	0.20	0.40
pH	(pH units)	6.5-8.5										8.20	7.90	8.00	7.80
Total Ammonia-N	mg/L		0.17	0.14	0.05	0.13	0.17	0.15	0.07	0.10	0.06	<0.15	<0.15	<0.15	0.2
Total Dissolved Solids	mg/L	500										764	820	785	844
Total Kjeldahl Nitrogen (TKN)	mg/L		0.25	0.18	0.17	0.15	0.19	0.25	0.21	0.15	<0.10	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		9.6	7.9	8.7	9.1	1.5	4.2	6.2	7.1	5.5	6.4	2.7	8.2	6.8

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			20-May-10	24-Nov-10	12-May-11	3-Nov-11	15-May-12	8-Nov-12	9-May-13	5-Nov-13	6-May-14	24-Nov-14	13-May-15	11-Nov-15	25-May-16
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	453	475	477	489	460	470	480	630	490	490	440	500	490
Conductivity	umho/cm		1240	1300	1300	1300	1300	1300	1300	1300	1300	1300	1200	1300	1300
Dissolved Barium (Ba)	mg/L	1*	0.015	0.016	0.015	0.018	0.013	0.013	0.016	0.014	0.013	0.017	0.013	0.021	0.017
Dissolved Boron (B)	mg/L	5.0*	0.27	0.27	0.26	0.25	0.27	0.26	0.25	0.27	0.25	0.28	0.25	0.28	0.28
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		110	100	110	120	110	95	120	110	110	110	100	110	110
Dissolved Chloride (Cl)	mg/L	250**	4	4	4	5	4	4	4	4	4	5	4	5.3	4.9
Dissolved Iron (Fe)	mg/L	0.30**	0.9	3.7	2.3	2.5	1.6	0.70	3.2	<0.10	1.1	3.1	1.4	1.2	2.0
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		84	74	83	84	82	84	83	88	86	79	82	86	84
Dissolved Organic Carbon	mg/L	5**	2.1	2.3	2.3	2.5	2.7	2.2	2.5	2.1	2.5	2.7	2	2.4	2.3
Dissolved Potassium (K)	mg/L		4.3	3.8	4.2	4.7	4.3	4.2	4.0	4.2	3.9	3.9	4.2	4.5	4.0
Dissolved Sodium (Na)	mg/L	200**	69	62	67	73	67	68	65	68	65	56	62	67	71
Dissolved Sulphate (SO4)	mg/L	500**	270	270	250	250	270	260	270	260	260	250	260	250	270
Nitrate (N)	mg/L	10.0*	0.4	0.6	0.2	0.8	1.2	0.52	0.21	0.29	<0.10	0.2	0.33	<0.10	0.29
pH	(pH units)	6.5-8.5	8.2	7.78	8.14	7.75	7.93	7.87	8.07	7.39	6.97	8.08	8.18	7.73	7.93
Total Ammonia-N	mg/L		<0.15	0.20	<0.15	0.41	<0.15	0.16	0.16	<0.15	<0.15	0.25	<0.15	1.67	0.19
Total Dissolved Solids	mg/L	500	810	796	756	788	802	804	864	792	790	804	782	850	860
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	1.8	<0.7
Ion Percentage	%		8.6	1.7	1.4	3.4	0.9	1.0	1.1	7.7	0.3	4.5	7.0	7.4	6.5

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			16-Nov-16	16-May-17	7-Nov-17	8-May-18	14-Nov-18	14-May-19	5-Nov-19	7-May-20	4-Nov-20	19-May-21	2-Nov-21	4-May-22	2-Nov-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	500	490	490		490	470	490	450	470	470	490	440	480
Conductivity	umho/cm		1300	1300	1300	1400	1300	1300	1300	1200	1300	1300	1300	1200	1300
Dissolved Barium (Ba)	mg/L	1*	0.016	0.013	0.014	0.014	0.016	0.015	0.016	0.023	0.021	0.02	0.017	0.017	0.016
Dissolved Boron (B)	mg/L	5.0*	0.29	0.26	0.26	0.29	0.26	0.26	0.24	0.23	0.26	0.28	0.27	0.25	0.27
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		120	100	110	110	110	110	99	100	120	110	120	100	110
Dissolved Chloride (Cl)	mg/L	250**	4.8	4.8	5.3	4.2	5.4	5.8	5.3	8.8	6.2	7.1	5.3	7.4	6.6
Dissolved Iron (Fe)	mg/L	0.30**	2.8	1.3	1.5	2	1.5	1.8	0.8	1	2.8	1.9	0.9	0.7	0.8
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		85	76	78	87	78	82	76	70	82	81	85	78	80
Dissolved Organic Carbon	mg/L	5**	2.2	2.4	2.4	2.1	2.7	2.2	2.4	3.4	2.5	2.3	1.9	2.3	2.4
Dissolved Potassium (K)	mg/L		4.2	3.9	4.1	4.2	4	3.8	3.9	3.4	3.9	4	3.8	3.6	3.9
Dissolved Sodium (Na)	mg/L	200**	68	61	62	71	62	64	60	53	63	64	61	61	60
Dissolved Sulphate (SO4)	mg/L	500**	280	300	260	210	280	290	250	220	260	270	270	250	260
Nitrate (N)	mg/L	10.0*	0.11	0.29	0.41	0.3	0.41	0.24	<0.10	0.25	0.11	0.12	<0.10	0.57	0.29
pH	(pH units)	6.5-8.5	7.8	7.8	7.8	8.0	7.9	7.8	7.8	8.0	7.7	7.8	8.0	8.0	7.9
Total Ammonia-N	mg/L		0.23	<0.15	<0.15	<0.15	<0.15	0.18	0.34	<0.15	0.23	0.134	0.19	<0.15	0.26
Total Dissolved Solids	mg/L	500	850	806	845	810	790	810	805	770	860	640	785	730	730
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.2	<0.7	<0.7	<0.7
Ion Percentage	%		6.6	1.1	4.3		2.8	4.5	2.3	4.1	8.3	5.7	6.9	6.1	5.0

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4
Date			22-Mar-84	8-Sep-86	30-Apr-87	14-Dec-94	6-Jun-95	11-Dec-96	14-May-97	4-Dec-97	13-May-98	8-Feb-99	9-Jun-99	22-Dec-99	29-Mar-00
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Zenon	Zenon	Zenon	Zenon	Zenon	Maxxam	Maxxam	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***			502	510	180	460	460	510	460	397	422	366	440
Dissolved Boron (B)	mg/L	5.0*				0.5	0.37					0.504	0.404		
Dissolved Calcium (Ca)	mg/L		470	480	430	430	55	380	400	440	420	448	482	423	476
Dissolved Chloride (Cl)	mg/L	250**	12	1	6	6.3	0.99	6.3	7.4	6.5	7	4.4	5.3	6	6
Dissolved Iron (Fe)	mg/L	0.30**	<0.04	0.38	0.05	0.03	0.019	0.12	0.052	0.31	0.012	0.38	0.084	0.02	0.48
Dissolved Magnesium (Mg)	mg/L		835	792	765	770	15	680	700	780	740	725	767	768	789
Dissolved Organic Carbon	mg/L	5**	16.9	3.1	3.1							2.5	2.2		
Dissolved Potassium (K)	mg/L		25	6.8	6.6	6.4	1.4	6.1	6.2	7.8	6.6	7	5	5	6
Dissolved Sodium (Na)	mg/L	200**	260	212	202	210	5.1	200	200	230	220	213	238		227
Dissolved Sulphate (SO4)	mg/L	500**	4490	4250	4030	4900	77	4000	4100	4100	4200	3920	3990	3950	5000
Nitrate (N)	mg/L	10.0*								<0.05	<0.05	0.2	<0.1	<0.10	<0.10
Nitrite (N)	mg/L	1.0*								<0.05	<0.05	<0.1	<0.1	<0.10	<0.10
NO3+NO2	mg/L	10.0*	0.4	0.02	<0.01	0.12	0.26	0.085	<0.0500	<0.05	<0.05			<0.10	<0.10
Total Ammonia-N	mg/L			0.01	0.09	0.09	0.1	0.03	<0.03	0.03	<0.03	<0.05	<0.05	0.03	<0.02
Total Kjeldahl Nitrogen (TKN)	mg/L			0.3	0.51	2	3.9	2	0.74	0.76	0.73	2.7	0.2	0.12	0.22
Ion Percentage	%				0.1	8.5	3.3	4.6	4.2	0.8	2.4	1.3	3.5		6.5

Parameter	Units	ODWQS	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4
Date			22-Jun-00	5-Dec-00	8-May-01	28-Nov-01	23-May-02	6-Nov-02	15-May-03	13-Nov-03	25-May-04	26-Nov-04	13-May-05	29-Nov-05	19-May-06
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	406	428	458	421	373	357	339	326	392	377	377	351	383
Dissolved Boron (B)	mg/L	5.0*	0.33			0.39	0.47	0.31	0.27	0.39	0.35	0.34	0.43	0.33	0.31
Dissolved Calcium (Ca)	mg/L		391	449	425	404	328	259	167	162	172	229	260	135	150
Dissolved Chloride (Cl)	mg/L	250**	5	7	8	7	16	28	41	35	32	28	31	37	34
Dissolved Iron (Fe)	mg/L	0.30**	<0.01	0.01	0.02	0.17	0.81	0.02	0.02	0.02	<0.01	0.10	0.10	0.03	<0.03
Dissolved Magnesium (Mg)	mg/L		656	709	710	729	467	331	176	175	161	257	264	114	159
Dissolved Organic Carbon	mg/L	5**	3.9			3.3	3.2	2.7	3.1	3.1	3.4	3.6	3.1	4.1	4.3
Dissolved Potassium (K)	mg/L		4	5	6	4	3	6	3	5	3	3	4	2	2
Dissolved Sodium (Na)	mg/L	200**	192	190	208	178	139	134	82	84	82	119	102	95	99
Dissolved Sulphate (SO4)	mg/L	500**	3700	3840	3990	3630	2460	1760	791	820	792	1550	1680	659	998
Nitrate (N)	mg/L	10.0*	0.40	<0.1	<0.1	<0.10	0.13	1.08	0.81	0.50	<0.10	<0.10	<0.10	0.48	0.16
Nitrite (N)	mg/L	1.0*	<0.10	<0.1	<0.1										
NO3+NO2	mg/L	10.0*	0.40	<0.1	<0.1										
Total Ammonia-N	mg/L		0.25	<0.2	<0.02	0.05	0.04	<0.02	<0.02	0.05	0.25	0.03	0.19	0.03	<0.02
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	0.18	0.07	0.18	0.05	0.31	0.40	0.28	0.26	0.22	0.36	0.18	0.27
Ion Percentage	%		1.6	0.7	1.5	2.7	2.2	2.9	6.5	5.6	3.3	2.1	3.7	0.6	6.0

Parameter	Units	ODWQS	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4
Date			24-Nov-06	4-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	19-Nov-09	20-May-10	23-Nov-10	10-May-11	3-Nov-11	10-May-12	5-Nov-12
Laboratory			Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	470	512	489	542	471	498	483	513	301	347	443	430	260
Conductivity	umho/cm					1680	2080	1900	2140	1750	1140	1020	1170	1100	890
Dissolved Barium (Ba)	mg/L	1*				0.01	0.013	0.012	0.011	0.010	0.012	0.013	0.018	0.016	0.014
Dissolved Boron (B)	mg/L	5.0*	0.37	0.48	0.37	0.35	0.41	0.41	0.41	0.33	0.32	0.24	0.37	0.28	0.27
Dissolved Cadmium (Cd)	mg/L	0.005*				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		166	176	196	130	210	230	250	220	130	110	120	130	110
Dissolved Chloride (Cl)	mg/L	250**	33	31	31	27	29	28	28	24	18	16	16	14	9
Dissolved Iron (Fe)	mg/L	0.30**	0.03	<0.03	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10
Dissolved Lead (Pb)	mg/L	0.01*				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		146	144	187	96	240	260	300	240	120	82	85	100	81
Dissolved Organic Carbon	mg/L	5**	4.5	4.9	5.0	3.5	3.2	4.9	3.6	3.3	3.4	3.3	4.3	3.3	3.4
Dissolved Potassium (K)	mg/L		3	2	2	1.7	3.5	3.3	3.3	2.7	2.3	1.9	2.3	2.2	2.2
Dissolved Sodium (Na)	mg/L	200**	133	131	125	120	130	130	120	110	90	74	65	70	62
Dissolved Sulphate (SO4)	mg/L	500**	779	684	964	402	751	580	770	450	290	190	200	180	200
Nitrate (N)	mg/L	10.0*	0.21	<0.10	<0.10	<0.1	0.1	<0.1	0.1	<0.1	0.5	<0.1	<0.1	<0.10	0.44
pH	(pH units)	6.5-8.5				8.0	8.0	8.0	7.9	8.1	8.0	8.2	7.9	7.9	7.7
Total Ammonia-N	mg/L		<0.02	<0.02	0.02	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500				997	1350	1140	1550	1140	722	618	746	668	594
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	0.21	0.35	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		2.5	5.8	2.7	4.6	19.6	29.6	26.4	31.9	28.0	16.1	8.4	17.4	22.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4
Date			**13-May-13**	**5-Nov-13**	**6-May-14**	**24-Nov-14**	**13-May-15**	**11-Nov-15**	**27-May-16**	**16-Nov-16**	**19-May-17**	**8-Nov-17**	**10-May-18**	**13-Nov-18**	**14-May-19**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	360	420	420	430	440	340	320	410	190	430	450	400	400
Conductivity	umho/cm		1400	1500	1500	2100	1800	1700	1100	1500	2500	1300	1800	1000	1700
Dissolved Barium (Ba)	mg/L	1*	0.015	0.019	0.019	0.02	0.017	0.02	0.016	0.019	0.007	0.018	0.014	0.016	0.016
Dissolved Boron (B)	mg/L	5.0*	0.21	0.29	0.24	0.33	0.28	0.30	0.20	0.29	0.27	0.31	0.29	0.23	0.25
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	130	160	150	160	190	130	150	180	150	190	100	190
Dissolved Chloride (Cl)	mg/L	250**	15	13	14	17	15	58	71	45	28	34	34	25	29
Dissolved Iron (Fe)	mg/L	0.30**	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.40	<0.1	0.3	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		120	110	140	140	150	180	100	120	91	130	180	64	180
Dissolved Organic Carbon	mg/L	5**	2.8	4.6	3.5	3.9	4	3.7	2.8	3.4	1.1	3.6	3.3	4.9	3.3
Dissolved Potassium (K)	mg/L		2.5	2.3	1.9	2	2.3	2.5	2.5	2.8	7.1	2.5	3	1.7	2.3
Dissolved Sodium (Na)	mg/L	200**	71	75	77	79	81	89	74	75	250	79	92	69	90
Dissolved Sulphate (SO4)	mg/L	500**	400	390	390	750	550	510	180	350	1200	310	460	200	530
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	0.36	<0.10	0.11	<0.10	0.16	<0.10	<0.10	0.13
pH	(pH units)	6.5-8.5	7.8	7.4	7.1	8.0	8.1	7.8	7.9	7.9	8.1	7.9	7.9	8.0	8.0
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.47	0.43	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	798	1010	968	2120	2130	1050	742	1000	2000	935	1310	625	1320
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		14.3	10.4	19.8	1.5	11.3	22.6	24.5	15.3	2.9	20.2	22.7	8.0	21.2

Parameter	Units	ODWQS	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4
Date			**5-Nov-19**	**8-May-20**	**3-Nov-20**	**20-May-21**	**3-Nov-21**	**3-May-22**	**2-Nov-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	400	400	420	420	450	470	430
Conductivity	umho/cm		2300	2500	2400	2000	2000	1600	2100
Dissolved Barium (Ba)	mg/L	1*	0.015	0.013	0.013	0.021	0.017	0.014	0.012
Dissolved Boron (B)	mg/L	5.0*	0.34	0.35	0.36	0.23	0.26	0.24	0.33
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		280	280	310	190	250	230	310
Dissolved Chloride (Cl)	mg/L	250**	30	31	33	35	32	32	28
Dissolved Iron (Fe)	mg/L	0.30**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		290	270	310	160	230	220	310
Dissolved Organic Carbon	mg/L	5**	3.8	3.4	3.5	3.2	3.1	3.1	7.8
Dissolved Potassium (K)	mg/L		3.8	3.1	3.8	1.6	2.3	2.0	3.6
Dissolved Sodium (Na)	mg/L	200**	120	110	120	79	98	93	120
Dissolved Sulphate (SO4)	mg/L	500**	880	1100	970	720	730	450	780
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	0.29	0.16	0.14
pH	(pH units)	6.5-8.5	7.7	7.9	7.9	8.0	8.1	8.1	7.8
Total Ammonia-N	mg/L		0.39	<0.15	<0.15	<0.050	<0.15	<0.15	0.31
Total Dissolved Solids	mg/L	500	2190	1870	2350	1360	1230	1140	1800
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	0.2	<0.7	<0.7	<0.7
Ion Percentage	%		25.2	14.8	24.5	6.6	20.7	30.6	31.5

Parameter	Units	ODWQS	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29
Date			**7-Feb-99**	**3-Jun-99**	**2-Dec-99**	**19-Jun-00**	**13-Jun-02**	**22-May-08**	**14-May-09**	**20-May-10**	**10-May-11**	**9-May-12**	**9-May-13**	**6-May-14**	**12-May-15**
Laboratory			**Maxxam**	**Maxxam**	**Accutest**	**Accutest**	**Accutest**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	183	177	185	188	187	193	191	188	192	190	190	190	190
Conductivity	umho/cm		2490	2470	2300	2390		2460	2460	2470	2470	2500	2500	2500	1900
Dissolved Barium (Ba)	mg/L	1*	0.035	0.011				0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.008
Dissolved Boron (B)	mg/L	5.0*	2.1	1.93	1.94	2.02	2.27	2.1	2.1	2.2	1.8	2.1	1.9	2	2.1
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.003	<0.003		<0.005		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		182	196	202	209	185	190	190	180	190	190	180	200	190
Dissolved Chloride (Cl)	mg/L	250**	24.5	25.9	30	28	34	28	29	28	28	26	27	28	27
Dissolved Iron (Fe)	mg/L	0.30**	0.808	0.966	0.96	0.73	0.51	0.1	<0.1	0.5	0.3	0.19	0.16	0.74	<0.10
Dissolved Lead (Pb)	mg/L	0.01*	<0.025	<0.002	<0.002	<0.001		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		92	96.2	104	102	97	92	94	97	100	100	92	99	100
Dissolved Organic Carbon	mg/L	5**	0.7	0.7	1.2	1.8	0.6	1	2.4	1.2	0.8	0.9	1.3	1.5	1.9
Dissolved Potassium (K)	mg/L		8	7	8	8	7	7.1	7.1	7.3	7.3	7.4	6.8	7	7.5
Dissolved Sodium (Na)	mg/L	200**	245	263	274	268	251	250	250	260	280	280	250	260	280
Dissolved Sulphate (SO4)	mg/L	500**	1280	1270	1230	1210	1277	1180	1200	1200	1100	1100	1100	1100	1000
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.10	<0.10	0.14	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.6	7.7	7.7	7.0		8.0	7.7	8.0	7.9	7.8	8.0	7.1	7.8
Total Ammonia-N	mg/L		0.47	0.5	0.54	0.62	0.5	0.52	0.54	0.48	0.48	0.79	0.51	0.5	0.48
Total Dissolved Solids	mg/L	500	2010	2090	1980	2080		1500	1550	1500	1490	2010	2050	1940	2070
Total Kjeldahl Nitrogen (TKN)	mg/L		0.9	0.5	0.55	0.67	0.68	<10	<4	1.4	0.7	<0.7	<0.7	<0.7	0.9
Ion Percentage	%		5.4	1.8	1.6	2.2	4.4	1.2	1.6	1.2	3.9	4.1	0.3	3.2	8.0

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29
Date			26-May-16	19-May-17	10-May-18	14-May-19	8-May-20	20-May-21	4-May-22
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	200	190	210	190	190	190	190
Conductivity	umho/cm		2400	2500	2600	2400	2600	2500	2500
Dissolved Barium (Ba)	mg/L	1*	0.007	0.007	0.006	0.007	0.007	0.007	0.006
Dissolved Boron (B)	mg/L	5.0*	2.2	2.1	2.2	2	2	2.2	2.3
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		190	180	200	190	180	190	200
Dissolved Chloride (Cl)	mg/L	250**	27	28	27	29	28	28	29
Dissolved Iron (Fe)	mg/L	0.30**	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		100	91	97	95	94	96	93
Dissolved Organic Carbon	mg/L	5**	1.3	1.1	1.5	1.2	1.2	1.3	1.6
Dissolved Potassium (K)	mg/L		7.4	7.1	7.6	7	6.8	7.5	7.1
Dissolved Sodium (Na)	mg/L	200**	270	250	270	260	260	260	270
Dissolved Sulphate (SO4)	mg/L	500**	1100	1200	1100	1100	1100	1200	1100
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.0	8.1	8.0	7.9	7.9	8.0	8.0
Total Ammonia-N	mg/L		0.5	0.43	0.5	0.53	0.47	0.484	0.45
Total Dissolved Solids	mg/L	500	1940	2000	1870	2070	2000	1810	1810
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	0.6	<0.7
Ion Percentage	%		4.3	2.9	4.5	3.1	2.1	0.5	4.4

Parameter	Units	ODWQS	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26
Date			4-Feb-99	3-Jun-99	30-Nov-99	21-Jun-00	22-May-08	20-May-09	20-May-10	12-May-11	16-May-12	8-May-13	5-May-14	14-May-15	27-May-16
Laboratory			Maxxam	Maxxam	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	282	283	323	319	308	281	310	280	300	290	300	290	300
Conductivity	umho/cm		940	921	863	935	943	949	935	879	770	850	780	740	730
Dissolved Barium (Ba)	mg/L	1*	0.07	0.044	0.07	0.05	0.066	0.082	0.051	0.075	0.073	0.076	0.087	0.1	0.15
Dissolved Boron (B)	mg/L	5.0*	2.02	1.61	1.9	1.87	2.0	1.9	1.8	1.7	1.7	1.7	1.9	1.9	1.9
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.003	<0.003	<0.005	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		26.9	24.5	21	27	26	23	26	16	15	17	19	16	19
Dissolved Chloride (Cl)	mg/L	250**	48.2	48.6	44	42	50	45	64	43	40	58	42	40	42
Dissolved Iron (Fe)	mg/L	0.30**	0.083	0.032	1.26	0.05	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Lead (Pb)	mg/L	0.01*	<0.025	<0.002	<0.002	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		20.7	18.7	20	19	20	17	21	12	11	12	12	11	13
Dissolved Organic Carbon	mg/L	5**	0.6	0.5	1.3	0.7	0.9	2.4	1.5	2.0	1.6	1.6	2.5	1.9	1.6
Dissolved Potassium (K)	mg/L		5	2	3	3	2.7	2.7	2.6	2.5	2.5	2.5	2.4	2.3	2.5
Dissolved Sodium (Na)	mg/L	200**	151	144	165	146	150	160	160	150	150	140	150	130	150
Dissolved Sulphate (SO4)	mg/L	500**	121	102	123	169	146	130	100	110	37	44	39	26	18
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	8.7	8.7	8.2	8.5	7.9	8.6	7.9	8.2	8.0	7.2	8.0	8.2
Total Ammonia-N	mg/L		0.2	0.23	0.27	0.19	0.34	0.39	0.25	0.38	0.18	0.36	0.27	0.38	0.51
Total Dissolved Solids	mg/L	500	575	635	520	636	611	580	610	512	408	476	420	400	406
Total Kjeldahl Nitrogen (TKN)	mg/L		0.7	0.3	0.33	0.22	<10	5	0.9	4	<0.7	<0.7	<0.7	1.1	<0.7
Ion Percentage	%		7.0	5.7	4.7	3.0	0.4	5.6	5.9	5.0	1.9	2.8	3.0	0.8	14.6

Parameter	Units	ODWQS	OW39A-26	OW39A-26	OW39A-26	OW39A-26	OW39A-26	OW39A-26
Date			17-May-17	8-May-18	15-May-19	6-May-20	21-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	190	300	300	300	300	280
Conductivity	umho/cm		530	880	890	960	940	950
Dissolved Barium (Ba)	mg/L	1*	0.07	0.066	0.054	0.055	0.054	0.081
Dissolved Boron (B)	mg/L	5.0*	0.75	0.35	1.7	1.5	1.8	1.8
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		24	33	30	29	32	21
Dissolved Chloride (Cl)	mg/L	250**	17	35	58	49	57	42
Dissolved Iron (Fe)	mg/L	0.30**	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		12	9.3	18	19	22	14
Dissolved Organic Carbon	mg/L	5**	7.6	2.8	4.7	3.7	2.8	11
Dissolved Potassium (K)	mg/L		3.1	5.8	3.2	3.2	3.1	3.1
Dissolved Sodium (Na)	mg/L	200**	64	50	150	150	150	140
Dissolved Sulphate (SO4)	mg/L	500**	53	130	93	120	120	130
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.1	8.4	8.7	8.5	8.5	8.1
Total Ammonia-N	mg/L		0.29	0.23	0.39	0.18	0.278	0.22
Total Dissolved Solids	mg/L	500	328	535	585	500	475	495
Total Kjeldahl Nitrogen (TKN)	mg/L		0.8	<0.7	<0.7	<0.7	0.5	<0.7
Ion Percentage	%		4.0	28.7	6.3	4.7	5.4	0.5

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWS	OW40-6	OW40-6	OW40-6	OW40-6	OW40-6	OW40-6	OW40-6	OW40-6	OW40-6	OW40-6
Date			31-Oct-89	25-May-90	11-Dec-90	22-May-91	13-Nov-91	29-May-92	17-Jun-93	9-Feb-99	3-Jun-99	21-Jun-00
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Maxxam	Maxxam	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	521	528	496	507	506	502	451	498	479	501
Conductivity	mS/cm		1571	1430	1590	1510	1520	1320	1520	1630	1520	1420
Dissolved Barium (Ba)	mg/L	1*								0.023	0.023	0.02
Dissolved Boron (B)	mg/L	5.0*								0.459	0.348	0.34
Dissolved Cadmium (Cd)	mg/L	0.005*								<0.003	<0.003	<0.005
Dissolved Calcium (Ca)	mg/L		150	127	89	93.5	144	120	129	126	123	105
Dissolved Chloride (Cl)	mg/L	250**	3	2	2	2	2	1	3	3.8	3.2	2
Dissolved Iron (Fe)	mg/L	0.3**	0.65			0.03	<0.02	<0.02	<0.02	0.762	0.137	0.05
Dissolved Lead (Pb)	mg/L	0.01*								0.026	<0.002	<0.001
Dissolved Magnesium (Mg)	mg/L		150	148	127	136	136	128	142	112	134	105
Dissolved Organic Carbon	mg/L	5**	3.6	1.4	2.3	3.8	2.6	1.8	1.4	1.2	1.1	2.8
Dissolved Potassium (K)	mg/L		6.7	4.2	4.4	3.05	4.01	3.78	4.04	5	4	4
Dissolved Sodium (Na)	mg/L	200**	74		67	65.2		58.4	58.4	62	59.6	47
Dissolved Sulphate (SO4)	mg/L	500**	422	400	420	460	510	460	440	486	416	387
Nitrate (N)	mg/L	10.0*								0.2	0.4	<0.10
pH	pH units	6.5-8.5	7.6	7.2	7.9	7.2	7.4	7.2	7	7.1	7.2	7.4
Total Ammonia-N	mg/L		0.15	0.08	0.02	0.09	0.05	0.12	0.14	0.08	0.07	0.65
Total Dissolved Solids	mg/L	500								1170	1220	1028
Total Kjeldahl Nitrogen (TKN)	mg/L		0.43	0.42	0.08	0.37	0.24	0.14	0.23	0.1	<0.1	1.30
Ion Percentage	%		14.5	4.8	3.0	2.4	1.1	3.8	11.2	0.0	9.1	0.7

Parameter	Units	ODWS	OW40B-4	OW40B-4	OW40B-4	OW40B-4	OW40B-4	OW40B-4r	OW40B-4r	OW40B-4r	OW40D-4	OW40D-4	OW40D-4	OW40D-4	OW40D-4
Date			19-May-09	20-May-10	12-May-11	15-May-12	12-Jun-12	3-Dec-12	8-May-13	6-May-14	14-May-15	27-May-16	17-May-17	8-May-18	15-May-19
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L	30-500***	412	454	460	310	360	400	370	380	420	450	450	400	370
Conductivity	mS/cm		1940	1890	1690	770	1100	4500	4300	4000	4600	4700	4700	2800	2100
Dissolved Barium (Ba)	mg/L	1*	0.015	0.011	0.020	0.02	0.029	0.031	0.023	0.017	0.012	0.011	0.008	0.012	0.012
Dissolved Boron (B)	mg/L	5.0*	0.25	0.28	0.24	0.11	0.16	0.55	0.48	0.4	0.67	0.68	0.68	0.6	0.39
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		170	170	140	94	99	560	530	490	440	440	420	290	260
Dissolved Chloride (Cl)	mg/L	250**	6	6	5	4	4	6	6	6	11	11	11	8.3	7.8
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.1	<0.1	0.7	0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0015	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		150	150	130	49	78	450	440	400	470	440	460	290	250
Dissolved Organic Carbon	mg/L	5**	12	5.5	3.7	6.0	5.1	3.8	3.7	3.4	2.8	2.6	2.4	2.9	3.6
Dissolved Potassium (K)	mg/L		6.4	4.7	4.5	5.6	4.2	8.6	6.2	6	6.7	6.5	6	5.2	4.4
Dissolved Sodium (Na)	mg/L	200**	77	97	69	80	71	140	130	120	200	230	210	160	150
Dissolved Sulphate (SO4)	mg/L	500**	730	700	490	86	220	3000	2700	2500	2900	2900	2900	1300	880
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	0.4	3.4	2.0	<0.10	0.14	<0.10	<0.10	<0.10	<0.10	<0.10	0.2
pH	pH units	6.5-8.5	7.7	8.1	8.2	7.9	7.8	7.7	7.5	7.8	7.7	7.7	7.6	7.8	7.7
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1220	1190	1030	514	890	4760	4500	4030	4760	4750	4610	2360	1950
Total Kjeldahl Nitrogen (TKN)	mg/L		<4	1.6	<0.7	0.8	0.9	<0.7	0.7	<0.7	<0.7	<0.7	1.4	<0.7	<0.7
Ion Percentage	%		4.7	6.3	2.9	21.9	10.3	0.0	3.1	1.9	0.2	0.2	0.4	14.3	23.9

Parameter	Units	ODWS	OW40D-4	OW40D-4	OW40D-4
Date			7-May-20	20-May-21	5-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	440	350	390
Conductivity	mS/cm		3900	2000	2000
Dissolved Barium (Ba)	mg/L	1*	0.011	0.009	0.012
Dissolved Boron (B)	mg/L	5.0*	0.56	0.4	0.33
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		330	280	210
Dissolved Chloride (Cl)	mg/L	250**	10	4.6	6.2
Dissolved Iron (Fe)	mg/L	0.3**	1.1	0.3	0.5
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		310	250	180
Dissolved Organic Carbon	mg/L	5**	2.9	3.1	3.9
Dissolved Potassium (K)	mg/L		5.4	4.9	4.2
Dissolved Sodium (Na)	mg/L	200**	170	140	120
Dissolved Sulphate (SO4)	mg/L	500**	2100	850	770
Nitrate (N)	mg/L	10.0*	<0.10	0.34	<0.10
pH	pH units	6.5-8.5	7.8	7.8	8.0
Total Ammonia-N	mg/L		<0.15	<0.050	<0.15
Total Dissolved Solids	mg/L	500	3400	1740	1830
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.3	<0.7
Ion Percentage	%		2.0	26.6	15.0

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7
Date			**19-May-09**	**20-May-10**	**12-May-11**	**15-May-12**	**9-May-13**	**5-May-14**	**14-May-15**	**27-May-16**	**17-May-17**	**8-May-18**	**15-May-19**	**7-May-20**	**20-May-21**
Laboratory			**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	423	393	352	370	360	360	360	350	330		330	340	330
Conductivity	umho/cm		2510	2650	2650	2700	2900	2900	2800	2800	2900	3000	2900	2900	2900
Dissolved Barium (Ba)	mg/L	1*	0.018	0.015	0.012	0.01	0.010	0.010	0.008	0.009	0.007	0.008	0.007	0.007	0.007
Dissolved Boron (B)	mg/L	5.0*	0.53	0.56	0.57	0.56	0.49	0.55	0.63	0.63	0.59	0.66	0.69	0.57	0.59
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		260	260	250	240	270	290	260	270	250	280	260	270	270
Dissolved Chloride (Cl)	mg/L	250**	5	6	6	8	7	8	8	8.2	7.7	7.1	7.2	7.2	6.7
Dissolved Iron (Fe)	mg/L	0.30**	<0.1	<0.1	1.1	2.4	0.80	0.45	1.20	3.10	1.50	2.7	1.2	1.4	0.9
Dissolved Lead (Pb)	mg/L	0.01*	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		230	230	220	210	240	250	220	240	230	270	260	240	250
Dissolved Organic Carbon	mg/L	5**	5.2	2.0	2.2	3.1	2.4	5.5	2.7	1.8	2.2	1.8	2.1	2.1	1.6
Dissolved Potassium (K)	mg/L		7.1	5.8	5.8	5.5	5.6	5.6	5.6	5.7	5.4	5.7	6.0	5.4	5.6
Dissolved Sodium (Na)	mg/L	200**	120	110	110	110	110	130	110	130	120	130	130	120	130
Dissolved Sulphate (SO4)	mg/L	500**	1200	1300	1300	1300	1500	1400	1400	1400	1500	1500	1500	1400	1600
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	0.1	0.14	0.14	<0.1	<0.10	<0.10	<0.10	0.1	0.16	0.16	0.2
pH	(pH units)	6.5-8.5	7.3	8.0	8.1	7.8	8.0	7.2	7.8	7.9	8.2	7.9	7.9	8.0	7.9
Total Ammonia-N	mg/L		0.23	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.050
Total Dissolved Solids	mg/L	500	1670	1700	1480	2250	2750	2530	2540	2550	2530	2470	2660	2530	2580
Total Kjeldahl Nitrogen (TKN)	mg/L		<4	2	<0.7	<0.7	<0.7	0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.2
Ion Percentage	%		7.4	4.2	1.3	1.2	1.1	5.1	1.3	5.0	0.5	13.8	4.0	4.7	0.8

Parameter	Units	ODWQS	OW40A-7
Date			**5-May-22**
Laboratory			**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	370
Conductivity	umho/cm		3000
Dissolved Barium (Ba)	mg/L	1*	0.007
Dissolved Boron (B)	mg/L	5.0*	0.61
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001
Dissolved Calcium (Ca)	mg/L		280
Dissolved Chloride (Cl)	mg/L	250**	7.2
Dissolved Iron (Fe)	mg/L	0.30**	1.0
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005
Dissolved Magnesium (Mg)	mg/L		250
Dissolved Organic Carbon	mg/L	5**	2.2
Dissolved Potassium (K)	mg/L		5.9
Dissolved Sodium (Na)	mg/L	200**	120
Dissolved Sulphate (SO4)	mg/L	500**	1500
Nitrate (N)	mg/L	10.0*	0.4
pH	(pH units)	6.5-8.5	8.1
Total Ammonia-N	mg/L		<0.15
Total Dissolved Solids	mg/L	500	2510
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7
Ion Percentage	%		2.8

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7
Date			11-Dec-90	22-May-91	14-Nov-91	29-May-92	12-Nov-92	17-Jun-93	16-Dec-93	12-May-94	14-Dec-94	6-Jun-95	3-Nov-95	11-Dec-96	14-May-97
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Zenon	Zenon	Zenon	Zenon
Alkalinity (Total as CaCO3)	mg/L	30-500***	376	331	362	356	364	336	35	366	360	360	380	380	380
Dissolved Boron (B)	mg/L	5.0*							1.05	0.76	1	0.93	0.96		
Dissolved Calcium (Ca)	mg/L		371	287	458	317	470	392	310	405	430	410	410	370	420
Dissolved Chloride (Cl)	mg/L	250**	14	11	11	6	14	7	13	11	14	13	14	15	14
Dissolved Iron (Fe)	mg/L	0.3**	0.05	0.08	<0.02	0.02	0.02	0.02	0.19	0.02	0.34	<0.01	0.076	0.62	0.11
Dissolved Magnesium (Mg)	mg/L		461	467	467	430	573	508	330	465	410	440	440	410	450
Dissolved Organic Carbon	mg/L	5**	1.1	1.9	1.6	1.8	2.2	1.1							
Dissolved Potassium (K)	mg/L		9.84	5.5	9.07	8.91	8.91	8.49	8.62	8.98	7.5	9.2	8.8	8.1	8.8
Dissolved Sodium (Na)	mg/L	200**	279	222	<204	<253	241	248	269	300	290	300	280	270	270
Dissolved Sulphate (SO4)	mg/L	500**	2700	2400	3000	2700	3800	3100	2700	3100	3700	3300	3300	3100	3200
Nitrate (N)	mg/L	10.0*													
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*	0.08	0.36	0.16	0.16	0.07	0.07	0.23	0.07	0.027	0.074	0.11	<0.05	0.16
Total Ammonia-N	mg/L		0.37	0.25	0.27	0.12	0.22	0.22	0.2	0.17	0.16	<0.03	0.03	0.31	0.22
Total Kjeldahl Nitrogen (TKN)	mg/L		0.51	0.3	0.43	0.17	0.33	0.33	0.39	0.35	0.77	1.1	0.36	1.3	0.51
Ion Percentage	%		4.2	5.3			3.0	1.0		0.2	10.6	3.9	4.8	5.7	2.7

Parameter	Units	ODWQS	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7
Date			4-Dec-97	11-Mar-98	13-May-98	22-Dec-99	29-Mar-00	5-Dec-00	8-May-01	28-Nov-01	23-May-02	6-Nov-02	15-May-03	16-Jun-03	14-Nov-03
Laboratory			Zenon	Maxxam	Zenon	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	380	339	380	275	278	318	353	374	370	353	225	221	297
Dissolved Boron (B)	mg/L	5.0*								0.81	1.32	0.77	0.12	0.10	0.43
Dissolved Calcium (Ca)	mg/L		440	386	430	298	239	323	405	461	467	379	168	149	261
Dissolved Chloride (Cl)	mg/L	250**	13	11.3	13	18	15	15	15	16	12	14	15	15	13
Dissolved Iron (Fe)	mg/L	0.3**	1.9	1.18	0.016	1.76	0.02	1.41	0.04	3.92	4.95	0.09	0.01	<0.01	0.03
Dissolved Magnesium (Mg)	mg/L		460	457	460	379	285	329	341	423	496	420	224	172	270
Dissolved Organic Carbon	mg/L	5**								5.8	1.4	1.6	2.8	3.2	2.7
Dissolved Potassium (K)	mg/L		8.7	10	8.5	6	6	7	8	9	8	14	5	4	10
Dissolved Sodium (Na)	mg/L	200**	290	239	300		237	246	283	314	287	263	146	114	210
Dissolved Sulphate (SO4)	mg/L	500**	3200	2980	3400	2740	2020	2580	2840	2980	3290	3020	1160	993	1740
Nitrate (N)	mg/L	10.0*	<0.05	0.2	<0.05	0.44	0.83	0.57	0.12	0.32	<0.10	<0.10	5.32	5.18	1.08
Nitrite (N)	mg/L	1.0*	<0.05	<0.1	<0.05	<0.05	<0.05	<0.1	<0.1						
NO3+NO2	mg/L	10.0*	<0.05	0.2	<0.05	0.44	0.83	0.57	0.12						
Total Ammonia-N	mg/L		0.33		0.35	0.15	0.02	0.22	0.2	0.32	0.49	0.25	<0.02	<0.02	0.19
Total Kjeldahl Nitrogen (TKN)	mg/L		0.68		0.89	0.37	0.36	0.46	0.27	0.35	0.49	0.35	0.44	0.60	0.23
Ion Percentage	%		0.8	0.7	3.7		1.7	5.1	4.1	1.8	0.8	3.3	7.8	3.4	3.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7
Date			26-May-04	26-Nov-04	13-May-05	29-Nov-05	19-May-06	24-Nov-06	4-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	18-Nov-09	19-May-10
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	245	246	244	262	288	289	285	284	273	284	291	297	309
Conductivity	umho/cm										2830	2940	3140	3380	3250
Dissolved Barium (Ba)	mg/L	1*									<0.005	<0.005	<0.005	<0.005	<0.005
Dissolved Boron (B)	mg/L	5.0*	0.17	0.11	0.16	0.16	0.14	0.18	0.19	0.16	0.18	0.2	0.23	0.22	0.21
Dissolved Cadmium (Cd)	mg/L	0.005*									<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		192	244	211	252	210	223	240	261	230	230	260	280	260
Dissolved Chloride (Cl)	mg/L	250**	14	14	13	14	18	18	17	18	18	17	17	16	16
Dissolved Iron (Fe)	mg/L	0.3**	0.02	<0.01	<0.01	0.02	<0.01	<0.03	0.20	<0.03	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*									<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		223	271	244	257	230	256	260	278	270	250	320	330	300
Dissolved Organic Carbon	mg/L	5**	2.6	3.5	3.2	3.5	3.9	3.0	4.0	4.4	3.5	3.5	6.3	4.4	4.4
Dissolved Potassium (K)	mg/L		6	5	5	6	5	5	5	5	5.2	5.3	5.8	6.0	5.2
Dissolved Sodium (Na)	mg/L	200**	153	157	135	149	126	144	152	151	150	130	170	170	150
Dissolved Sulphate (SO4)	mg/L	500**	1280	1430	1430	1620	1300	1570	1700	1690	1580	1710	1800	1900	1800
Nitrate (N)	mg/L	10.0*	1.08	0.81	<0.10	<0.10	<0.10	<0.10	0.50	0.43	0.1	<0.1	<0.1	<0.1	<0.1
pH	(pH units)	6.5-8.5									8.4	8.3	8.3	8.3	8.3
Total Ammonia-N	mg/L		0.19	0.02	0.03	<0.02	0.05	<0.02	0.23	<0.02	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500									1610	2000	1960	2170	2000
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	0.32	0.10	0.18	0.25	0.25	3.08	<0.10	`	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		5.2	9.2	3.1	2.1	3.7	0.5	0.9	2.3	2.8	4.1	4.2	3.7	1.1

Parameter	Units	ODWQS	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7
Date			23-Nov-10	10-May-11	3-Nov-11	10-May-12	6-Nov-12	13-May-13	5-Nov-13	6-May-14	24-Nov-14	13-May-15	11-Nov-15	27-May-16	16-Nov-16
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	323	327	331	330	330	300	310	320	320	320	360	320	320
Conductivity	umho/cm		3330	2490	2790	2900	3100	2700	2900	2900	3200	3500	4200	3300	3400
Dissolved Barium (Ba)	mg/L	1*	0.005	<0.005	0.005	0.005	<0.01	0.007	0.0086	0.009	0.012	0.011	0.014	0.012	0.012
Dissolved Boron (B)	mg/L	5.0*	0.23	0.20	0.22	0.24	0.25	0.20	0.25	0.24	0.28	0.29	0.60	0.33	0.33
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	<0.00010	0.0003	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		270	190	240	220	250	230	240	240	220	270	390	280	280
Dissolved Chloride (Cl)	mg/L	250**	15	21	20	17	16	15	14	13	14	14	13	15	16
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		310	230	260	280	290	270	300	280	270	310	410	350	350
Dissolved Organic Carbon	mg/L	5**	4.6	4.4	4.6	4.7	4.4	6.7	4.7	4.2	4.7	4.1	3.2	4.1	4.2
Dissolved Potassium (K)	mg/L		5.5	4.4	5.4	5.0	5.2	5.0	5.1	4.7	4.6	5.6	8.0	5.7	5.9
Dissolved Sodium (Na)	mg/L	200**	150	120	130	130	140	120	130	130	110	150	280	160	160
Dissolved Sulphate (SO4)	mg/L	500**	1800	1200	1400	1600	1500	1400	1500	1500	1600	1900	2700	1800	1800
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.3	8.5	8.3	8.3	8.3	8.3	7.9	6.9	8.3	8.3	7.8	8.3	8.1
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1980	1550	2080	2510	2860	2430	2570	2600	2900	3210	3850	3140	3060
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	1.2	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		2.4	2.0	3.3	1.3	4.9	4.2	5.4	3.1	3.1	1.3	2.0	6.9	6.8

Parameter	Units	ODWQS	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7
Date			19-May-17	8-Nov-17	10-May-18	14-Nov-18	14-May-19	5-Nov-19	11-May-20	3-Nov-20	18-May-21	3-Nov-21	4-May-22	2-Nov-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	320	330	320	310	300	360	310	330	300	370	340	390
Conductivity	umho/cm		2900	2700	2900	2800	3200	4300	3600	3600	3700	4500	4500	4900
Dissolved Barium (Ba)	mg/L	1*	0.015	0.012	0.018	0.022	0.019	0.02	0.02	0.022	0.022	0.021	0.017	0.014
Dissolved Boron (B)	mg/L	5.0*	0.27	0.28	0.28	0.27	0.31	0.53	0.36	0.65	0.34	0.70	0.58	0.8
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		220	220	230	230	270	360	300	390	300	430	410	470
Dissolved Chloride (Cl)	mg/L	250**	14	14	13	14	14	13	14	13	14	13	14	13
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		260	260	270	280	300	390	330	400	360	450	420	490
Dissolved Organic Carbon	mg/L	5**	4.3	4.5	4	4.6	4	2.9	4.1	2.9	3.8	2.0	2.7	2.7
Dissolved Potassium (K)	mg/L		4.6	4.7	4.8	4.7	5	7	5.4	7.2	5.6	7.6	6.9	8.7
Dissolved Sodium (Na)	mg/L	200**	110	110	120	110	140	230	150	230	150	270	250	300
Dissolved Sulphate (SO4)	mg/L	500**	1500	1500	1400	1500	1800	2500	2000	2200	2200	3100	2800	3100
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	0.11	<0.10	0.15	0.15	0.17
pH	(pH units)	6.5-8.5	8.4	8.2	8.3	8.2	8.2	7.8	8.2	7.9	8.3	8.1	8.1	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	0.21	<0.15	<0.15	<0.050	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	2500	2470	2400	2590	3010	4720	3210	3590	3600	3670	3960	4470
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.2	<0.7	<0.7	<0.7
Ion Percentage	%		0.2	0.0	5.5	3.2	1.4	1.2	1.4	9.2	0.3	0.8	0.9	3.4

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6
Date			11-Dec-90	22-May-91	14-Nov-91	29-May-92	11-Nov-92	17-Jun-93	16-Dec-93	12-May-94	14-Dec-94	6-Jun-95	2-Nov-95	8-May-96	11-Dec-96
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Enviroclean	Zenon	Zenon	Zenon	Zenon
Alkalinity (Total as CaCO3)	mg/L	30-500***	401	412	408	410	410	385	405	406	410	430	450	410	430
Dissolved Boron (B)	mg/L	5.0*							0.91	0.71	0.99	0.98	0.86	0.87	
Dissolved Calcium (Ca)	mg/L		344	287	457	374	474	536	477	424	490	460	420	390	410
Dissolved Chloride (Cl)	mg/L	250**	5	4	3	1	1	2	6	4	6.7	5.6	6.8	6	6.6
Dissolved Iron (Fe)	mg/L	0.3**		0.08	<0.2	<0.2	0.03	<0.02	0.02	0.02	0.46	<0.01	0.16	0.036	0.15
Dissolved Magnesium (Mg)	mg/L		490	505	496	488	514	548	488	501	430	510	460	440	460
Dissolved Organic Carbon	mg/L	5**	1	3.2	1.8	1.7	2.1	1.6							
Dissolved Potassium (K)	mg/L		8.87	7.61	7.37	7.26	7.71	7.36	7.08	7.54	7.2	8.3	8.6	6.9	7.1
Dissolved Sodium (Na)	mg/L	200**	186	175	<155	<170	170	174	182	181	190	190	180	160	180
Dissolved Sulphate (SO4)	mg/L	500**	2800	2500	3200	2800	3400	3400	3400	3100	3800	3200	3200	3200	3300
Nitrate (N)	mg/L	10.0*													
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*	0.09	0.5	0.13	0.38	0.01	0.08	0.76	0.11	0.085	0.18	0.092	0.13	0.083
Total Ammonia-N	mg/L		0.32	0.23	0.39	0.2	0.23	0.27	0.2	0.14	0.15	<0.03	1.4	0.27	0.33
Total Kjeldahl Nitrogen (TKN)	mg/L		0.57	0.24	0.58	0.28	3.42	0.29	0.46	1.99	0.81	0.75	4.7	1.8	1.6
Ion Percentage	%		0.2	3.5			3.1	1.1	4.1	1.0	11.9	0.7	5.6	8.3	7.2

Parameter	Units	ODWQS	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6
Date			14-May-97	4-Dec-97	11-Mar-98	13-May-98	22-Dec-99	29-Mar-00	5-Dec-00	8-May-01	28-Nov-01	23-May-02	6-Nov-02	15-May-03	13-Nov-03
Laboratory			Zenon	Zenon	Maxxam	Zenon	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	410	410	418	420	453	402	414	399	418	407	416	385	400
Dissolved Boron (B)	mg/L	5.0*									0.80	1.38	0.90	0.98	0.91
Dissolved Calcium (Ca)	mg/L		430	450	443	460	98	509	486	476	488	478	455	464	459
Dissolved Chloride (Cl)	mg/L	250**	6.1	6.3	4	5.8	2	5	5	5	5	5	5	5	5
Dissolved Iron (Fe)	mg/L	0.3**	0.12	0.16	1.6	0.049	5.09	<0.01	6.28	<0.01	3.75	0.88	4.00	<0.01	0.97
Dissolved Magnesium (Mg)	mg/L		470	490	531	510	136	558	512	468	484	516	511	534	533
Dissolved Organic Carbon	mg/L	5**									2.8	1.9	2.2	1.8	2.0
Dissolved Potassium (K)	mg/L		7.9	7.9	8	8	3	8	8	7	8	7	12	8	13
Dissolved Sodium (Na)	mg/L	200**	180	190	175	190		220	198	200	199	200	221	224	235
Dissolved Sulphate (SO4)	mg/L	500**	3200	3300	3260	3300	1100	4000	3100	3200	3080	3200	2990	3000	3070
Nitrate (N)	mg/L	10.0*		0.079	<0.1	0.077	<0.10	<0.10	<0.1	0.12	<0.10	<0.10	<0.10	0.35	0.19
Nitrite (N)	mg/L	1.0*		<0.05	<0.1	<0.05	<0.10	<0.10	<0.1	<0.1					
NO3+NO2	mg/L	10.0*	0.21	0.079	<0.1	0.077	<0.10	<0.10	<0.1	0.12					
Total Ammonia-N	mg/L		0.23	0.23		0.11	8.26	0.86	0.88	<0.02	<0.02	0.22	0.47	<0.02	0.20
Total Kjeldahl Nitrogen (TKN)	mg/L		0.61	0.86		0.68	<0.10	1.36	1.09	0.11	0.48	0.30	0.60	0.14	0.37
Ion Percentage	%		4.2	3.4	1.2	2.0		5.7	2.1	1.9	0.9	0.8	3.4	5.2	4.1

Parameter	Units	ODWQS	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6
Date			26-May-04	26-Nov-04	13-May-05	29-Nov-05	18-May-06	24-Nov-06	4-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	18-Nov-09	19-May-10
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	396	389	376	387	381	401	368	375	360	411	388	406	350
Conductivity	umho/cm										4360	4870	4700	4820	4760
Dissolved Barium (Ba)	mg/L	1*									<0.03	0.01	0.009	0.009	<0.05
Dissolved Boron (B)	mg/L	5.0*	0.99	0.69	1.03	0.85	0.85	0.84	0.86	1.07	1.1	0.94	1.0	0.96	1.10
Dissolved Cadmium (Cd)	mg/L	0.005*									<0.0005	<0.0001	<0.0001	<0.0001	<0.001
Dissolved Calcium (Ca)	mg/L		474	423	453	420	454	443	417	460	430	470	480	460	460
Dissolved Chloride (Cl)	mg/L	250**	5	5	6	6	5	6	5	6	7	5	6	6	6
Dissolved Iron (Fe)	mg/L	0.3**	0.01	<0.01	0.01	0.01	<0.03	<0.03	<0.03	<0.30	6.9	9.4	3.7	<0.1	2
Dissolved Lead (Pb)	mg/L	0.01*									<0.003	<0.0005	<0.0005	<0.0005	<0.005
Dissolved Magnesium (Mg)	mg/L		528	476	479	456	483	479	462	495	440	440	510	450	480
Dissolved Organic Carbon	mg/L	5**	1.1	2.0	1.7	2.3	1.9	1.5	2.7	2.4	1.8	1.9	3.6	2.4	2.4
Dissolved Potassium (K)	mg/L		10	8	7	7	7	8	7	8	7	7.6	8.1	7.7	7
Dissolved Sodium (Na)	mg/L	200**	262	253	236	219	218	232	229	246	230	220	240	240	230
Dissolved Sulphate (SO4)	mg/L	500**	3330	3290	3070	2890	3050	3070	2990	3130	2730	3230	3000	3200	3100
Nitrate (N)	mg/L	10.0*	0.38	0.32	0.24	0.24	0.27	0.25	0.32	0.35	0.3	<0.1	0.5	0.3	0.5
pH	(pH units)	6.5-8.5									8.0	7.8	7.9	7.7	7.9
Total Ammonia-N	mg/L		0.09	<0.02	0.10	0.03	0.04	<0.02	0.23	<0.02	0.16	0.41	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500									3010	3200	2920	3060	3000
Total Kjeldahl Nitrogen (TKN)	mg/L		0.13	0.25	0.18	0.18	0.16	0.20	0.28	<0.10	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		1.4	2.9	1.1	0.7	1.1	0.4	0.0	1.7	3.3	3.7	4.8	2.4	1.1

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6
Date			**23-Nov-10**	**10-May-11**	**3-Nov-11**	**10-May-12**	**8-Nov-12**	**13-May-13**	**5-Nov-13**	**6-May-14**	**24-Nov-14**	**13-May-15**	**11-Nov-15**	**27-May-16**	**16-Nov-16**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	399	356	556	430	460	380	450	400	480	410	480	460	530
Conductivity	umho/cm		4900	4780	4850	4800	4900	4800	4800	4900	4900	4900	4800	4900	5000
Dissolved Barium (Ba)	mg/L	1*	0.009	0.009	0.012	0.009	0.011	0.010	0.010	0.007	0.009	0.008	0.009	0.010	0.010
Dissolved Boron (B)	mg/L	5.0*	0.97	0.85	0.91	0.96	0.96	0.83	0.98	1	0.98	0.83	0.96	1.00	0.99
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		460	440	490	440	460	470	490	480	440	410	470	470	460
Dissolved Chloride (Cl)	mg/L	250**	5	6	7	6	6	6	7	6	7	6	6.9	6.0	7.4
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	4.5	<0.1	1.2	0.31	8.8	0.36	<0.1	<0.10	3.2	0.33	0.20	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		510	490	510	510	440	520	480	530	510	450	490	460	440
Dissolved Organic Carbon	mg/L	5**	2.3	2.2	3.7	2.8	3.0	2.8	6	2.8	4.4	2.8	4.2	3.8	5.5
Dissolved Potassium (K)	mg/L		7.3	7.3	10	7.8	8.4	8.2	13	7.6	9.1	7.8	10	9.4	11
Dissolved Sodium (Na)	mg/L	200**	220	250	250	240	240	230	260	230	200	190	240	240	230
Dissolved Sulphate (SO4)	mg/L	500**	3100	3000	2800	3000	2900	3100	2900	3200	2900	3000	3100	3100	3000
Nitrate (N)	mg/L	10.0*	0.4	0.4	<0.1	<0.10	<0.10	0.32	<0.10	<0.10	<0.10	1.06	0.26	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	8.1	7.6	7.7	7.8	7.7	7.1	7.3	7.9	8.0	7.7	7.8	7.7
Total Ammonia-N	mg/L		<0.15	<0.15	11.2 †	1.28	2.65	0.27	4.24	<0.15	5.55	1	6.47	3.93	12.3
Total Dissolved Solids	mg/L	500	2850	2830	4360	4690	4860	4910	4500	4950	4990	4940	4990	5120	4910
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	10 †	1.5	3.7	<0.7	4.3	<0.7	5.7	16	6.9	4.6	13
Ion Percentage	%		1.9	2.0	5.0	1.8	0.5	2.3	3.7	1.4	1.4	4.1	0.9	0.6	1.7

Parameter	Units	ODWQS	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6
Date			**19-May-17**	**8-Nov-17**	**10-May-18**	**13-Nov-18**	**14-May-19**	**5-Nov-19**	**11-May-20**	**3-Nov-20**	**18-May-21**	**3-Nov-21**	**4-May-22**	**2-Nov-22**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	490	440	430	390	380	410	400	400	400	420	340	400
Conductivity	umho/cm		5000	4700	4800	4200	4500	4800	4800	4400	4800	4600	4400	4800
Dissolved Barium (Ba)	mg/L	1*	0.011	0.009	<0.03	0.011	0.01	0.009	0.008	0.009	0.008	0.008	0.017	0.007
Dissolved Boron (B)	mg/L	5.0*	0.91	0.92	1	0.95	0.92	0.84	1.1	1.1	0.91	0.96	0.58	1.0
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		470	450	460	460	450	450	450	450	450	480	400	470
Dissolved Chloride (Cl)	mg/L	250**	6.4	6	5.6	6.2	6.5	5.4	5.9	5.9	6.4	5.4	14	5.9
Dissolved Iron (Fe)	mg/L	0.3**	0.20	3.1	6.5	8	1.7	1.7	2.3	<0.1	0.2	3.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		510	460	490	450	470	480	460	460	470	490	420	490
Dissolved Organic Carbon	mg/L	5**	4.4	2.8	2.8	2.6	2.7	2.4	2.6	2.6	2.2	2.1	3.3	2.4
Dissolved Potassium (K)	mg/L		10	7.3	8	7.3	7.2	7.1	7.9	7.7	7.5	7.0	6.9	7.6
Dissolved Sodium (Na)	mg/L	200**	220	190	220	210	220	210	220	220	230	220	240	220
Dissolved Sulphate (SO4)	mg/L	500**	3200	2900	2800	2600	2900	2900	2900	2900	3100	3200	2800	3100
Nitrate (N)	mg/L	10.0*	0.17	<0.10	0.13	0.78	0.96	0.12	0.7	0.79	0.37	0.38	0.15	0.33
pH	(pH units)	6.5-8.5	7.9	7.6	7.7	7.7	7.9	7.5	8.0	7.8	8.0	7.8	8.1	7.9
Total Ammonia-N	mg/L		4.32	1.82	1.62	0.77	0.15	0.67	<0.15	<0.15	0.115	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	5000	4770	4580	4190	4700	4580	4820	4860	4950	4330	4140	4210
Total Kjeldahl Nitrogen (TKN)	mg/L		5.4	2.3	1.8	1	<0.7	0.7	<0.7	<0.7	0.3	1.0	<0.7	<0.7
Ion Percentage	%		0.1	0.3	5.1	6.2	2.6	2.5	1.8	1.8	0.4	0.2	0.2	1.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29
Date			**19-May-09**	**18-May-10**	**12-May-11**	**9-May-12**	**9-May-13**	**6-May-14**	**12-May-15**	**25-May-16**	**17-May-17**	**8-May-18**	**13-May-19**	**7-May-20**	**18-May-21**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	146	132	124	130	120	110	110	130	110	110	110	110	110
Conductivity	umho/cm		1600	1670	1800	1900	2000	2000	1600	2000	2200	2200	2100	2100	2100
Dissolved Barium (Ba)	mg/L	1*	0.015	0.015	0.016	0.017	0.015	0.015	0.016	0.015	0.012	0.012	0.011	0.011	0.011
Dissolved Boron (B)	mg/L	5.0*	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.5	1.5	1.6	1.4	1.5	1.5
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		84	86	100	110	110	110	110	120	110	120	130	130	130
Dissolved Chloride (Cl)	mg/L	250**	29	27	33	32	33	35	36	36	34	30	29	28	29
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	0.5	0.5	0.36	0.31	0.29	0.25	0.60	0.30	0.3	0.2	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		55	54	59	65	62	65	62	74	63	72	71	68	69
Dissolved Organic Carbon	mg/L	5**	3.6	1.2	1.5	1.5	1.6	1.9	3.2	1.6	1.5	1.5	1.4	1.8	1.6
Dissolved Potassium (K)	mg/L		4.7	4.4	6.1	6.8	6.8	6.7	7.3	7.5	6.9	7.5	6.3	6.5	6.3
Dissolved Sodium (Na)	mg/L	200**	220	210	230	260	250	260	250	270	250	260	250	250	240
Dissolved Sulphate (SO4)	mg/L	500**	610	630	720	780	850	870	840	830	950	910	910	940	940
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.2	8.2	7.9	7.8	8.0	7.9	7.8	8.0	7.9	8.0	7.9	7.9	8.0
Total Ammonia-N	mg/L		0.35	0.40	0.51	0.59	0.61	0.74	0.83	0.77	0.75	0.79	0.89	0.71	0.75
Total Dissolved Solids	mg/L	500	1020	1050	1080	1360	1480	1460	1510	1530	1570	1510	1580	1590	1470
Total Kjeldahl Nitrogen (TKN)	mg/L		<4	1.1	1.2	<0.7	0.9	0.8	1.0	0.8	0.9	0.8	0.8	0.8	0.8
Ion Percentage	%		6.8	5.2	3.6	5.6	0.8	0.8	0.8	7.6	2.4	3.5	3.5	1.6	0.7

Parameter	Units	ODWQS	OW49-29
Date			**3-May-22**
Laboratory			**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	100
Conductivity	umho/cm		2100
Dissolved Barium (Ba)	mg/L	1*	0.010
Dissolved Boron (B)	mg/L	5.0*	1.7
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001
Dissolved Calcium (Ca)	mg/L		140
Dissolved Chloride (Cl)	mg/L	250**	27
Dissolved Iron (Fe)	mg/L	0.3**	0.2
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005
Dissolved Magnesium (Mg)	mg/L		66
Dissolved Organic Carbon	mg/L	5**	1.5
Dissolved Potassium (K)	mg/L		6.6
Dissolved Sodium (Na)	mg/L	200**	250
Dissolved Sulphate (SO4)	mg/L	500**	950
Nitrate (N)	mg/L	10.0*	<0.10
pH	(pH units)	6.5-8.5	7.9
Total Ammonia-N	mg/L		0.63
Total Dissolved Solids	mg/L	500	1370
Total Kjeldahl Nitrogen (TKN)	mg/L		0.7
Ion Percentage	%		2.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4
Date			**22-Dec-99**	**29-Mar-00**	**7-Dec-00**	**10-May-01**	**23-May-02**	**6-Nov-02**	**15-May-03**	**14-Nov-03**	**26-May-04**	**26-Nov-04**	**13-May-05**	**29-Nov-05**	**19-May-06**
Laboratory			**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**
Alkalinity (Total as CaCO3)	mg/L	30-500***					586	586							
Dissolved Barium (Ba)	mg/L	1*		0.01	0.03	0.02	<0.005	0.02	0.05	0.02	0.01	0.02	0.02	0.01	0.01
Dissolved Boron (B)	mg/L	5.0*		0.31	0.32	0.31	0.49	0.32	0.31	0.34	0.36	0.28	0.37	0.35	0.29
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.005	<0.00015	<0.005	<0.005	<0.001	<0.001	0.001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		105	145	114	141	136	131		133				130	
Dissolved Chloride (Cl)	mg/L	250**					7	8							
Dissolved Iron (Fe)	mg/L	0.3**			24	1.66	11.4	3.14	6.83	3.75	7.55	10.1	8.58	6.54	6.34
Dissolved Lead (Pb)	mg/L	0.01*	<0.02	<0.002	<0.001	<0.001	<0.001	<0.001	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Magnesium (Mg)	mg/L			250	180	211	216	193		220				204	
Dissolved Organic Carbon	mg/L	5**					4.7	4.8							
Dissolved Potassium (K)	mg/L				4		4	7		6				4	
Dissolved Sodium (Na)	mg/L	200**					106	121		116				102	
Dissolved Sulphate (SO4)	mg/L	500**					863	838							
Nitrate (N)	mg/L	10.0*					<0.10	<0.10							
Total Ammonia-N	mg/L						0.60	0.24							
Total Kjeldahl Nitrogen (TKN)	mg/L						0.75	0.55							
Ion Percentage	%						2.6	1.0							

Parameter	Units	ODWQS	OW54-4	OW54-4	OW54-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4
Date			**24-Nov-06**	**4-May-07**	**16-Nov-07**	**22-May-08**	**5-Nov-08**	**19-May-09**	**19-Nov-09**	**20-May-10**	**22-Nov-10**	**11-May-11**	**2-Nov-11**	**9-May-12**	**5-Nov-12**
Laboratory			**Accutest**	**Accutest**	**Accutest**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***				517	549	570	DRY	554	542	539	542	600	590
Conductivity	umho/cm					2350	2120	2200		2140	2000	1950	1930	2100	2000
Dissolved Barium (Ba)	mg/L	1*	0.02	0.01	0.02	0.033	0.02	0.016		0.014	0.013	0.012	0.014	0.014	0.013
Dissolved Boron (B)	mg/L	5.0*	0.32	0.42	0.30	0.43	0.33	0.30		0.25	0.28	0.21	0.29	0.25	0.27
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	0.0003	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L					170	130	140		130	130	120	120	120	110
Dissolved Chloride (Cl)	mg/L	250**				14	9	9		13	10	11	11	11	10
Dissolved Iron (Fe)	mg/L	0.3**	4.74	6.83	3.99	0.3	<0.1	<0.1		<0.1	0.1	0.2	0.2	<0.10	0.21
Dissolved Lead (Pb)	mg/L	0.01*	0.001	<0.001	<0.001	0.0007	<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L					200	180	200		190	200	190	210	200	180
Dissolved Organic Carbon	mg/L	5**				12.1	5.5	5.4		3.9	3.7	3.7	3.8	4.1	3.7
Dissolved Potassium (K)	mg/L					13.0	6	5.1		4.1	4.2	3.5	4	3.6	3.6
Dissolved Sodium (Na)	mg/L	200**				110	93	110		110	100	96	100	130	110
Dissolved Sulphate (SO4)	mg/L	500**				946	763	780		750	600	590	570	630	530
Nitrate (N)	mg/L	10.0*				<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.10	<0.10
pH	(pH units)	6.5-8.5				8.1	8.2	7.8		8.1	7.8	8.1	7.4	7.9	7.6
Total Ammonia-N	mg/L					<0.15	<0.15	<0.15		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500				1380	1360	1330		1370	1250	1170	1260	1630	1480
Total Kjeldahl Nitrogen (TKN)	mg/L					<0.7	<4	<4		1.1	<0.7	<0.7	<0.7	<0.7	0.9
Ion Percentage	%					2.5	0.7	4.6		3.7	11.8	4.9	9.3	5.0	4.1

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4
Date			**10-May-13**	**6-Nov-13**	**6-May-14**	**19-Nov-14**	**12-May-15**	**11-Nov-15**	**25-May-16**	**16-Nov-16**	**19-May-17**	**7-Nov-17**	**9-May-18**	**12-Nov-18**	**14-May-19**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	620	620	620	620	610	620	610	620	620	620	640	610	600
Conductivity	umho/cm		2200	2100	2200	2200	1700	2100	2200	2200	2400	2200	2300	2100	2200
Dissolved Barium (Ba)	mg/L	1*	0.016	0.015	0.013	0.013	0.013	0.013	0.014	0.015	0.014	0.015	0.014	0.016	0.014
Dissolved Boron (B)	mg/L	5.0*	0.23	0.26	0.20	0.24	0.23	0.24	0.22	0.26	0.22	0.24	0.23	0.26	0.19
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		120	110	120	110	110.0	120	110	120	110	120	130	130	120
Dissolved Chloride (Cl)	mg/L	250**	12	11	11	12	18	14	20	18	24	20	22	23	29
Dissolved Iron (Fe)	mg/L	0.3**	<0.10	0.44	<0.10	0.11	<0.10	0.4	<0.10	<0.1	<0.1	1.3	<0.1	0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		190	180	190	190	190	180	190	200	180	180	210	190	190
Dissolved Organic Carbon	mg/L	5**	4.5	3.7	3.3	4	4.0	3.7	3.5	3.4	3.4	3.5	3.6	3.8	3.9
Dissolved Potassium (K)	mg/L		3.0	3.3	3.2	3.4	3.5	3.6	2.9	3.6	2.9	3.5	3.2	3.2	2.9
Dissolved Sodium (Na)	mg/L	200**	160	140	150	140	150	140	160	160	150	140	160	160	150
Dissolved Sulphate (SO4)	mg/L	500**	630	650	670	640	610	610	690	630	730	640	670	680	700
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.0	7.4	8.0	7.9	7.9	7.7	8.1	7.8	7.8	7.7	7.9	7.9	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1580	1490	1550	1500	1560	1520	1640	1570	1680	1600	1540	1570	1670
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		5.0	0.0	2.6	2.0	4.2	7.5	6.1	10.8	1.6	5.8	10.4	8.1	5.6

Parameter	Units	ODWQS	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4
Date			**7-Nov-19**	**8-May-20**	**3-Nov-20**	**19-May-21**	**2-Nov-21**	**4-May-22**	**1-Nov-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	610	610	610	590	630	600	650
Conductivity	umho/cm		2300	2400	2300	2200	2200	2300	2200
Dissolved Barium (Ba)	mg/L	1*	0.016	0.013	0.014	0.013	0.016	0.014	0.017
Dissolved Boron (B)	mg/L	5.0*	0.24	0.18	0.25	0.23	0.23	0.18	0.24
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	130	130	130	130	140	140
Dissolved Chloride (Cl)	mg/L	250**	26	29	26	24	23	28	25
Dissolved Iron (Fe)	mg/L	0.3**	1.2	<0.1	0.2	<0.1	1.1	<0.1	0.2
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	0.0023	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		200	190	190	200	200	200	200
Dissolved Organic Carbon	mg/L	5**	3.9	4.2	4.4	3.9	3.9	4.0	6.6
Dissolved Potassium (K)	mg/L		3.4	2.9	3.6	3.3	3.3	2.9	3.9
Dissolved Sodium (Na)	mg/L	200**	150	150	140	130	140	140	140
Dissolved Sulphate (SO4)	mg/L	500**	670	710	700	720	690	760	710
Nitrate (N)	mg/L	10.0*	0.16	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	7.9	7.7	7.9	8.0	8.0	7.9
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	0.059	<0.15	<0.15	1.37
Total Dissolved Solids	mg/L	500	1610	1660	1670	1660	1560	1620	1540
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	0.1	<0.7	<0.7	1.6
Ion Percentage	%		9.0	5.8	5.6	6.2	7.0	5.6	6.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10
Date			**14-May-09**	**19-Nov-09**	**17-May-10**	**22-Nov-10**	**11-May-11**	**2-Nov-11**	**9-May-12**	**6-Nov-12**	**10-May-13**	**6-Nov-13**	**6-May-14**	**24-Nov-14**	**12-May-15**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	271	276	262	265	254	260	280	270	280	310	290	320	340
Conductivity	umho/cm		2500	2480	2500	2490	2460	2450	2500	2500	2400	2500	2400	2500	1900
Dissolved Barium (Ba)	mg/L	1*	0.011	0.012	0.016	0.013	0.012	0.013	0.013	0.012	0.013	0.012	0.012	0.014	0.014
Dissolved Boron (B)	mg/L	5.0*	1.2	1.1	1.0	1.0	0.95	1.1	1.1	1.0	1.0	0.9	0.9	0.96	0.9
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		190	200	190	190	190	200	180	170	180	160	180	160	160
Dissolved Chloride (Cl)	mg/L	250**	7	8	8	8	9	9	8	7	9	9	8	9	9
Dissolved Iron (Fe)	mg/L	0.3**	2.30	4.50	3.0	0.1	0.8	1.7	1.3	0.26	2.7	2.2	1	2.3	0.86
Dissolved Lead (Pb)	mg/L	0.01*	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		200	210	200	200	200	210	200	180	180	170	180	170	170
Dissolved Organic Carbon	mg/L	5**	4.6	1.7	2.5	1.6	1.4	1.8	2.3	2.0	2.8	4.8	2.3	2.5	2.0
Dissolved Potassium (K)	mg/L		5.2	5.4	5.1	5.1	5.0	5.3	4.9	4.7	4.8	4.5	4.5	4.3	4.3
Dissolved Sodium (Na)	mg/L	200**	130	150	140	140	150	150	150	140	170	190	190	180	190
Dissolved Sulphate (SO4)	mg/L	500**	1300	1300	1200	1200	1200	1200	1200	1100	1100	1200	1100	1100	1000
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	0.3	0.1	0.1	<0.10	0.11	0.13	0.12	0.15	0.15	0.11
pH	(pH units)	6.5-8.5	7.7	7.9	8.0	7.7	8.1	7.5	7.9	7.7	8.0	7.8	8.1	8.1	7.8
Total Ammonia-N	mg/L		0.72	0.65	0.72	0.31	0.21	0.2	<0.15	0.17	0.23	<0.15	<0.15	0.18	0.19
Total Dissolved Solids	mg/L	500	1550	1600	1550	1500	1520	1590	2090	2080	2060	1970	1990	1990	2110
Total Kjeldahl Nitrogen (TKN)	mg/L		8	<40	14	2	0.9	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		0.3	2.8	4.0	3.9	3.2	5.0	1.5	1.2	3.8	2.3	4.9	0.1	3.8

Parameter	Units	ODWQS	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10
Date			**11-Nov-15**	**25-May-16**	**16-Nov-16**	**18-May-17**	**7-Nov-17**	**9-May-18**	**12-Nov-18**	**14-May-19**	**7-Nov-19**	**8-May-20**	**3-Nov-20**	**18-May-21**	**2-Nov-21**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	300	330	300	290	290		290	320	300	310	300	320	330
Conductivity	umho/cm		2400	2400	2400	2500	2300	2500	2400	2400	2500	2500	2400	2324	2300
Dissolved Barium (Ba)	mg/L	1*	0.014	0.014	0.014	0.014	0.016	0.013	0.012	0.011	0.011	0.011	0.01	0.01	0.014
Dissolved Boron (B)	mg/L	5.0*	1.0	0.9	1.0	1.0	0.96	1.1	0.99	0.95	1.00	0.88	0.97	0.96	0.95
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		170	160	160	160	170	180	180	170	180	170	170	160	190
Dissolved Chloride (Cl)	mg/L	250**	9	8.5	8.8	8.5	7.8	8.3	8.8	9.1	8.6	8.8	8.3	8.9	8.5
Dissolved Iron (Fe)	mg/L	0.3**	<0.10	1.80	0.60	0.30	6.6	5.5	4.4	1.8	0.2	0.6	<0.1	0.7	5.3
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		180	170	180	170	170	200	180	180	180	180	180	180	180
Dissolved Organic Carbon	mg/L	5**	2.1	2.4	1.8	1.5	2.1	1.7	2	1.6	1.9	1.8	2.0	1.5	2.0
Dissolved Potassium (K)	mg/L		4.5	4.1	4.4	4.2	4.3	4.5	4.4	4.3	4.6	4.3	4.5	4.6	4.6
Dissolved Sodium (Na)	mg/L	200**	190	200	190	170	160	150	150	160	170	170	170	170	160
Dissolved Sulphate (SO4)	mg/L	500**	1100	1100	1100	1200	890	1100	1200	1100	1100	1100	1100	1200	1100
Nitrate (N)	mg/L	10.0*	0.26	0.16	0.27	0.19	0.25	0.23	0.28	0.17	0.29	0.27	0.34	0.18	0.35
pH	(pH units)	6.5-8.5	7.9	7.9	8.0	8.0	7.9	7.9	7.8	7.9	8.0	8.0	7.9	8.2	8.0
Total Ammonia-N	mg/L		<0.15	0.24	<0.15	0.17	0.2	0.31	0.39	0.16	<0.15	<0.15	<0.15	0.209	0.29
Total Dissolved Solids	mg/L	500	1980	1980	1890	1990	1940	1940	2030	1970	1920	2000	1940	2040	1850
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.3	<0.7
Ion Percentage	%		5.7	3.4	4.9	1.2	11.1		0.4	3.0	5.1	4.0	4.3	0.6	4.4

Parameter	Units	ODWQS	OW54-10	OW54-10
Date			**3-May-22**	**1-Nov-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	330	330
Conductivity	umho/cm		2400	2400
Dissolved Barium (Ba)	mg/L	1*	0.011	0.013
Dissolved Boron (B)	mg/L	5.0*	0.95	1.0
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		170	180
Dissolved Chloride (Cl)	mg/L	250**	9.2	8.8
Dissolved Iron (Fe)	mg/L	0.3**	2.3	0.7
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		180	180
Dissolved Organic Carbon	mg/L	5**	2.0	2.1
Dissolved Potassium (K)	mg/L		4.5	4.5
Dissolved Sodium (Na)	mg/L	200**	160	150
Dissolved Sulphate (SO4)	mg/L	500**	1100	1100
Nitrate (N)	mg/L	10.0*	0.57	0.27
pH	(pH units)	6.5-8.5	8.0	7.9
Total Ammonia-N	mg/L		<0.15	0.26
Total Dissolved Solids	mg/L	500	1920	1710
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7
Ion Percentage	%		2.7	2.9

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4
Date			11-Feb-99	8-Jun-99	21-Jun-00	5-Dec-00	8-May-01	28-Nov-01	23-May-02	6-Nov-02	15-May-03	16-Jun-03	14-Nov-03	18-Dec-03	25-May-04
Laboratory			Maxxam	Maxxam	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	368	428	383	402	378	392	399	336	288	296	143	159	239
Dissolved Boron (B)	mg/L	5.0*	0.582	0.529	0.46			0.40	0.59	0.33	0.16	0.21	0.17	0.15	0.29
Dissolved Calcium (Ca)	mg/L		378	428	423	461	452	414	422	348	333	333	70	104	238
Dissolved Chloride (Cl)	mg/L	250**	3.5	4.1	4	5	6	5	4	7	7	7	6	5	6
Dissolved Iron (Fe)	mg/L	0.3**	0.172	1.32	<0.01	0.38	0.37	0.31	0.78	0.03	0.02	<0.01	0.01	0.02	<0.01
Dissolved Magnesium (Mg)	mg/L		580	685	660	615	563	559	565	472	269	292	25	61	195
Dissolved Organic Carbon	mg/L	5**	5.3	3.9	5.9			4.3	3.9	4.3	3.3	2.9	8.1		4.0
Dissolved Potassium (K)	mg/L		7	3	5	4	3	4	4	6	3	2	3	3	3
Dissolved Sodium (Na)	mg/L	200**	118	151	127	111	124	107	107	127	82	80	12	22	57
Dissolved Sulphate (SO4)	mg/L	500**	3220	3370	3200	3280	3200	2920	2830	2350	2060	1780	145	276	1170
Nitrate (N)	mg/L	10.0*	<0.1	0.2	0.14	<0.1	0.29	<0.10	<0.10	1.12	5.15	4.31	3.24	4.97	3.75
Nitrite (N)	mg/L	1.0*	<0.1	<0.1	<0.10	<0.1	<0.1								
NO3+NO2	mg/L	10.0*	<0.1		0.14	<0.1	0.29								
Total Ammonia-N	mg/L		<0.05	<0.05	0.13	0.04	0.04	0.05	0.07	0.05	0.07	0.06	<0.02	<0.02	0.05
Total Kjeldahl Nitrogen (TKN)	mg/L		2.4	0.7	0.84	0.26	0.14	0.17	0.28	0.31	0.59	0.50	0.82	0.78	0.34
Ion Percentage	%		1.3	4.0	4.8	1.9	0.5	2.5	4.5	5.8	6.4	2.1	5.5	13.9	3.1

Parameter	Units	ODWQS	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4
Date			27-Nov-04	13-May-05	29-Nov-05	18-May-06	24-Nov-06	5-Jan-07	5-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	19-Nov-09	19-May-10
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	218	246	238	279	274	287	269	DRY	271	276	320	315	308
Conductivity	umho/cm										2950	3400	3920	3350	3040
Dissolved Barium (Ba)	mg/L	1*									0.018	0.016	0.013	0.013	0.011
Dissolved Boron (B)	mg/L	5.0*	0.26	0.35	0.29	0.20	0.32	0.29	0.36		0.25	0.41	0.41	0.43	0.34
Dissolved Cadmium (Cd)	mg/L	0.005*									<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		252	303	103	306	224	199	217		330	430	480	430	440
Dissolved Chloride (Cl)	mg/L	250**	7	7	17	10	13	12	14		8	7	7	7	8
Dissolved Iron (Fe)	mg/L	0.3**	0.01	0.01	<0.01	<0.03	0.16	0.07	<0.03		<0.1	<0.1	<0.1	<0.1	0.3
Dissolved Lead (Pb)	mg/L	0.01*									0.0007	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		165	261	51	213	153	130	155		270	350	440	370	380
Dissolved Organic Carbon	mg/L	5**	3.9	3.8	6.0	4.4	3.8	5.8	4.0		3.6	3.7	5.2	4.0	2.9
Dissolved Potassium (K)	mg/L		2	3	1	2	2	2	2		2.6	3.2	3.2	2.8	2.7
Dissolved Sodium (Na)	mg/L	200**	51	70	32	56	45	42	50		74	79	100	79	85
Dissolved Sulphate (SO4)	mg/L	500**	993	1400	288	1340	958	713	1040		1800	2150	2500	2100	2300
Nitrate (N)	mg/L	10.0*	5.26	2.56	0.88	0.51	5.34	3.85	2.21		0.4	0.3	<0.1	0.8	1.9
pH	(pH units)	6.5-8.5									8.0	7.9	7.8	7.8	7.9
Total Ammonia-N	mg/L		0.03	<0.02	<0.02	0.05	<0.02	0.05	<0.02		<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500									1630	2300	2360	950	2070
Total Kjeldahl Nitrogen (TKN)	mg/L		0.33	0.19	0.28	0.35	0.30	0.37	0.34		<0.7	<0.7	<1	<0.7	<0.7
Ion Percentage	%		7.3	8.3	1.9	3.4	1.7	6.1	1.5		0.6	3.8	5.4	5.7	3.1

Parameter	Units	ODWQS	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4
Date			23-Nov-10	10-May-11	3-Nov-11	10-May-12	8-Nov-12	3-Dec-12	13-May-13	10-Jun-13	5-Nov-13	6-May-14	24-Nov-14	13-May-15	11-Nov-15
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	330	308	308	330	300	DRY	310	330	300	330	400	330	380
Conductivity	umho/cm		3610	3920	3690	4100	3300		4100	4100	3300	4000	4500	4100	4300
Dissolved Barium (Ba)	mg/L	1*	0.013	0.011	0.011	0.011	0.012		0.008	0.01	0.012	0.009	0.013	0.007	0.009
Dissolved Boron (B)	mg/L	5.0*	0.46	0.35	0.41	0.38	0.45		0.35	0.42	0.32	0.41	0.32	0.41	0.52
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		460	480	470	470	480		460	490	380	480	430	400	470
Dissolved Chloride (Cl)	mg/L	250**	8	8	10	8	15		8	7	7	7	8	7	7.5
Dissolved Iron (Fe)	mg/L	0.3**	0.2	0.2	0.4	1.2	1.0		<0.10	<0.10	<0.10	0.23	<0.10	0.82	0.84
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		440	450	400	490	420		510	480	340	480	390	460	480
Dissolved Organic Carbon	mg/L	5**	3.7	3.6	4	3.6	3.9		3.7	5.3	11	4.4	4.3	3.7	4
Dissolved Potassium (K)	mg/L		3.5	2.9	3.3	3.3	4.1		3.6	3.6	4	3.1	3	3.5	4
Dissolved Sodium (Na)	mg/L	200**	96	99	85	100	100		100	110	87	100	94	96	110
Dissolved Sulphate (SO4)	mg/L	500**	2100	2400	2200	2600	1700		2700	2700	1800	2600	2800	2500	2800
Nitrate (N)	mg/L	10.0*	0.6	0.2	0.3	0.19	9.9		0.95	0.55	0.62	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.6	7.9	7.6	7.6	7.7		7.6	7.6	7.1	7.8	7.8	7.9	7.6
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	2.86		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	1.04
Total Dissolved Solids	mg/L	500	1990	2390	3330	3980	3600		4230	4300	3060	4050	4410	4410	4350
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	4.3		<0.7	<0.7	1	<0.7	<0.7	<0.7	1.3
Ion Percentage	%		12.1	7.0	6.6	5.2	20.0		5.6	5.0	8.5	5.0	7.7	2.2	2.0

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4
Date			27-May-16	16-Nov-16	19-May-17	8-Nov-17	10-May-18	14-Nov-18	12-Dec-18	14-May-19	5-Nov-19	8-May-20	3-Nov-20	19-May-21	3-Nov-21
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	380	380	350	390	370	260	370	350	370	370	390	350	370
Conductivity	umho/cm		4400	4300	4200	4000	4200	1800	4300	4000	4300	4200	4400	4100	4100
Dissolved Barium (Ba)	mg/L	1*	0.014	0.011	0.007	0.007	<0.03	0.011	0.007	0.013	0.012	<0.03	0.012	<0.03	0.011
Dissolved Boron (B)	mg/L	5.0*	0.32	0.38	0.5	0.52	0.5	0.42	0.19	0.44	0.43	0.50	0.58	0.4	0.49
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0005	<0.0001
Dissolved Calcium (Ca)	mg/L		360	470	450	460	470	480	240	480	460	450	460	460	480
Dissolved Chloride (Cl)	mg/L	250**	7.1	7.6	7.5	7.4	7.3	10	7.3	7.8	6.6	7.7	7.9	8.6	7.6
Dissolved Iron (Fe)	mg/L	0.3**	0.10	0.30	0.60	0.9	0.5	0.6	<0.1	3.2	4.0	2.4	3.3	2	2.5
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		330	420	480	550	480	420	160	500	490	450	470	460	490
Dissolved Organic Carbon	mg/L	5**	3.8	3.9	3.7	3.8	3.3	4.6	10	3.7	4.5	3.8	4.3	3.7	3.8
Dissolved Potassium (K)	mg/L		8.2	3.9	4.3	3.9	4	4.3	28	3.4	3.8	3.0	4.2	3	3.9
Dissolved Sodium (Na)	mg/L	200**	85	110	100	100	100	100	63	100	98	93	100	99	100
Dissolved Sulphate (SO4)	mg/L	500**	2800	2600	2600	2700	2500	780	2700	2600	2500	2600	2700	2600	2800
Nitrate (N)	mg/L	10.0*	0.1	0.19	0.12	<0.10	0.17	14.9	0.68	0.97	<0.10	0.54	<0.10	0.31	0.11
pH	(pH units)	6.5-8.5	7.6	7.6	7.6	7.6	7.7	7.7	7.5	7.6	7.5	7.8	7.5	7.6	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.24	<0.15	0.5	0.131	0.16
Total Dissolved Solids	mg/L	500	4380	4420	4280	4240	4070	1480	4490	3570	4250	4170	4400	3700	3950
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.8	0.5	1.0
Ion Percentage	%		14.2	1.5	4.6	6.9	6.9	50.2	37.5	6.9	7.0	2.2	2.2	3.7	2.7

Parameter	Units	ODWQS	OW56-4	OW56-4
Date			4-May-22	2-Nov-22
Laboratory			Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	390	370
Conductivity	umho/cm		4800	4200
Dissolved Barium (Ba)	mg/L	1*	0.011	0.012
Dissolved Boron (B)	mg/L	5.0*	0.35	0.5
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		470	450
Dissolved Chloride (Cl)	mg/L	250**	5.8	7.4
Dissolved Iron (Fe)	mg/L	0.3**	0.30	2.30
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		420	470
Dissolved Organic Carbon	mg/L	5**	3.1	3.7
Dissolved Potassium (K)	mg/L		2.9	3.7
Dissolved Sodium (Na)	mg/L	200**	99	98
Dissolved Sulphate (SO4)	mg/L	500**	3000	2800
Nitrate (N)	mg/L	10.0*	0.36	0.14
pH	(pH units)	6.5-8.5	8.0	7.5
Total Ammonia-N	mg/L		<0.15	<0.15
Total Dissolved Solids	mg/L	500	4340	3630
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.8
Ion Percentage	%		5.4	0.3

Parameter	Units	ODWQS	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4
Date			29-Jun-00	28-Nov-01	23-May-02	6-Nov-02	15-May-03	13-Nov-03	26-May-04	27-Nov-04	12-May-05	29-Nov-05	19-May-06	24-Nov-06	5-May-07
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	177	490	478	491	471	495	479	490	497	494	492	494	469
Dissolved Boron (B)	mg/L	5.0*	1.14	0.35	0.39	0.38	0.33	0.39	0.22	0.31	0.39	0.38	0.29	0.38	0.46
Dissolved Calcium (Ca)	mg/L		327	355	370	319	318	318	330	412	313	310	329	330	342
Dissolved Chloride (Cl)	mg/L	250**	6	4	4	5	5	6	5	4	5	6	5	5	5
Dissolved Iron (Fe)	mg/L	0.3**	0.02	2.03	4.69	2.18	3.81	1.54	4.61	1.65	0.86	0.86	8.90	1.77	1.28
Dissolved Magnesium (Mg)	mg/L		222	359	416	375	382	387	382	432	332	336	348	351	359
Dissolved Organic Carbon	mg/L	5**	3.5	5.5	5.8	4.7	3.4	3.3	2.5	3.2	2.7	3.4	5.6	2.5	3.0
Dissolved Potassium (K)	mg/L		6	5	6	8	4	8	5	6	4	5	4	5	4
Dissolved Sodium (Na)	mg/L	200**	152	109	132	134	116	132	131	143	117	110	105	114	116
Dissolved Sulphate (SO4)	mg/L	500**	2896	2040	2190	2120	2620	2140	2100	2240	1990	1850	1990	2090	1860
Nitrate (N)	mg/L	10.0*	0.21	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite (N)	mg/L	1.0*	<0.10												
NO3+NO2	mg/L	10.0*	0.21												
Total Ammonia-N	mg/L		0.47	0.07	0.36	0.11	0.05	0.17	0.09	0.07	0.04	0.05	0.07	0.11	<0.02
Total Kjeldahl Nitrogen (TKN)	mg/L		0.8	0.16	1.13	0.51	0.28	0.39	0.23	0.38	0.24	0.22	0.49	0.30	0.35
Ion Percentage	%		21.5	1.2	4.2	0.1	9.0	0.5	1.6	6.3	1.9	1.0	0.2	1.6	5.0

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4
Date			**16-Nov-07**	**22-May-08**	**5-Nov-08**	**16-May-09**	**19-Nov-09**	**19-May-10**	**23-Nov-10**	**10-May-11**	**2-Nov-11**	**9-May-12**	**5-Nov-12**	**13-May-13**	**5-Nov-13**
Laboratory			**Accutest**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	470	DRY	555	524	487	493	489	511	537	540	530	500	520
Conductivity	umho/cm				3570	3560	3530	3600	3630	3570	3590	3600	3600	3600	3600
Dissolved Barium (Ba)	mg/L	1*			0.007	0.007	0.006	0.005	0.007	0.006	0.007	0.007	<0.01	0.006	0.0071
Dissolved Boron (B)	mg/L	5.0*	0.5		0.41	0.36	0.40	0.34	0.41	0.33	0.4	0.35	0.42	0.29	0.42
Dissolved Cadmium (Cd)	mg/L	0.005*			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010
Dissolved Calcium (Ca)	mg/L		342		330	340	340	340	330	340	360	330	330	340	360
Dissolved Chloride (Cl)	mg/L	250**	5		5	5	3	6	5	5	6	5	5	6	5
Dissolved Iron (Fe)	mg/L	0.3**	1.8		3.2	3.7	2.3	5.0	1.9	3.2	2.2	4.8	1.5	2.8	0.16
Dissolved Lead (Pb)	mg/L	0.01*			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.0005	<0.00050
Dissolved Magnesium (Mg)	mg/L		368		330	380	360	370	340	380	360	360	350	350	390
Dissolved Organic Carbon	mg/L	5**	3.5		3.7	5.1	3.7	3.0	3.9	4.2	4.0	3.5	3.4	4.1	12
Dissolved Potassium (K)	mg/L		4		4.7	4.2	4.9	4.2	4.6	4.2	5.3	4.3	4.8	4.1	5.4
Dissolved Sodium (Na)	mg/L	200**	116		110	130	120	120	110	130	130	120	120	120	130
Dissolved Sulphate (SO4)	mg/L	500**	1930		1960	2000	2000	2000	1900	1900	1800	1800	1700	2000	1800
Nitrate (N)	mg/L	10.0*	<0.10		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5			7.8	7.9	8.0	7.8	7.6	7.9	7.4	7.7	7.4	7.6	7.3
Total Ammonia-N	mg/L		0.14		0.18	<0.15	0.23	<0.15	0.16	<0.15	0.22	<0.15	0.24	<0.15	0.18
Total Dissolved Solids	mg/L	500			2250	2250	2260	2340	2220	2040	3000	3430	3350	3440	3380
Total Kjeldahl Nitrogen (TKN)	mg/L		0.24		<0.7	0.8	<0.7	0.8	<0.7	<0.7	1.0	<0.7	0.8	<0.7	<0.70
Ion Percentage	%		4.2		1.8	3.2	1.9	2.5	1.4	3.5	4.6	2.6	4.3	1.2	7.2

Parameter	Units	ODWQS	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4
Date			**6-May-14**	**24-Nov-14**	**12-May-15**	**11-Nov-15**	**26-May-16**	**16-Nov-16**	**19-May-17**	**8-Nov-17**	**10-May-18**	**13-Nov-18**	**14-May-19**	**5-Nov-19**	**8-May-20**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	680	540	560	540	550	560	520	550	610	560	620	600	610
Conductivity	umho/cm		3100	3600	2700	2700	3600	3600	3700	3300	3600	3400	3600	3600	3800
Dissolved Barium (Ba)	mg/L	1*	0.005	0.009	0.005	0.007	0.006	0.006	0.006	0.008	0.007	0.006	0.006	0.007	0.006
Dissolved Boron (B)	mg/L	5.0*	0.30	0.37	0.34	0.41	0.39	0.41	0.37	0.42	0.35	0.4	0.33	0.37	0.32
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		340	300	310	320	320	330	320	340	330	330	330	320	330
Dissolved Chloride (Cl)	mg/L	250**	5	6	6	4.4	5.7	5.8	5.3	5.5	5.7	5.5	5.7	5.4	5.5
Dissolved Iron (Fe)	mg/L	0.3**	0.76	0.75	0.85	1.6	1.2	0.7	1.9	2.5	0.8	0.6	2	1.6	1.3
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		370	330	350	340	360	370	340	340	350	350	340	320	350
Dissolved Organic Carbon	mg/L	5**	3.3	3.9	4.9	3.4	2.7	3.1	3.0	3.3	3	3.3	3.1	3.5	3.3
Dissolved Potassium (K)	mg/L		4	4.4	4.7	4.8	4.3	4.7	4.2	4.7	4.3	4.6	4.2	4.7	4.1
Dissolved Sodium (Na)	mg/L	200**	130	130	140	120	130	140	120	120	140	140	160	130	140
Dissolved Sulphate (SO4)	mg/L	500**	1200	1800	1800	1100	1900	1800	2000	1900	1900	1800	1800	1600	1700
Nitrate (N)	mg/L	10.0*	0.98	<0.10	<0.10	1.69	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.0	7.7	7.8	7.7	7.8	7.6	7.7	7.6	7.7	7.6	7.6	7.6	7.7
Total Ammonia-N	mg/L		0.16	0.16	<0.15	<0.15	<0.15	0.15	<0.15	<0.15	<0.15	0.16	0.15	0.55	<0.15
Total Dissolved Solids	mg/L	500	2290	3220	3400	2950	3410	3310	3410	3240	3210	3300	3360	3120	3450
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		18.8	1.2	3.5	21.4	2.4	6.1	1.3	1.3	1.5	4.5	3.5	5.0	5.9

Parameter	Units	ODWQS	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4
Date			**3-Nov-20**	**19-May-21**	**3-Nov-21**	**3-May-22**	**2-Nov-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	590	570	590	580	590
Conductivity	umho/cm		3600	3600	3500	3500	3600
Dissolved Barium (Ba)	mg/L	1*	0.006	0.007	0.007	0.007	0.009
Dissolved Boron (B)	mg/L	5.0*	0.43	0.37	0.39	0.35	0.45
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		340	340	340	360	340
Dissolved Chloride (Cl)	mg/L	250**	5.5	6.6	6.4	6.0	6.1
Dissolved Iron (Fe)	mg/L	0.3**	1.3	2.2	2.4	1.6	1.9
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		340	360	350	360	360
Dissolved Organic Carbon	mg/L	5**	3.5	3.6	3.2	3.1	3.8
Dissolved Potassium (K)	mg/L		4.7	4.3	4.8	4.1	4.6
Dissolved Sodium (Na)	mg/L	200**	130	140	130	140	130
Dissolved Sulphate (SO4)	mg/L	500**	1700	1900	1900	1800	1800
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.6	7.6	7.8	8.0	7.6
Total Ammonia-N	mg/L		<0.15	<0.050	0.25	<0.15	0.2
Total Dissolved Solids	mg/L	500	3410	2880	2920	3160	2820
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.2	0.7	<0.7	0.9
Ion Percentage	%		5.5	3.4	1.9	6.3	4.8

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15
Date			**9-Jun-99**	**7-Dec-99**	**21-Jun-00**	**28-Nov-01**	**23-May-02**	**6-Nov-02**	**15-May-03**	**13-Nov-03**	**26-May-04**	**27-Nov-04**	**12-May-05**	**29-Nov-05**	**19-May-06**
Laboratory			**Maxxam**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**	**Accutest**
Alkalinity (Total as CaCO3)	mg/L	30-500***	183	171	163	163	165	172	165	164	161	157	158	157	157
Dissolved Boron (B)	mg/L	5.0*	1.11	1.13	1.03	0.96	1.54	1.07	1.13	1.07	1.17	0.84	1.31	0.99	0.79
Dissolved Calcium (Ca)	mg/L		326	287	316	310	311	287	319	284	290	265	271	270	292
Dissolved Chloride (Cl)	mg/L	250**	7.19	9	6	8	7	8	8	8	8	8	8	8	8
Dissolved Iron (Fe)	mg/L	0.3**	0.051	0.05	0.03	0.19	0.48	0.16	0.06	0.08	0.02	0.14	1.65	1.54	1.44
Dissolved Magnesium (Mg)	mg/L		243	227	228	207	221	190	237	228	212	253	219	215	206
Dissolved Organic Carbon	mg/L	5**	2.8	4.8	3.5	3.0	2.2	2.8	2.4	1.9	1.1	1.9	1.7	2.4	2.3
Dissolved Potassium (K)	mg/L		9	8	6	6	5	9	5	8	6	5	5	5	5
Dissolved Sodium (Na)	mg/L	200**	181	176	156	164	148	181	169	177	182	190	172	168	169
Dissolved Sulphate (SO4)	mg/L	500**	4010	1820	2270	1770	1730	1730	2260	1780	1770	1920	1740	1610	1690
Nitrate (N)	mg/L	10.0*	0.3	<0.10	0.63	0.12	0.14	0.17	0.27	0.10	0.13	0.14	0.15	0.17	0.24
Nitrite (N)	mg/L	1.0*	<0.1	<0.10	<0.10										
NO3+NO2	mg/L	10.0*			0.63										
Total Ammonia-N	mg/L		0.41	0.54	0.56	0.44	0.75	0.42	0.03	0.21	0.08	0.09	0.28	0.17	0.11
Total Kjeldahl Nitrogen (TKN)	mg/L		0.8	0.85	1.14	0.45	0.75	0.49	0.16	0.25	0.16	0.23	0.25	0.37	0.16
Ion Percentage	%			0.6	9.9	0.4	1.3	1.8	8.1	0.6	0.1	0.9	0.3	2.6	0.9

Parameter	Units	ODWQS	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15
Date			**24-Nov-06**	**5-May-07**	**16-Nov-07**	**22-May-08**	**5-Nov-08**	**16-May-09**	**18-Nov-09**	**19-May-10**	**23-Nov-10**	**10-May-11**	**2-Nov-11**	**9-May-12**	**6-Nov-12**
Laboratory			**Accutest**	**Accutest**	**Accutest**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	153	154	151	151	149	159	148	144	145	142	145	150	150
Conductivity	umho/cm					3000	2980	3000	3010	3000	3030	2990	2970	3000	3000
Dissolved Barium (Ba)	mg/L	1*				0.01	0.01	0.01	0.011	0.010	0.010	0.010	0.010	0.009	<0.01
Dissolved Boron (B)	mg/L	5.0*	1.17	0.95	1.19	1.1	1.1	1.3	1.2	1.1	1.2	1.0	1.1	1.1	1.1
Dissolved Cadmium (Cd)	mg/L	0.005*				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002
Dissolved Calcium (Ca)	mg/L		286	264	276	280	280	310	290	280	280	280	260	270	270
Dissolved Chloride (Cl)	mg/L	250**	8	8	9	8	8	7	8	8	8	8	7	8	8
Dissolved Iron (Fe)	mg/L	0.3**	1.49	1.08	1.57	0.8	1.7	1.2	1.6	1.4	1.3	1.1	1.2	1.7	1.6
Dissolved Lead (Pb)	mg/L	0.01*				<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001
Dissolved Magnesium (Mg)	mg/L		213	207	218	220	200	230	220	200	210	210	180	210	200
Dissolved Organic Carbon	mg/L	5**	1.8	2.5	2.6	2	1.9	2.9	2.6	2.1	2.1	2.1	2.0	2.1	2.2
Dissolved Potassium (K)	mg/L		5	5	5	5	4.6	5.2	5.1	4.8	4.7	4.7	4.3	4.7	4.5
Dissolved Sodium (Na)	mg/L	200**	180	181	185	190	170	200	200	180	180	200	160	190	180
Dissolved Sulphate (SO4)	mg/L	500**	1790	1760	1720	1740	1790	1800	1700	1600	1600	1600	1100	1700	1500
Nitrate (N)	mg/L	10.0*	0.22	0.23	0.34	0.3	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.29
pH	(pH units)	6.5-8.5				8.1	7.9	7.8	7.9	7.9	7.8	8.0	7.8	7.9	7.4
Total Ammonia-N	mg/L		0.25	0.12	0.06	<0.15	0.28	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.18
Total Dissolved Solids	mg/L	500				1710	1950	1950	1900	1910	1840	1780	2510	2780	2730
Total Kjeldahl Nitrogen (TKN)	mg/L		0.38	0.22	<0.10	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		0.8	2.0	1.2	1.5	3.0	3.1	3.7	2.9	3.9	4.3	14.2	0.1	4.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15
Date			**13-May-13**	**5-Nov-13**	**6-May-14**	**24-Nov-14**	**12-May-15**	**11-Nov-15**	**26-May-16**	**16-Nov-16**	**19-May-17**	**8-Nov-17**	**10-May-18**	**13-Nov-18**	**14-May-19**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	140	150	150	150	150	150	150	150	150	160	150	150	140
Conductivity	umho/cm		3000	3000	3000	3000	2300	3000	3000	3000	3100	3000	3100	2900	3000
Dissolved Barium (Ba)	mg/L	1*	0.009	0.01	0.0	0.01	0.009	0.01	0.009	0.009	0.009	0.008	0.01	0.01	0.008
Dissolved Boron (B)	mg/L	5.0*	1.0	1.1	1.0	1.2	1.1	1.2	1.2	1.2	1.2	1.1	1.2	1.1	1.1
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		300	290	310	270	280	290	270	280	270	280	290	280	290
Dissolved Chloride (Cl)	mg/L	250**	8	8	9	9	8	8.5	8.6	8.9	8.2	8.2	8.2	8.6	8.8
Dissolved Iron (Fe)	mg/L	0.3**	1.6	<0.10	1.9	0.3	<0.10	1.5	0.8	1.4	1.5	2.2	1.1	2	0.4
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		220	220	210	210	210	220	210	220	200	200	200	200	200
Dissolved Organic Carbon	mg/L	5**	2.6	9.3	3.1	2.4	3.1	2.5	2.0	1.9	1.8	2.3	2	2.3	1.9
Dissolved Potassium (K)	mg/L		4.9	5.1	4.7	4.8	5	5	4.5	4.9	4.6	4.5	4.6	4.7	4.4
Dissolved Sodium (Na)	mg/L	200**	200	210	200	180	190	200	190	200	180	180	190	180	180
Dissolved Sulphate (SO4)	mg/L	500**	1700	1600	1600	1600	1700	1600	1700	1700	1700	1600	1600	1700	1700
Nitrate (N)	mg/L	10.0*	0.32	0.12	0.4	0.29	0.38	0.42	0.29	0.24	0.41	<0.10	0.58	0.37	0.56
pH	(pH units)	6.5-8.5	7.9	7.7	7.9	7.9	7.7	7.7	7.9	7.8	7.9	7.8	7.9	7.7	7.9
Total Ammonia-N	mg/L		0.17	0.46	<0.15	0.16	0.21	0.2	0.3	0.33	0.26	0.33	0.28	0.22	<0.15
Total Dissolved Solids	mg/L	500	2720	2670	2650	2690	2790	2700	2760	2610	3470	2530	2590	2650	2680
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		4.5	7.0	6.7	3.1	1.5	6.5	0.9	3.1	0.7	2.5	3.9	0.1	0.7

Parameter	Units	ODWQS	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15
Date			**5-Nov-19**	**8-May-20**	**3-Nov-20**	**18-May-21**	**3-Nov-21**	**3-May-22**	**2-Nov-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	150	150	150	150	160	150	170
Conductivity	umho/cm		3000	3100	3000	2714	2900	3000	3000
Dissolved Barium (Ba)	mg/L	1*	0.009	0.009	0.009	0.009	0.01	0.009	0.01
Dissolved Boron (B)	mg/L	5.0*	1	1	1.2	1.1	1.1	1.2	1.2
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		270	280	290	290	300	290	310
Dissolved Chloride (Cl)	mg/L	250**	8.0	8.4	7.7	8.8	8.4	8.8	8.7
Dissolved Iron (Fe)	mg/L	0.3**	1.7	0.5	2.2	1.2	1.7	1.8	3.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		190	210	210	200	210	210	220
Dissolved Organic Carbon	mg/L	5**	2.3	1.9	2.2	1.7	1.8	2.0	2.5
Dissolved Potassium (K)	mg/L		4.5	4.6	4.7	4.7	4.5	4.4	5
Dissolved Sodium (Na)	mg/L	200**	170	190	180	180	180	190	190
Dissolved Sulphate (SO4)	mg/L	500**	1500	1700	1600	1600	1800	1700	1600
Nitrate (N)	mg/L	10.0*	0.37	0.38	0.36	0.44	<0.10	0.80	<0.10
pH	(pH units)	6.5-8.5	7.7	7.9	7.7	8.1	7.9	7.9	7.8
Total Ammonia-N	mg/L		0.23	0.17	0.24	0.053	0.53	<0.15	1.08
Total Dissolved Solids	mg/L	500	2500	2750	2590	2710	2380	2570	2370
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	0.2	1.1	<0.7	1.2
Ion Percentage	%		3.4	1.5	4.4	3.4	0.6	2.1	6.7

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW58-4	OW58-4	OW58-4	OW58-4	OW58-4	OW58-4	OW58-4	OW58-4
Date			15-Jun-02 to 2-Jul-02	16-Jul-02 to 22-Jul-02	6-Aug-02	6-Nov-02	13-Nov-03	30-Sep-04	27-Nov-04	12-May-05
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	251	310	320	349	295	289	292	361
Dissolved Boron (B)	mg/L	5.0*	0.6	0.44	0.43	0.34	0.17	0.41	0.25	0.26
Dissolved Calcium (Ca)	mg/L		462	569	531	242	70	137	157	200
Dissolved Chloride (Cl)	mg/L	250**	1	3	4	12	18	12	21	15
Dissolved Iron (Fe)	mg/L	0.3**	0.12	0.03	0.03	1.02	0.03	1.62	0.17	0.20
Dissolved Magnesium (Mg)	mg/L		284	299	339	127	42	78	93	112
Dissolved Organic Carbon	mg/L	5**	10.3	110	4	8.9	8.9	6.5	7.9	5.4
Dissolved Potassium (K)	mg/L		7	9	6	7	4	3	4	4
Dissolved Sodium (Na)	mg/L	200**	84	86	85	99	120	99	112	88
Dissolved Sulphate (SO4)	mg/L	500**	2120	2060	2580	933	275	487	628	681
Nitrate (N)	mg/L	10.0*	<0.10	0.17	<0.10	<0.10	<0.10	0.15	0.11	<0.10
Total Ammonia-N	mg/L		<0.02	0.13	<0.02	0.04	0.08	0.11	<0.02	0.12
Total Kjeldahl Nitrogen (TKN)	mg/L		0.31	0.35	0.29	0.49	0.61	487	0.31	0.10
Ion Percentage	%		1.6	8.2	1.1	2.7	5.2	7.3	5.0	5.9

Parameter	Units	ODWQS	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6
Date			29-Nov-05	19-May-06	24-Nov-06	5-May-07	16-Nov-07	22-May-08	5-Nov-08	19-May-09	19-Nov-09	19-May-10	23-Nov-10	10-May-11	2-Nov-11
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	313	300	357	416	452	416	452	439	464	437	445	416	433
Conductivity	umho/cm							4040	4160	4100	4180	4070	4090	3910	3900
Dissolved Barium (Ba)	mg/L	1*						0.011	0.011	0.010	0.012	0.011	0.012	0.010	0.011
Dissolved Boron (B)	mg/L	5.0*	0.59	0.41	0.75	0.75	0.7	0.59	0.63	0.60	0.69	0.60	0.66	0.56	0.63
Dissolved Cadmium (Cd)	mg/L	0.005*						<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		383	425	331	295	281	320	300	310	290	320	310	330	370
Dissolved Chloride (Cl)	mg/L	250**	6	5	5	6	6	5	5	5	5	6	5	5	5
Dissolved Iron (Fe)	mg/L	0.3**	5.85	3.29	2.66	0.24	1.4	0.3	1.0	1.6	2.9	2.7	2.8	<0.1	4.5
Dissolved Lead (Pb)	mg/L	0.01*						<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		261	275	225	204	183	220	190	200	210	220	210	230	230
Dissolved Organic Carbon	mg/L	5**	5.6	4.2	2.5	2.3	2.4	1.5	1.5	1.9	2.2	1.5	1.8	1.4	1.7
Dissolved Potassium (K)	mg/L		11	8	8	7	7	7.1	6.7	6.8	7.3	6.8	6.9	6.5	7.6
Dissolved Sodium (Na)	mg/L	200**	88	86	362	551	606	460	460	490	530	460	450	410	410
Dissolved Sulphate (SO4)	mg/L	500**	1870	1990	2320	2220	2110	2200	2240	270	2300	2100	2000	1900	1900
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pH	(pH units)	6.5-8.5						7.8	7.9	7.6	7.7	7.9	7.6	8.1	7.5
Total Ammonia-N	mg/L		0.37	0.19	0.36	0.45	0.54	0.26	0.48	0.35	0.44	0.35	0.43	0.23	0.36
Total Dissolved Solids	mg/L	500						2420	2800	2560	2660	2590	2450	2350	2960
Total Kjeldahl Nitrogen (TKN)	mg/L		1.95	0.37	0.48	0.57	0.52	<0.7	<0.7	0.8	<0.7	0.7	<0.7	<0.7	<0.7
Ion Percentage	%		0.2	1.0	3.6	1.8	3.4	0.9	3.7	61.1	1.1	2.6	2.9	4.8	6.4

Parameter	Units	ODWQS	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6
Date			9-May-12	5-Nov-12	13-May-13	5-Nov-13	6-May-14	24-Nov-14	12-May-15	11-Nov-15	26-May-16	17-Nov-16	19-May-17	8-Nov-17	10-May-18
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	420	420	400	410	390	410	390	410	400	400	390	410	430
Conductivity	umho/cm		3900	3900	3800	3700	3700	3800	2800	3800	3800	3800	3800	3400	4000
Dissolved Barium (Ba)	mg/L	1*	0.010	0.011	0.009	0.01	0.008	0.011	0.007	0.009	0.007	0.009	0.008	0.009	0.008
Dissolved Boron (B)	mg/L	5.0*	0.61	0.65	0.53	0.66	0.58	0.69	0.64	0.63	0.67	0.67	0.67	0.62	0.58
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		340	330	390	360	390	350	370	370	380	380	370	380	410
Dissolved Chloride (Cl)	mg/L	250**	5	4	5	4	4	5	4	4.7	4.1	4.7	4.2	4.5	5.1
Dissolved Iron (Fe)	mg/L	0.3**	0.32	5.0	0.12	1.1	<0.10	3	<0.10	2.7	<0.1	1.2	<0.1	5	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		250	230	260	250	260	250	260	260	270	280	250	250	270
Dissolved Organic Carbon	mg/L	5**	1.6	1.7	1.8	8.3	1.7	2.2	3.7	2.7	1.5	4.3	1.3	1.6	1.5
Dissolved Potassium (K)	mg/L		6.7	6.9	6.9	7	6.1	6.8	7.1	6.7	6.5	7.0	6.5	6.5	6.2
Dissolved Sodium (Na)	mg/L	200**	390	360	320	320	290	270	290	300	300	300	260	250	290
Dissolved Sulphate (SO4)	mg/L	500**	1900	1800	2100	1900	2000	2000	1900	2000	2000	2000	2100	2000	2100
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	0.13	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	7.4	7.6	7.4	7.7	7.9	8.0	7.5	7.9	7.6	7.7	7.6	7.7
Total Ammonia-N	mg/L		0.16	0.40	0.25	0.38	<0.15	0.33	<0.15	0.3	<0.15	0.75	<0.15	0.28	<0.15
Total Dissolved Solids	mg/L	500	3610	3590	3410	3350	3340	3360	3410	3430	3450	3370	2660	3360	3440
Total Kjeldahl Nitrogen (TKN)	mg/L		0.8	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		5.9	4.9	2.4	4.3	3.5	0.6	4.7	4.1	5.5	6.3	0.1	1.7	3.9

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6
Date			12-Nov-18	14-May-19	5-Nov-19	8-May-20	3-Nov-20	19-May-21	3-Nov-21	4-May-22	2-Nov-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	410	390	400	390	400	380	400	400	380
Conductivity	umho/cm		3600	3800	3800	3900	3800	3700	3600	4900	3600
Dissolved Barium (Ba)	mg/L	1*	0.01	0.008	0.008	0.008	0.009	0.008	0.012	0.010	0.009
Dissolved Boron (B)	mg/L	5.0*	0.64	0.55	0.51	0.5	0.66	0.62	0.59	0.41	0.69
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		390	390	370	390	400	400	390	470	410
Dissolved Chloride (Cl)	mg/L	250**	5.3	5.7	5	4.9	5.3	6.1	5.3	5.5	4.6
Dissolved Iron (Fe)	mg/L	0.3**	3.8	<0.1	0.5	<0.1	2.3	<0.1	9.2	1.4	3.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		270	260	250	260	260	270	270	460	270
Dissolved Organic Carbon	mg/L	5**	1.6	1.5	1.7	1.7	1.6	1.4	2.0	3.3	3.3
Dissolved Potassium (K)	mg/L		6.5	5.9	6	5.9	6.6	6.3	6.7	3.2	6.5
Dissolved Sodium (Na)	mg/L	200**	280	260	250	250	230	230	220	100	210
Dissolved Sulphate (SO4)	mg/L	500**	2100	2200	2000	2100	2100	2000	2100	3000	2100
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.47	<0.10
pH	(pH units)	6.5-8.5	7.6	7.7	7.5	7.8	7.7	7.6	7.9	8.0	7.5
Total Ammonia-N	mg/L		0.22	<0.15	0.5	<0.15	0.22	<0.050	0.56	<0.15	0.16
Total Dissolved Solids	mg/L	500	3510	3580	3170	3580	3480	2880	3000	3310	2950
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.1	1.1	0.9	<0.7
Ion Percentage	%		2.9	0.4	1.4	1.2	0.7	3.9	0.6	2.9	1.5

Parameter	Units	ODWQS	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14
Date			9-Jun-99	7-Dec-99	21-Jun-00	14-Jun-02	22-May-08	20-Jun-08	3-Jul-08	6-Nov-08	4-Dec-08	15-Dec-08	19-May-09	11-Jun-09	25-Nov-09
Laboratory			Maxxam	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	88	91	93	84	86	109	81	87	131	117	93	89	80
Conductivity	umho/cm		3760	3460	3770		3900	3840	3890	3870	4240	3920	3860	3850	3850
Dissolved Barium (Ba)	mg/L	1*	0.022	0.01	<0.01		0.007	0.008	0.01	0.007	<0.005	0.007	0.007	0.007	0.006
Dissolved Boron (B)	mg/L	5.0*	1.63	1.53	1.32	3.72	6	3.5	3.9	2.5	2.4	2.1	2.1	2.0	1.9
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.003	<0.005	<0.005		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		427	432	476	429	400	370	430	400	260	360	420	410	410
Dissolved Chloride (Cl)	mg/L	250**	6.67	8	6	10	14	14	10	9	9	9	8	8	7
Dissolved Iron (Fe)	mg/L	0.3**	0.04	0.04	0.22	0.54	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.002	<0.002	<0.001		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		342	288	321	294	260	250	280	250	290	280	310	300	270
Dissolved Organic Carbon	mg/L	5**	2.4	3.1	3.2	3	1.6	4.3	1.8	2.6	2.4	1.8	2.8	4.4	2.5
Dissolved Potassium (K)	mg/L		9	7	6	6	6.8	6.4	7.7	5.3	7.8	6.4	5.5	5.4	4.7
Dissolved Sodium (Na)	mg/L	200**	190	169	170	198	250	270	260	210	470	340	260	250	200
Dissolved Sulphate (SO4)	mg/L	500**	4940	2690	2200	2620	2490	2500	2280	2620	2720	2530	2400	2400	2400
Nitrate (N)	mg/L	10.0*	<0.1	<0.10	0.21	0.18	0.1	0.3	<0.1	0.3	0.3	0.4	0.3	0.4	0.5
pH	(pH units)	6.5-8.5	7.43	7.58	6.87		7.8	7.8	7.9	7.9	8.2	7.9	7.2	7.7	7.8
Total Ammonia-N	mg/L		0.54	0.53	1.03	0.58	0.16	0.60	0.17	0.26	<0.15	<0.15	0.21	0.20	<0.15
Total Dissolved Solids	mg/L	500	3600	3940	3900		2410	2690	2750	2410	2700	2600	2400	2360	2430
Total Kjeldahl Nitrogen (TKN)	mg/L		1.7	0.67	1.43	0.75	<0.7	<7	<1	<4	<4	4.0	<4	<4	<0.7
Ion Percentage	%		29.1	5.0	9.2	2.2	1.7	3.7	6.1	6.6	2.0	0.4	5.1	3.6	0.5

Parameter	Units	ODWQS	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14
Date			20-May-10	23-Nov-10	10-May-11	2-Nov-11	9-May-12	6-Nov-12	13-May-13	10-Jun-13	5-Nov-13	13-Dec-13	6-May-14	19-Nov-14	12-May-15
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L	30-500***	105	89	92	94	93	120	110	110	110	100	110	110	120
Conductivity	umho/cm		4060	3920	3870	3830	3900	3800	3800	3800	3800	3800	3900	3800	2900
Dissolved Barium (Ba)	mg/L	1*	0.007	0.007	0.006	0.006	0.006	<0.03	0.006	0.007	0.0063	0.006	0.006	0.007	0.007
Dissolved Boron (B)	mg/L	5.0*	1.7	1.8	2.0	2.1	2.1	2.0	2.9	3.6	3.1	3	3.9	3.7	3.4
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		320	390	410	470	420	410	450	460	460	400	450	440	430
Dissolved Chloride (Cl)	mg/L	250**	9	8	9	9	8	8	10	10	9	9	10	10	11
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.1	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		270	280	290	300	310	280	290	290	310	270	290	290	280
Dissolved Organic Carbon	mg/L	5**	2.8	1.9	1.7	2.1	1.7	1.7	2.2	3.7	4.7	3.3	2	2.1	3.6
Dissolved Potassium (K)	mg/L		6.5	5.0	5.4	5.9	5.1	4.5	6.3	6.9	6.5	6	6.4	6.6	6.6
Dissolved Sodium (Na)	mg/L	200**	340	220	240	230	220	200	210	220	220	190	210	210	210
Dissolved Sulphate (SO4)	mg/L	500**	2600	2500	2400	2400	2500	2300	2500	2400	2400	2400	2300	2500	2300
Nitrate (N)	mg/L	10.0*	0.4	0.3	0.2	0.2	0.11	<0.10	0.24	0.24	0.19	0.18	0.29	0.31	0.36
pH	(pH units)	6.5-8.5	7.9	7.8	7.8	7.8	7.8	7.3	7.8	7.8	7.2	7.2	7.9	7.8	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	0.52	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	2500	2340	2300	3250	3840	3800	3760	3750	3690	3680	3620	3710	3800
Total Kjeldahl Nitrogen (TKN)	mg/L		1.2	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	1.2	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		3.3	2.0	2.1	5.1	1.3	1.2	0.5	3.3	4.7	2.1	4.4	4.2	4.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.
5) The November 16, 2007 lab sample was labelled as OW58-4.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW58-14	OW58-14
Date			11-Nov-15	26-May-16
Laboratory			Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L	30-500***	110	130
Conductivity	umho/cm		3800	3900
Dissolved Barium (Ba)	mg/L	1*	0.006	0.007
Dissolved Boron (B)	mg/L	5.0*	3.8	4.2
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		440	430
Dissolved Chloride (Cl)	mg/L	250**	11	12
Dissolved Iron (Fe)	mg/L	0.3**	<0.10	<0.10
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		290	290
Dissolved Organic Carbon	mg/L	5**	1.9	1.7
Dissolved Potassium (K)	mg/L		6.8	7
Dissolved Sodium (Na)	mg/L	200**	220	220
Dissolved Sulphate (SO4)	mg/L	500**	2500	2400
Nitrate (N)	mg/L	10.0*	0.26	0.41
pH	(pH units)	6.5-8.5	7.7	7.9
Total Ammonia-N	mg/L		<0.15	<0.15
Total Dissolved Solids	mg/L	500	3730	3770
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7
Ion Percentage	%		3.3	2.0

Parameter	Units	ODWQS	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17
Date			27-May-14	19-Nov-14	12-May-15	11-Nov-15	27-May-16	16-Nov-16	19-May-17	8-Nov-17	10-May-18	12-Nov-18	14-May-19	5-Nov-19	8-May-20
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	71	74	73	56	61	67	69	80	75	74	72	70	67
Conductivity	umho/cm		3800	3800	2900	3800	3800	3900	3900	3600	4000	3700	3800	3800	4000
Dissolved Barium (Ba)	mg/L	1*	0.023	0.024	0.021	0.022	0.018	0.018	0.017	0.015	<0.03	0.015	0.014	0.015	0.014
Dissolved Boron (B)	mg/L	5.0*	1.2	1.4	1.2	1.3	1.3	1.4	1.3	1.3	1.4	1.2	1.2	1.1	1.2
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		480	490	440	490	470	500	460	480	490	450	480	470	470
Dissolved Chloride (Cl)	mg/L	250**	11	10	11	9.5	9.8	8.8	9.6	8.8	8.8	8.8	9.1	8.3	8.7
Dissolved Iron (Fe)	mg/L	0.3**	0.16	0.99	0.14	<0.10	<0.1	0.10	0.10	<0.1	<0.5	0.3	0.1	0.9	0.2
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		270	270	240	280	270	290	250	260	260	240	270	250	270
Dissolved Organic Carbon	mg/L	5**	3.7	4.4	3.6	3.1	2.4	2.5	3.3	2	1.9	2.2	2.1	2.1	2.2
Dissolved Potassium (K)	mg/L		11	9.1	7.3	6	5.7	5.6	5.1	5.3	5	4.7	4.7	4.6	4.7
Dissolved Sodium (Na)	mg/L	200**	190	190	180	190	190	200	180	190	180	170	190	180	190
Dissolved Sulphate (SO4)	mg/L	500**	2600	2500	2300	2500	2500	2400	2600	2400	2400	2500	2600	2300	2400
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	0.20	<0.10	0.15	0.11	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.3	7.7	7.4	7.4	7.6	7.7	7.7	7.8	7.8	7.5	7.7	7.7	7.7
Total Ammonia-N	mg/L		0.51	0.52	0.64	0.6	0.35	0.62	0.39	0.35	0.37	0.45	0.43	0.47	0.41
Total Dissolved Solids	mg/L	500	3940	3750	3780	3670	3830	3730	3820	3500	3540	3770	3890	3510	3830
Total Kjeldahl Nitrogen (TKN)	mg/L		1.0	1	1.1	0.9	0.7	<0.7	1.0	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		1.3	1.0	0.2	1.9	0.2	5.3	4.3	1.6	1.7	4.2	1.4	2.2	2.1

Parameter	Units	ODWQS	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17
Date			3-Nov-20	18-May-21	3-Nov-21	3-May-22	2-Nov-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	66	69	65	64	64
Conductivity	umho/cm		3800	3545	3700	3800	3800
Dissolved Barium (Ba)	mg/L	1*	0.015	0.014	0.016	0.014	0.014
Dissolved Boron (B)	mg/L	5.0*	1.4	1.3	1.3	1.4	1.3
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		460	470	480	480	470
Dissolved Chloride (Cl)	mg/L	250**	8.6	9.5	8.4	8.4	9.5
Dissolved Iron (Fe)	mg/L	0.3**	0.6	0.5	0.9	0.9	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		270	260	270	270	260
Dissolved Organic Carbon	mg/L	5**	2.1	1.8	1.9	1.5	2
Dissolved Potassium (K)	mg/L		4.8	4.6	4.5	4.3	4.9
Dissolved Sodium (Na)	mg/L	200**	190	190	190	200	200
Dissolved Sulphate (SO4)	mg/L	500**	2500	2500	2600	2400	2400
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	0.25	<0.10
pH	(pH units)	6.5-8.5	7.5	7.8	7.7	7.7	7.8
Total Ammonia-N	mg/L		0.53	0.194	0.31	0.31	0.24
Total Dissolved Solids	mg/L	500	3660	3070	3490	3660	3370
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.3	0.8	0.9	<0.7
Ion Percentage	%		0.3	0.7	1.3	3.0	1.8

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parmeter	Units	ODWQS	OW59-4	OW59-4	OW59-4	OW59-4
Date			15-Jun-02	30-Sep-04	27-Nov-04 to 30-Nov-04	2-Jun-05 to 27-Jun-05
Laboratory			Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	309	325	343	332
Dissolved Boron (B)	mg/L	5.0*	0.89	0.77	0.67	0.47
Dissolved Calcium (Ca)	mg/L		465	427	558	456
Dissolved Chloride (Cl)	mg/L	250**	5	6	6	6
Dissolved Iron (Fe)	mg/L	0.3**	0.02	<0.01	0.01	<0.03
Dissolved Magnesium (Mg)	mg/L		530	530	623	531
Dissolved Organic Carbon	mg/L	5**	5.5	2.1	3.1	1.9
Dissolved Potassium (K)	mg/L		7	6	9	7
Dissolved Sodium (Na)	mg/L	200**	176	186	212	168
Dissolved Sulphate (SO4)	mg/L	500**		3510	3370	2740
Nitrate (N)	mg/L	10.0*		<0.10	<0.10	0.10
Nitrite (N)	mg/L	1.0*				
NO3+NO2	mg/L	10.0*				
Total Ammonia-N	mg/L		0.03	0.02	0.04	0.03
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	0.12	0.66	0.24
Ion Percentage	%			4.0	7.2	7.8

Parameter	Units	ODWQS	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6
Date			29-Nov-05	19-May-06	24-Nov-06	5-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	11-Jun-09	18-Nov-09	19-May-10	23-Nov-10	10-May-11
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	367	375	375	368	504	373	368	348	375	383	390	370	387
Conductivity	umho/cm							3620	3560	3710	4090	4320	4840	4640	4700
Dissolved Barium (Ba)	mg/L	1*						0.008	0.008	<0.03	0.009	0.009	0.009	0.009	0.008
Dissolved Boron (B)	mg/L	5.0*	0.75	0.57	0.81	0.82	0.38	0.82	0.82	1.0	0.83	0.85	0.76	0.83	0.70
Dissolved Cadmium (Cd)	mg/L	0.005*						<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		292	314	307	324	473	320	310	340	330	340	360	350	360
Dissolved Chloride (Cl)	mg/L	250**	9	7	7	8	13	7	5	6	7	7	7	7	7
Dissolved Iron (Fe)	mg/L	0.3**	2.87	<0.03	0.61	0.05	<0.3	<0.1	0.4	<0.1	<0.1	0.7	1.0	1.9	0.2
Dissolved Lead (Pb)	mg/L	0.01*						<0.0005	<0.0005	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		298	326	329	342	589	360	320	370	380	360	380	360	380
Dissolved Organic Carbon	mg/L	5**	5.6	2.8	1.4	1.9	3.0	1.4	1.3	3.7	2.6	2.2	2.0	2.5	2.3
Dissolved Potassium (K)	mg/L		10	7	7	7	8	6.9	6.3	6.9	7.6	7.6	7.6	7.5	7.2
Dissolved Sodium (Na)	mg/L	200**	164	160	161	164	195	170	150	220	360	350	490	440	420
Dissolved Sulphate (SO4)	mg/L	500**	1900	2000	2160	2090	3230	2170	2200	2100	2300	2700	2800	2600	2700
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	0.21	<0.10	0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.2	<0.1
pH	(pH units)	6.5-8.5						8.1	7.9	7.8	7.6	7.7	7.9	7.6	7.9
Total Ammonia-N	mg/L		0.34	0.19	0.22	0.03	0.06	<0.15	<0.15	<0.15	<0.15	0.26	0.37	0.28	0.30
Total Dissolved Solids	mg/L	500						2230	2400	2400	2460	2600	3000	2920	2800
Total Kjeldahl Nitrogen (TKN)	mg/L		0.52	0.46	0.22	0.08	0.16	<0.7	<0.7	<0.7	<0.7	<0.7	0.7	<0.7	<0.7
Ion Percentage	%		0.4	1.3	2.1	1.5	2.7	1.2	3.9	6.7	7.5	1.0	3.8	4.3	2.1

Parameter	Units	ODWQS	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6
Date			2-Nov-11	9-May-12	6-Nov-12	10-May-13	5-Nov-13	6-May-14	19-Nov-14	12-May-15	12-Nov-15	26-May-16	16-Nov-16	18-May-17	7-Nov-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXM	MAXXAM	MAXXM
Alkalinity (Total as CaCO3)	mg/L	30-500***	389	390	380	390	400	380	390	400	400	400	410	400	410
Conductivity	umho/cm		4790	4900	4700	4600	4700	4700	4800	3800	4800	4900	4800	4900	4800
Dissolved Barium (Ba)	mg/L	1*	0.010	0.009	<0.03	0.008	0.009	0.008	0.008	0.008	0.008	0.007	0.007	0.007	0.007
Dissolved Boron (B)	mg/L	5.0*	0.90	0.77	0.8	0.85	0.85	0.74	0.86	0.82	0.79	0.78	0.79	0.79	0.79
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0005	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		400	370	350	390	400	390	400	410	410	390	400	380	400.0
Dissolved Chloride (Cl)	mg/L	250**	7	7	6	6	6	6	7	6	6.6	6.9	6.8	6.3	6.1
Dissolved Iron (Fe)	mg/L	0.3**	3.3	2.9	3.6	0.20	<0.10	<0.10	<0.10	<0.10	0.27	0.40	<0.10	<0.1	0.5
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.003	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		420	400	370	390	370	410	410	400	410	400	410	400	400.0
Dissolved Organic Carbon	mg/L	5**	2.4	2.6	2.6	3.3	4.3	2.5	2.4	2.8	2.9	2.3	2.2	2.4	3.3
Dissolved Potassium (K)	mg/L		8.4	7.3	7.0	7.3	7.8	6.9	7.4	7.3	7.4	6.9	7.4	6.8	6.9
Dissolved Sodium (Na)	mg/L	200**	490	480	390	370	400	370	380	370	400	380	380	320	320
Dissolved Sulphate (SO4)	mg/L	500**	2700	2900	2600	2700	2800	2700	2900	2800	3000	2900	2900	3000	2900
Nitrate (N)	mg/L	10.0*	<0.1	<0.10	<0.10	<0.10	<0.10	0.18	0.13	0.13	0.14	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.0	7.7	7.4	7.8	7.7	7.8	7.8	7.8	7.6	7.8	7.6	7.7	7.7
Total Ammonia-N	mg/L		0.33	0.30	0.40	0.20	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	3290	4830	4360	4490	4500	4440	4570	4770	4590	4940	4580	4670	4510
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		8.0	2.3	1.9	2.2	0.6	3.6	0.9	1.8	1.4	1.0	1.8	2.8	0.7

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6
Date			10-May-18	12-Nov-18	14-May-19	5-Nov-19	8-May-20	3-Nov-20	19-May-21	3-Nov-21	4-May-22	2-Nov-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	420	400	390	400	420	410	410	420	420	430
Conductivity	umho/cm		5000	4500	4800	4900	5100	4900	4900	4800	4900	4900
Dissolved Barium (Ba)	mg/L	1*	<0.03	0.006	0.007	0.007	0.007	0.007	<0.03	0.007	0.007	0.007
Dissolved Boron (B)	mg/L	5.0*	0.8	0.8	0.7	0.65	0.71	0.86	0.8	0.72	0.72	0.74
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		420	430	440	420	430	440	430	460	450	430
Dissolved Chloride (Cl)	mg/L	250**	6	6.4	6.6	6.0	6.2	6.6	7	6.5	6.2	6.4
Dissolved Iron (Fe)	mg/L	0.3**	<0.5	<0.1	<0.1	<0.1	0.1	<0.1	<0.5	0.2	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		430	410	460	430	440	440	470	470	460	460
Dissolved Organic Carbon	mg/L	5**	2.3	2.4	2.3	2.8	2.6	2.6	2.2	2.4	2.4	2.8
Dissolved Potassium (K)	mg/L		7	7.1	6.6	6.8	6.4	6.8	7	6.9	6.6	6.4
Dissolved Sodium (Na)	mg/L	200**	330	340	330	310	320	310	310	300	290	290
Dissolved Sulphate (SO4)	mg/L	500**	3000	3000	3100	2700	3000	2900	3000	3100	3100	3200
Nitrate (N)	mg/L	10.0*	<0.10	0.11	<0.10	0.10	<0.10	0.1	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	7.6	7.7	7.6	7.7	7.6	7.6	7.8	7.8	7.5
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	0.40	<0.15	<0.15	<0.050	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	4570	4800	5000	4700	4860	4720	4280	4670	4830	4370
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.2	0.8	<0.7	0.7
Ion Percentage	%		0.5	0.2	1.8	4.9	1.1	2.8	2.6	1.8	0.6	1.6

Parameter	Units	ODWQS	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4
Date			10-Feb-99	3-Jun-99	22-Jun-00	23-May-08	19-May-09	21-May-10	12-May-11	15-May-12	9-May-13	6-May-14	13-May-15	18-Jun-15	27-May-16
Laboratory			Maxxam	Maxxam	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	372	541	238	242	357	325	207	270	240	430	320	310	250
Conductivity	umho/cm		840	790	570	594	821	782	627	700	620	1400	750		610
Dissolved Barium (Ba)	mg/L	1*	0.068	0.051	0.04	0.04	0.06	0.048	0.044	0.049	0.041	0.021	0.055		0.047
Dissolved Boron (B)	mg/L	5.0*	0.205	0.15	0.06	0.04	0.04	0.04	0.03	0.05	0.03	0.2	0.04		0.06
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.003	<0.003	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001
Dissolved Calcium (Ca)	mg/L		104	99	77	71	120	97	84	91	85	130	100	100	86
Dissolved Chloride (Cl)	mg/L	250**	8.4	11.8	14	18	29	24	21	16	13	14	11	12	8.7
Dissolved Iron (Fe)	mg/L	0.3**	0.027	0.01	0.32	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10		0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.025	<0.002	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0023	<0.0005	0.008		0.0061
Dissolved Magnesium (Mg)	mg/L		41.7	40.2	22	22	32	31	23	27	23	93	31	29	23
Dissolved Organic Carbon	mg/L	5**	1.4	1.3	6.2	4.0	5.8	3.9	3.1	4.2	4.1	3.6	3.2		3.3
Dissolved Potassium (K)	mg/L		3	3	2	1.5	1.6	1.9	1.4	1.7	1.4	1.4	1.8	1.6	1.6
Dissolved Sodium (Na)	mg/L	200**	25.1	27.3	11	13	14	15	12	14	14	68	17	17	15
Dissolved Sulphate (SO4)	mg/L	500**	90.3	97.2	56	59	56	70	81	88	72	370	67	74	69
Nitrate (N)	mg/L	10.0*	<0.1	0.3	0.42	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10		<0.10
pH	(pH units)	6.5-8.5	7.2	7.3	7.1	8.0	7.4	8.0	8.2	7.8	8.1	8.1	7.8		7.9
Total Ammonia-N	mg/L		<0.05	<0.05	0.07	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15		<0.15
Total Dissolved Solids	mg/L	500	666	447	368	375	530	500	318	396	404	1120	444		372
Total Kjeldahl Nitrogen (TKN)	mg/L		1.4	0.4	0.52	<1	1	4	<0.7	<0.7	0.7	<0.7	0.6		<0.7
Ion Percentage	%		9.5	7.5	6.9	2.9	9.2	4.8	8.5	5.7	8.5	6.4	9.8	8.7	9.4

Parameter	Units	ODWQS	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4
Date			16-May-17	8-May-18	15-May-19	7-May-20	19-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	260	260	300	280	230	280
Conductivity	umho/cm		620	610	710	680	560	730
Dissolved Barium (Ba)	mg/L	1*	0.039	0.04	0.049	0.048	0.038	0.046
Dissolved Boron (B)	mg/L	5.0*	0.04	0.03	0.04	0.04	0.03	0.04
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		80	81	93	94	79	97
Dissolved Chloride (Cl)	mg/L	250**	8.2	7.1	9.2	8.0	6.5	8.3
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	0.013	0.0086	0.0055	0.0047	0.0081	0.012
Dissolved Magnesium (Mg)	mg/L		23	23	30	26	24	29
Dissolved Organic Carbon	mg/L	5**	3.7	3.4	3.0	3.7	3.3	3.4
Dissolved Potassium (K)	mg/L		1.4	1.4	1.5	1.5	1.5	1.5
Dissolved Sodium (Na)	mg/L	200**	13	12	15	13	12	13
Dissolved Sulphate (SO4)	mg/L	500**	61	55	71	79	67	99
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.0	8.0	7.8	8.0	7.9	8.1
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.050	<0.15
Total Dissolved Solids	mg/L	500	338	300	455	370	340	415
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	0.1	<0.7
Ion Percentage	%		6.7	8.1	8.7	7.7	10.3	7.1

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8
Date			10-Feb-99	3-Jun-99	1-Dec-99	22-Jun-00	23-May-08	14-May-09	21-May-10	12-May-11	15-May-12	9-May-13	6-May-14	13-May-15	27-May-16
Laboratory			Maxxam	Maxxam	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	205	207	213	178	247	254	252	241	240	240	630	230	260
Conductivity	umho/cm		895	752	744	839	834	839	825	803	790	790	4800	770	750
Dissolved Barium (Ba)	mg/L	1*	0.044	0.03	0.03	0.02	0.019	0.021	0.020	0.019	0.018	0.019	0.008	0.019	0.015
Dissolved Boron (B)	mg/L	5.0*	0.847	0.773	0.82	0.74	0.86	0.81	0.83	0.81	0.86	0.80	0.97	0.85	0.77
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.003	<0.003		<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		86.6	54.8	51	46	43	44	45	46	45	44	450	45	33
Dissolved Chloride (Cl)	mg/L	250**	9.6	5.8	7	5	7	7	7	7	7	7	10	7	6.9
Dissolved Iron (Fe)	mg/L	0.3**	0.291	0.13	0.33	0.02	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	20	<0.10	<0.10
Dissolved Lead (Pb)	mg/L	0.01*	<0.025	<0.002	<0.002	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	0.0005
Dissolved Magnesium (Mg)	mg/L		29.5	28.6	30	28	28	30	30	30	29	29	560	29	24
Dissolved Organic Carbon	mg/L	5**	2.9	2.4	3.5	3.9	1.6	3.7	1.8	1.8	2.1	1.7	3.8	2.4	1.9
Dissolved Potassium (K)	mg/L		7	4	3	3	2	2.6	2.3	2.2	2.1	2.0	5.6	2.1	4.6
Dissolved Sodium (Na)	mg/L	200**	72.7	74.4	80	86	87	110	100	93	89	86	280	84	97
Dissolved Sulphate (SO4)	mg/L	500**	248	177	180	392	195	180	180	170	160	160	2900	150	130
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.10	0.47	<0.1	0.2	0.1	<0.1	<0.10	<0.10	<0.10	<0.10	0.13
pH	(pH units)	6.5-8.5	7.5	7.8	7.8	7.0	8.2	8.0	8.2	8.1	8.1	8.3	7.6	8.1	8.4
Total Ammonia-N	mg/L		0.09	0.22	0.28	0.18	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	659	508	456	560	548	530	524	500	456	482	5090	460	442
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.1	0.3	0.4	0.41	<0.7	<1	1.0	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		6.9	7.7	7.2	14.5	0.02	8.1	6.2	7.3	7.0	5.9	6.2	8.3	5.5

Parameter	Units	ODWQS	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8
Date			16-May-17	8-May-18	15-May-19	7-May-20	19-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	250		240	250	240	240
Conductivity	umho/cm		780	800	760	770	760	780
Dissolved Barium (Ba)	mg/L	1*	0.014	0.018	0.017	0.018	0.02	0.018
Dissolved Boron (B)	mg/L	5.0*	0.74	0.91	0.87	0.85	0.85	0.85
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		31	41	41	41	43	43
Dissolved Chloride (Cl)	mg/L	250**	7.6	8	8.1	8.6	8.8	8.8
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005
Dissolved Magnesium (Mg)	mg/L		23	29	29	28	28	26
Dissolved Organic Carbon	mg/L	5**	2	1.7	1.6	1.9	1.2	1.5
Dissolved Potassium (K)	mg/L		4.6	2.6	2.1	2.0	2.1	2.0
Dissolved Sodium (Na)	mg/L	200**	96	92	91	87	87	82
Dissolved Sulphate (SO4)	mg/L	500**	150	140	150	150	150	150
Nitrate (N)	mg/L	10.0*	<0.10	0.1	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.2	8.3	8.2	8.3	8.2	8.3
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.050	<0.15
Total Dissolved Solids	mg/L	500	430	420	470	475	445	415
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.1	<0.7
Ion Percentage	%		2.1		7.6	4.8	6.5	4.1

Parameter	Units	ODWQS	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4
Date			2-Dec-99	19-Jun-00	28-Nov-01	22-May-02	5-Nov-02	15-May-03	13-Nov-03	26-May-04	27-Nov-04	12-May-05	30-Nov-05	19-May-06	24-Nov-06
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	535	527	456	491	459	260	301	339	373	298	203	268	267
Dissolved Boron (B)	mg/L	5.0*	0.44	0.35	0.38	1.36	0.65	0.41	0.82	0.78	0.48	0.61	0.95	0.69	0.91
Dissolved Calcium (Ca)	mg/L		192	150	257	293	262	175	164	232	232	201	178	179	210
Dissolved Chloride (Cl)	mg/L	250**	70	102	56	56	47	41	35	41	44	34	28	33	33
Dissolved Iron (Fe)	mg/L	0.3**	<0.01	<0.01	<0.01	0.08	0.02	0.01	0.01	0.02	1.35	0.29	<0.01	<0.03	<0.03
Dissolved Magnesium (Mg)	mg/L		75	54	83	114	92	70	63	83	85	73	55	68	77
Dissolved Organic Carbon	mg/L	5**	4.8	4.8	5.0	5.4	5.4	3.6	<0.5	3.6	3.0	2.4	4.7	3.9	4.0
Dissolved Potassium (K)	mg/L		2	1	2	2	3	2	3	2	2	1	2	1	2
Dissolved Sodium (Na)	mg/L	200**	178	139	90	161	96	91	95	104	75	76	125	79	90
Dissolved Sulphate (SO4)	mg/L	500**	492	590	705	976	654	759	467	653	567	580	708	644	704
Nitrate (N)	mg/L	10.0*	6.05	10.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrite (N)	mg/L	1.0*	0.25	<0.10											
NO3+NO2	mg/L	10.0*		10.1											
Total Ammonia-N	mg/L		0.07	0.09	0.04	0.07	0.04	0.03	0.02	0.08	<0.02	<0.02	<0.02	<0.02	<0.02
Total Kjeldahl Nitrogen (TKN)	mg/L		0.46	0.51	0.47	0.57	0.42	0.28	0.45	0.26	0.14	0.12	0.39	0.42	0.22
Ion Percentage	%		5.9	13.8	0.2	1.7	5.2	7.0	5.8	6.1	6.7	3.8	0.2	2.1	1.9

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4
Date			4-May-07	16-Nov-07	22-May-08	5-Nov-08	4-Dec-08	16-May-09	11-Jun-09	18-Nov-09	15-Dec-09	20-May-10	22-Nov-10	23-Dec-10	12-May-11
Laboratory			Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	303	DRY	DRY	140	162	196	269	281	330	333	268	300	338
Conductivity	umho/cm		1830			1590	1600	870	1160	1150	1340	1320	960	1090	1270
Dissolved Barium (Ba)	mg/L	1*	0.01			0.037	0.034	0.026	0.025	0.026	0.026	0.026	0.025	0.025	0.027
Dissolved Boron (B)	mg/L	5.0*	0.81			0.86	0.72	0.59	0.77	0.77	0.83	0.72	0.66	0.59	0.53
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		252			180	190	160	140	140	160	170	160	120	150
Dissolved Chloride (Cl)	mg/L	250**	34			54	47	26	27	27	26	22	18	19	22
Dissolved Iron (Fe)	mg/L	0.3**	<0.03			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		85			60	69	61	56	51	55	67	62	48	56
Dissolved Organic Carbon	mg/L	5**	4.2			1.8	3.5	7.8	4.9	4.0	4.7	3.2	5.0	4.2	4.4
Dissolved Potassium (K)	mg/L		2			2.2	1.9	1.5	1.7	1.9	1.9	1.5	1.9	1.6	1.4
Dissolved Sodium (Na)	mg/L	200**	83			75	77	68	71	64	66	63	58	61	54
Dissolved Sulphate (SO4)	mg/L	500**	686			643	686	230	350	340	360	390	210	260	340
Nitrate (N)	mg/L	10.0*	<0.10			3.4	3.1	2.9	0.5	0.3	0.2	<0.1	2.4	0.7	<0.1
pH	(pH units)	6.5-8.5	8.2			8.0	8.0	7.8	8.0	8.0	8.0	8.1	8.0	7.8	7.9
Total Ammonia-N	mg/L		<0.02			<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1090			1030	1050	565	710	745	854	836	610	674	772
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27			<4	<7	1	<4	<1	<0.7	<0.7	1.4	0.7	<0.7
Ion Percentage	%		6.9			0.2	0.6	29.5	8.4	6.0	6.3	8.4	25.9	7.7	4.7

Parameter	Units	ODWQS	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4
Date			2-Nov-11	9-May-12	6-Nov-12	9-May-13	6-Nov-13	6-May-14	6-Nov-14	12-May-15	12-Nov-15	25-May-16	15-Nov-16	17-May-17	7-Nov-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	208	300	220	330	270	450	310	290	180	310	290	380	270
Conductivity	umho/cm		613	990	800	1200	770	1500	890	940	950	1300	850	1300	1100
Dissolved Barium (Ba)	mg/L	1*	0.037	0.038	0.039	0.051	0.037	0.1	0.034	0.049	0.043	0.071	0.066	0.057	0.049
Dissolved Boron (B)	mg/L	5.0*	0.48	0.38	0.20	0.49	0.34	0.6	0.42	0.39	0.32	0.39	0.36	0.38	0.32
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		100	120	91	130	71	160	88	110	97	120	96	130	86
Dissolved Chloride (Cl)	mg/L	250**	8	18	17	21	16	18	11	26	71	45	36	38	40
Dissolved Iron (Fe)	mg/L	0.3**	0.5	0.85	0.24	2.0	0.3	0.4	<0.10	4.2	1.5	1.7	1.9	1.8	0.3
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		35	51	24	43	22	56	42	42	32	46	30	43	26
Dissolved Organic Carbon	mg/L	5**	5.5	4.1	10.5	6.7	10	6.6	9.1	7.5	8.7	7.0	13.0	9.2	12
Dissolved Potassium (K)	mg/L		1.7	1.4	2.9	2.5	3.1	2.7	3.3	2.6	3.0	3.2	4.8	3	3.6
Dissolved Sodium (Na)	mg/L	200**	41	48	41	73	61	110	65	66	65	70	52	55	110
Dissolved Sulphate (SO4)	mg/L	500**	92	210	160	330	110	360	160	220	210	360	100	300	230
Nitrate (N)	mg/L	10.0*	0.5	<0.10	1.4	<0.10	0.67	<0.10	0.42	0.1	1.4	0.24	<0.10	<0.10	0.72
pH	(pH units)	6.5-8.5	7.6	7.9	7.7	8.0	7.4	8.0	8.2	7.9	7.8	7.9	8.0	8.1	8.0
Total Ammonia-N	mg/L		<0.15	<0.15	0.24	0.66	0.22	<0.15	<0.15	<0.15	<0.15	0.25	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	408	492	572	884	482	958	542	402	578	952	540	818	760
Total Kjeldahl Nitrogen (TKN)	mg/L		3	<0.7	2.5	7	2.8	0.8	1.9	<0.7	<1 (1)	<0.7	0.8	<0.7	2.7
Ion Percentage	%		27.7	11.7	6.4	1.7	6.5	6.5	10.8	8.5	5.4	3.4	10.8	3.8	4.6

Parameter	Units	ODWQS	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4
Date			8-May-18	12-Nov-18	13-May-19	7-Nov-19	6-May-20	3-Nov-20	20-May-21	2-Nov-21	5-May-22	1-Nov-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	340	290	370	300	230	290	250	300	400	240
Conductivity	umho/cm		1300	770	970	840	600	880	690	780	1500	880
Dissolved Barium (Ba)	mg/L	1*	0.059	0.023	0.051	0.037	0.048	0.038	0.043	0.037	0.019	0.048
Dissolved Boron (B)	mg/L	5.0*	0.37	0.12	0.29	0.26	0.25	0.32	0.17	0.21	0.68	0.21
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	37	110	67	98	82	88	58	150	89
Dissolved Chloride (Cl)	mg/L	250**	31	15	15	12	8.1	14	12	18	23	60
Dissolved Iron (Fe)	mg/L	0.3**	2.5	<0.1	0.1	<0.1	3.8	0.2	11	0.2	0.5	0.7
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		44	12	36	21	33	24	28	17	110	24
Dissolved Organic Carbon	mg/L	5**	6.8	9	7	11	7.1	10	10	13	2.4	12
Dissolved Potassium (K)	mg/L		2.3	2.1	2.1	2.4	1.9	2.3	2.3	4.4	4.3	2.2
Dissolved Sodium (Na)	mg/L	200**	73	53	83	85	57	66	59	95	64	62
Dissolved Sulphate (SO4)	mg/L	500**	310	130	150	130	71	160	95	92	430	140
Nitrate (N)	mg/L	10.0*	0.29	0.74	0.46	0.37	0.62	1.05	1.21	0.78	0.20	0.16
pH	(pH units)	6.5-8.5	7.9	7.9	7.8	8.0	7.9	7.8	8.0	8.2	8.0	8.0
Total Ammonia-N	mg/L		0.25	0.21	<0.15	0.23	<0.15	<0.15	0.574	0.23	0.63	<0.15
Total Dissolved Solids	mg/L	500	770	500	610	495	465	615	350	495	1010	625
Total Kjeldahl Nitrogen (TKN)	mg/L		3.7	<0.7	<0.7	2.0	<0.7	2.7	<2	1.2	1.0	<0.7
Ion Percentage	%		1.9	20.2	12.0	5.5	30.4	3.3	19.0	8.0	9.3	3.9

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11
Date			2-Dec-99	19-Jun-00	28-Nov-01	22-May-02	7-Nov-02	15-May-03	16-Jun-03	13-Nov-03	26-May-04	27-Nov-04	12-May-05	30-Nov-05	19-May-06
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	383	384	386	376	427	385	374	372	379	371	348	371	342
Dissolved Boron (B)	mg/L	5.0*	0.95	1.00	0.70	1.17	0.85	0.81	0.77	1.00	1.33	0.89	1.12	1.00	0.93
Dissolved Calcium (Ca)	mg/L		91	95	84	90	75	30	19	85	71	76	94	85	83
Dissolved Chloride (Cl)	mg/L	250**	7	5	8	6	9	34	41	9	25	19	27	12	21
Dissolved Iron (Fe)	mg/L	0.3**	1.77	2.46	<0.01	0.68	0.36	0.13	0.07	2.24	0.65	<0.01	1.25	1.85	0.05
Dissolved Magnesium (Mg)	mg/L		120	120	101	117	98	38	20	116	81	96	100	102	88
Dissolved Organic Carbon	mg/L	5**	2.4	1.8	176	1.0	3.4	3.4	3.5	1.2	2.8	2.1	2.2	1.6	2.7
Dissolved Potassium (K)	mg/L		4	4	5	4	7	3	2	5	3	3	3	3	2
Dissolved Sodium (Na)	mg/L	200**	120	116	124	111	136	397	423	158	286	239	228	139	160
Dissolved Sulphate (SO4)	mg/L	500**	559	531	502	539	446	809	591	581	690	645	707	544	534
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	1.27	0.92	<0.10	0.36	0.28	0.17	<0.10	0.37
Nitrite (N)	mg/L	1.0*	<0.10	<0.10											
NO3+NO2	mg/L	10.0*		<0.10											
Total Ammonia-N	mg/L		0.40	0.52	0.26	0.63	5.05	0.87	0.91	0.66	0.60	0.11	0.41	0.63	0.08
Total Kjeldahl Nitrogen (TKN)	mg/L		0.60	0.82	0.33	0.66	6.56	1.11	1.20	0.72	0.79	0.24	0.50	0.79	0.22
Ion Percentage	%		4.2	6.1	2.9	4.0	4.0	5.1	3.2	5.8	3.0	4.8	3.7	2.7	2.9

Parameter	Units	ODWQS	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11
Date			24-Nov-06	4-May-07	16-Nov-07	22-May-08	5-Nov-08	19-May-09	18-Nov-09	19-May-10	22-Nov-10	12-May-11	2-Nov-11	9-May-12	6-Nov-12
Laboratory			Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	334	340	414	415	393	373	369	359	364	374	352	390	390
Conductivity	umho/cm		1830			1570	1510	1510	1530	1590	1570	1590	1530	1600	1600
Dissolved Barium (Ba)	mg/L	1*	0.01			0.02	0.018	0.018	0.016	0.018	0.016	0.018	0.018	0.017	0.017
Dissolved Boron (B)	mg/L	5.0*	1.17	1.00	1.01	1	0.96	0.99	1.0	0.99	0.92	0.92	0.93	0.8	0.84
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		80	91	76	88	83	87	89	86	87	95	88	96	92
Dissolved Chloride (Cl)	mg/L	250**	23	24	23	16	11	9	11	19	14	30	24	30	24
Dissolved Iron (Fe)	mg/L	0.3**	0.07	0.33	0.11	<0.1	0.2	0.4	0.7	1.8	0.9	0.9	0.6	0.65	1.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		86	92	79	100	89	100	110	100	110	110	98	110	100
Dissolved Organic Carbon	mg/L	5**	2.7	3.6	5.6	2.7	2.2	3.2	2.1	2.4	2.2	2.5	2.6	2.3	2.4
Dissolved Potassium (K)	mg/L		2	2	3	3.4	2.8	3.1	3.1	2.8	2.8	2.8	2.7	2.8	2.8
Dissolved Sodium (Na)	mg/L	200**	158	150	126	150	110	120	120	120	110	110	100	110	110
Dissolved Sulphate (SO4)	mg/L	500**	534	533	455	446	443	450	470	500	460	550	430	430	400
Nitrate (N)	mg/L	10.0*	0.46	0.31	<0.10	<0.1	<0.1	0.8	0.5	0.1	0.5	0.2	0.5	0.19	0.35
pH	(pH units)	6.5-8.5	8.2			8.2	8.0	8.0	8.2	8.0	7.9	7.7	7.6	7.9	7.8
Total Ammonia-N	mg/L		0.26	0.55	7.31	3.07	1.79	0.50	0.58	0.76	0.53	0.64	0.34	0.53	0.61
Total Dissolved Solids	mg/L	500	1090			1000	970	955	980	1020	962	974	988	1110	1170
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	0.71	8.26	4	2.1	<4	<4	1.2	0.8	2	<0.7	0.9	1.0
Ion Percentage	%		2.0	3.6	3.2	7.5	1.1	6.3	7.6	2.8	6.7	3.5	0.2	2.8	2.2

Parameter	Units	ODWQS	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11
Date			9-May-13	6-Nov-13	6-May-14	24-Nov-14	12-May-15	12-Nov-15	25-May-16	16-Nov-16	17-May-17	7-Nov-17	8-May-18	12-Nov-18	13-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	390	410	400	400	400	380	400	400	410	420		420	410
Conductivity	umho/cm		1600	1500	1600	1600	1200	1600	1600	1600	1700	1600	1800	1600	1600
Dissolved Barium (Ba)	mg/L	1*	0.019	0.018	0.0	0.019	0.02	0.017	0.018	0.024	0.023	0.018	0.023	0.021	0.021
Dissolved Boron (B)	mg/L	5.0*	0.61	0.64	0.6	0.67	0.59	0.63	0.60	0.62	0.47	0.53	0.56	0.46	0.5
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		110	110	120	120	120	110	120	120	140	120	160	150	150
Dissolved Chloride (Cl)	mg/L	250**	34	33	33	34	33	32	38	35	41	37	38	34	33
Dissolved Iron (Fe)	mg/L	0.3**	1.4	1	1.0	0.69	0.37	<0.10	0.10	0.40	0.70	0.2	0.4	0.7	1.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		110	110	120	120	130	120	120	120	110	110	130	110	110
Dissolved Organic Carbon	mg/L	5**	3.0	2.6	2.5	3.1	2.6	2.7	2.8	2.7	2.6	3.4	2.8	3.1	3
Dissolved Potassium (K)	mg/L		2.8	2.8	2.8	3.3	3.3	3.1	3.3	3.8	3.9	4	4.3	4.1	4.2
Dissolved Sodium (Na)	mg/L	200**	90	89	89	88	89	89	83	80	63	73	66	57	57
Dissolved Sulphate (SO4)	mg/L	500**	430	410	420	430	440	440	460	410	470	430	450	430	430
Nitrate (N)	mg/L	10.0*	0.30	0.30	0.6	0.5	0.35	0.90	0.24	<0.10	0.60	<0.10	0.52	<0.10	0.23
pH	(pH units)	6.5-8.5	8.0	7.3	8.0	8.0	7.9	7.9	7.9	7.8	7.9	7.9	7.9	7.8	7.9
Total Ammonia-N	mg/L		0.83	0.82	0.6	0.82	0.84	0.69	0.98	2.42	0.84	1.73	0.97	1.03	0.78
Total Dissolved Solids	mg/L	500	1100	1040	1080	1090	1180	1080	1220	1130	1210	1120	1230	1100	1130
Total Kjeldahl Nitrogen (TKN)	mg/L		1.1	1.1	1.0	1.5	1	0.8	1.1	2.6	1	1.8	1.2	1	1.1
Ion Percentage	%		6.5	6.7	10.0	9.2	10.8	8.5	6.5	9.6	3.4	4.2		6.6	7.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11
Date			7-Nov-19	6-May-20	3-Nov-20	18-May-21	2-Nov-21	3-May-22	1-Nov-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	420	410	410	400	420	410	420
Conductivity	umho/cm		1500	1500	1500	1500	1500	1500	1500
Dissolved Barium (Ba)	mg/L	1*	0.0	0.0	0.018	0.019	0.022	0.019	0.019
Dissolved Boron (B)	mg/L	5.0*	0.5	0.5	0.56	0.51	0.53	0.47	0.58
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		140	150	140	140	150	150	140
Dissolved Chloride (Cl)	mg/L	250**	33	32	32	24	31	30	25
Dissolved Iron (Fe)	mg/L	0.3**	0.4	0.6	0.2	0.7	3.0	0.8	0.3
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		110	110	100	100	100	110	100
Dissolved Organic Carbon	mg/L	5**	2.8	2.8	3.2	2.8	2.8	2.8	2.8
Dissolved Potassium (K)	mg/L		4.3	4.6	4.3	4.5	4.3	4.3	4.4
Dissolved Sodium (Na)	mg/L	200**	59	56	57	53	54	53	57
Dissolved Sulphate (SO4)	mg/L	500**	390	410	400	410	410	430	430
Nitrate (N)	mg/L	10.0*	<0.10	0.3	0.43	0.14	<0.10	0.26	0.1
pH	(pH units)	6.5-8.5	7.8	7.9	7.8	8.1	8.0	7.9	7.9
Total Ammonia-N	mg/L		0.6	0.5	0.37	0.652	1.01	0.43	0.62
Total Dissolved Solids	mg/L	500	1030	1070	1050	1010	1010	1070	980
Total Kjeldahl Nitrogen (TKN)	mg/L		1.0	0.7	<0.7	0.8	1.3	<0.7	0.7
Ion Percentage	%		8.2	8.5	5.7	5.8	5.6	7.0	3.8

Parameter	Units	ODWQS	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5
Date			22-May-02	13-Jun-02	6-Nov-02	15-May-03	13-Nov-03	26-May-04	27-Nov-04	13-May-05	8-Dec-05	18-May-06	24-Nov-06	4-May-07	16-Nov-07
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	422	422	430	391	394	403	394	397	412	378	384	394	
Dissolved Boron (B)	mg/L	5.0*	0.14	0.24	0.11	0.09	0.12	0.08	0.08	0.06	0.08	0.06	0.09	0.07	
Dissolved Calcium (Ca)	mg/L		90	90	101	81	86	81	87	81	95	66	87	84	
Dissolved Chloride (Cl)	mg/L	250**	10	11	9	9	8	8	7	8	12	7	8	7	
Dissolved Iron (Fe)	mg/L	0.3**	0.03	<0.01	0.32	0.01	0.09	0.01	0.32	<0.01	0.03	<0.03	0.17	<0.03	
Dissolved Magnesium (Mg)	mg/L		65	64	64	68	67	66	69	62	66	52	62	64	
Dissolved Organic Carbon	mg/L	5**	3.3	3.2	3.1	2.4	1.9	2.2	2.3	1.9	2.5	2.4	2.0	2.4	
Dissolved Potassium (K)	mg/L		3	3	4	2	3	3	2	2	3	2	2	2	DRY
Dissolved Sodium (Na)	mg/L	200**	53	45	33	41	41	50	46	43	34	32	34	40	
Dissolved Sulphate (SO4)	mg/L	500**	171	181	153	214	165	174	154	142	175	124	148	138	
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.23	<0.10	<0.10	
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*													
Total Ammonia-N	mg/L		0.04	0.03	<0.02	<0.02	<0.02	0.02	<0.02	0.16	0.03	<0.02	<0.02	<0.02	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	0.20	0.38	0.06	0.14	0.17	<0.05	0.15	0.10	0.05	0.09	0.16	
Ion Percentage	%		6.9	4.0	6.7	2.0	7.6	6.2	10.6	7.2	4.9	0.8	7.2	8.8	

Parameter	Units	ODWQS	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5
Date			22-May-08	5-Nov-08	16-May-09	18-Nov-09	20-May-10	22-Nov-10	23-Dec-10	12-May-11	3-Nov-11	15-May-12	8-Nov-12	3-Dec-12	13-May-13
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	409	431	421	413	429		367	387	411	440			370
Conductivity	umho/cm		980	1020	998	997	1040		968	999	1020	1000			980
Dissolved Barium (Ba)	mg/L	1*	0.038	0.039	0.035	0.035	0.035		0.037	0.036	0.035	0.034			0.034
Dissolved Boron (B)	mg/L	5.0*	0.06	0.08	0.08	0.08	0.07		0.07	0.07	0.08	0.08			0.06
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001			<0.0001
Dissolved Calcium (Ca)	mg/L		85	79	86	88	82		84	87	91	83			87
Dissolved Chloride (Cl)	mg/L	250**	7	8	7	8	9		7	8	8	7			8
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	3.9	<0.1	1.5	<0.1		<0.1	<0.1	0.1	<0.10			<0.10
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005			<0.0005
Dissolved Magnesium (Mg)	mg/L		67	60	75	72	69	DRY	71	68	69	70	DRY	DRY	70
Dissolved Organic Carbon	mg/L	5**	2.3	2.3	3.4	2.8	2.1		2.8	2.8	3	2.6			9.5
Dissolved Potassium (K)	mg/L		2.4	2.3	2.2	2.4	1.9		2.4	2.1	2.6	2			2.3
Dissolved Sodium (Na)	mg/L	200**	46	46	51	51	51		48	41	47	49			41
Dissolved Sulphate (SO4)	mg/L	500**	158	146	150	150	160		140	160	150	150			160
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	0.1	<0.1		<0.1	<0.1	<0.1	<0.10			<0.10
pH	(pH units)	6.5-8.5	8.3	8	8.1	7.9	8.2		7.9	8.2	7.8	7.9			7.9
Total Ammonia-N	mg/L		<0.15	0.19	<0.15	<0.15	<0.15		<0.15	<0.15	<0.15	<0.15			<0.15
Total Dissolved Solids	mg/L	500	641	645	640	660	646		636	616	628	604			620
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7		<0.7	<0.7	<0.7	<0.7			<0.7
Ion Percentage	%		7.9	3.4	11.5	11.4	6.8		14.8	2.0	3.2	0.4			4.4

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5
Date			5-Nov-13	6-May-14	24-Nov-14	13-May-15	12-Nov-15	25-May-16	16-May-17	8-Nov-17	8-May-18	14-Nov-18	14-May-19	5-Nov-19	7-May-20
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	410	420	440	430	430	420	420	460	470	460	460	460	470
Conductivity	umho/cm		1000	1000	1000	1000	1000	1000	1100	1100	1200	1100	1100	1100	1100
Dissolved Barium (Ba)	mg/L	1*	0.036	0.0	0.033	0.035	0.037	0.033	0.032	0.034	0.038	0.035	0.035	0.035	0.032
Dissolved Boron (B)	mg/L	5.0*	0.089	0.1	0.08	0.04	0.09	0.07	0.07	0.09	0.08	0.09	0.07	0.09	0.08
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		94	83	80	77	90	81	79	91	91	98	97	95	98
Dissolved Chloride (Cl)	mg/L	250**	7	8	8	8	8.1	7.4	7.8	8.1	8	8	8.5	7.8	8.6
Dissolved Iron (Fe)	mg/L	0.3**	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	0.1	<0.1	0.4	<0.1	0.2	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		77	72	70	68	77	70	69	73	77	78	79	74	77
Dissolved Organic Carbon	mg/L	5**	6.1	4.8	4.2	2.4	3.3	2.5	2.9	3.3	2.8	3	2.7	4.8	2.7
Dissolved Potassium (K)	mg/L		2.7	1.8	2.2	1.7	2.3	2.0	1.9	2.2	1.8	2.3	1.7	2.4	2.0
Dissolved Sodium (Na)	mg/L	200**	45	50.0	47	45	50	41	40	40	43	41	42	35	38
Dissolved Sulphate (SO4)	mg/L	500**	160	150	150	150	160	160	180	170	180	190	180	180	180
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.0	8.0	8.1	8.1	7.9	8.0	8.0	7.9	8.0	7.8	7.9	7.8	8.0
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	588	576	598	618	634	656	602	690	580	660	650	660	660
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		12.5	9.7	6.3	5.3	10.9	6.0	3.0	4.9	5.1	6.3	7.3	4.3	5.6

Parameter	Units	ODWQS	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5
Date			4-Nov-20	20-May-21	2-Nov-21	4-May-22	2-Nov-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	460	470	470	480	480
Conductivity	umho/cm		1100	1100	1100	1100	1100
Dissolved Barium (Ba)	mg/L	1*	0.033	0.034	0.034	0.035	0.037
Dissolved Boron (B)	mg/L	5.0*	0.09	0.08	0.09	0.08	0.1
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		100	100	100	110	110
Dissolved Chloride (Cl)	mg/L	250**	8.6	9.1	8.5	9.9	9.8
Dissolved Iron (Fe)	mg/L	0.3**	0.2	<0.1	0.2	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		82	84	79	85	81
Dissolved Organic Carbon	mg/L	5**	3	2.8	2.6	2.6	2.9
Dissolved Potassium (K)	mg/L		2.5	2.1	2.5	1.9	2.6
Dissolved Sodium (Na)	mg/L	200**	38	39	36	39	36
Dissolved Sulphate (SO4)	mg/L	500**	180	180	180	180	180
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.9	8.0	8.0	8.0	7.75
Total Ammonia-N	mg/L		<0.15	<0.050	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	660	615	655	590	590
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.1	<0.7	<0.7	<0.7
Ion Percentage	%		8.2	8.2	6.3	9.5	7.9

Parameter	Units	ODWQS	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5
Date			23-May-02	13-Jun-02	6-Nov-02	15-May-03	13-Nov-03	26-May-04	27-Nov-04	13-May-05	29-Nov-05	19-May-06	24-Nov-06	5-May-07	16-Nov-07
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (Total as CaCO3)	mg/L	30-500***	461	468	517	467	509	509	594	554	558	519	562	540	599
Dissolved Boron (B)	mg/L	5.0*	1.25	1.15	0.96	0.96	0.98	0.71	0.79	0.93	1	1	1	1	1
Dissolved Chloride (Cl)	mg/L	250**	9	9	9	8	7	8	8	9	9	8	8	10	8
Dissolved Sulphate (SO4)	mg/L	500**	3840	5100	3870		3630	3690	4570	3700	3520	3500	3770	3540	3730
Dissolved Calcium (Ca)	mg/L		444	441	412	531	451	447	546	452	440	455	451	493	477
Dissolved Magnesium (Mg)	mg/L		641	574	603	660	689	622	790	654	616	618	651	680	678
Dissolved Potassium (K)	mg/L		8	8	15	7	14	10	9	7	7	6	7	7	7
Dissolved Sodium (Na)	mg/L	200**	322	348	327	328	297	288	384	298	284	251	286	291	331
Dissolved Iron (Fe)	mg/L	0.3**	2.14	1.55	6.20	1.85	5.67	2.23	3.73	1.26	3.12	1.66	3.17	0.7	3.98
Total Ammonia-N	mg/L		0.19	0.16	0.11	0.12	0.19	0.29	0.08	0.13	0.12	0.08	0.15	0.13	0.14
Total Kjeldahl Nitrogen (TKN)	mg/L		0.45	0.29	0.30	0.33	0.24	0.82	0.23	0.23	0.28	0.66	0.20	0.57	0.29
Nitrite (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrate (N)	mg/L	10.0*													
NO3+NO2	mg/L	5**	6.0	4.7	3.1	3.4	1.9	3.6	2.7	2.7	3.0	3.2	2.3	2.6	3.1
Dissolved Organic Carbon	mg/L	5.0*	1.25	1.15	0.96	0.96	0.98	0.71	0.79	0.93	1.00	0.68	1.29	1.0	0.91
Ion Percentage	%		0.3	15.3	3.0		4.3	0.1	1.5	1.4	1.1	1.4	0.0	5.6	3.1

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5
Date			22-May-08	5-Nov-08	16-May-09	11-Jun-09	19-Nov-09	19-May-10	23-Nov-10	10-May-11	2-Nov-11	10-May-12	6-Nov-12	13-May-13	5-Nov-13
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	520	552	556	571	657	648	665	626	674	670	670	610	680
Conductivity	umho/cm		5680	5680	5650	5710	5900	5880	6000	5820	5870	5900	5900	5700	5800
Dissolved Barium (Ba)	mg/L	1*	0.009	0.01	<0.03	0.009	0.01	<0.05	0.010	0.008	0.01	0.008	<0.03	0.008	0.0086
Dissolved Boron (B)	mg/L	5.0*	1	1	1.1	1	1.1	0.9	1.0	0.87	1.0	0.94	1.1	0.76	1.1
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.00010
Dissolved Calcium (Ca)	mg/L		480	460	490	470	480	460	460	470	500	470	430	470	490
Dissolved Chloride (Cl)	mg/L	250**	8	9	9	9	9	9	9	9	9	9	8	9	9
Dissolved Iron (Fe)	mg/L	0.3**	0.7	3.4	1.7	2.2	2.7	2.0	2.7	0.3	3.5	2.0	4.4	0.54	<0.10
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.003	<0.0005	<0.0005	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.0005	<0.00050
Dissolved Magnesium (Mg)	mg/L		630	580	700	590	670	700	710	660	710	750	630	740	640
Dissolved Organic Carbon	mg/L	5**	1.7	2.3	2.9	2.6	2.0	1.6	2.1	2.1	2.1	1.7	2.0	2.2	9.3
Dissolved Potassium (K)	mg/L		7.4	7.3	7.3	7.4	7.5	6	6.9	6.5	8.3	6.8	6.4	6.2	7.6
Dissolved Sodium (Na)	mg/L	200**	320	270	310	310	340	310	300	320	330	320	280	260	320
Dissolved Sulphate (SO4)	mg/L	500**	3820	3830	3700	3700	3900	3900	3800	3800	3700	3700	3600	3700	3600
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	7.7	7.7	7.7	7.6	7.6	7.4	7.8	7.3	7.4	7.2	7.4	7.1
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.15
Total Dissolved Solids	mg/L	500	3520	3800	3550	3440	3700	3610	3520	3440	4900	6030	6460	5990	5950
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		0.5	4.2	4.7	1.0	0.6	0.7	2.0	0.6	3.3	4.1	2.2	2.9	0.8

Parameter	Units	ODWQS	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5
Date			6-May-14	24-Nov-14	17-Dec-14	12-May-15	18-Jun-15	12-Nov-15	27-May-16	16-Nov-16	19-May-17	8-Nov-17	10-May-18	13-Nov-18	14-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	630	660	630	660	650	620	590	630	600	650	690	680	670
Conductivity	umho/cm		5000	5600	5600	4000	4600	5300	5400	5500	5600	5600	5800	5300	5600
Dissolved Barium (Ba)	mg/L	1*	0.008	0.011	0.011	0.009	0.009	0.010	0.008	0.008	0.007	0.009	<0.03	0.009	0.008
Dissolved Boron (B)	mg/L	5.0*	0.98	1.2	1.3	1.1	1.0	1	1.1	1.1	1.1	1.1	1	1.1	0.91
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		480	450	480	490	460	470	440	450	450	470	480	490	500
Dissolved Chloride (Cl)	mg/L	250**	9	9	10	10	12	11	10	11	10	11	10	11	11
Dissolved Iron (Fe)	mg/L	0.3**	8.2	4.1	6.1	1.9	7.3	6.9	4.0	3.3	2.2	5.1	4.6	4.3	4.4
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		690	620	610	690	600	560	570	580	580	580	620	630	680
Dissolved Organic Carbon	mg/L	5**	2.8	3.4	2.5	8.2	3	2.7	2.4	2.5	2.2	2.3	2.3	2.5	2.4
Dissolved Potassium (K)	mg/L		6.2	6.8	7.0	7.4	6.0	6.6	6.2	6.7	6.6	6.7	6	6.8	6.1
Dissolved Sodium (Na)	mg/L	200**	290	270	290	320	270	270	260	290	270	280	280	290	290
Dissolved Sulphate (SO4)	mg/L	500**	3100	3500	3600	3100	2900	3300	3400	3400	3600	3400	3500	3600	3600
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.6	7.6	7.5	7.7	7.6	7.4	7.5	7.5	7.4	7.5	7.5	7.4	7.4
Total Ammonia-N	mg/L		<0.15	0.19	0.2	<0.15	0.22	0.29	0.21	0.27	0.16	0.21	0.2	0.33	0.19
Total Dissolved Solids	mg/L	500	5330	5770	5820	5390	5320	5350	5570	5520	5650	5690	5550	5730	6150
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.9	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		10.5	0.5	0.4	11.2	7.9	1.0	0.6	0.6	2.2	0.7	1.3	1.1	3.8

Parameter	Units	ODWQS	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5
Date			5-Nov-19	8-May-20	3-Nov-20	20-May-21	3-Nov-21	5-May-22	2-Nov-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	700	730	720	690	720	710	720
Conductivity	umho/cm		5700	5800	5800	5800	5800	5800	5800
Dissolved Barium (Ba)	mg/L	1*	0.009	<0.03	0.009	<0.03	0.009	0.007	0.009
Dissolved Boron (B)	mg/L	5.0*	0.83	0.9	1.1	1.0	0.9	0.94	1.1
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0005	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		450	450	460	460	470	500	460
Dissolved Chloride (Cl)	mg/L	250**	10	11	11	11	11	12	11
Dissolved Iron (Fe)	mg/L	0.3**	2.2	3.1	3.2	3.5	3.4	3.3	3.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		620	630	620	660	640	640	650
Dissolved Organic Carbon	mg/L	5**	2.8	2.6	2.8	2.3	2.7	2.8	3
Dissolved Potassium (K)	mg/L		6.2	6.0	6.8	6.0	6.7	5.9	6.6
Dissolved Sodium (Na)	mg/L	200**	270	280	290	290	290	300	290
Dissolved Sulphate (SO4)	mg/L	500**	3100	3300	3600	3800	3700	3500	3700
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.3	7.5	7.4	7.5	7.7	7.7	7.36
Total Ammonia-N	mg/L		0.36	0.15	0.16	0.162	0.15	<0.15	0.17
Total Dissolved Solids	mg/L	500	5690	5590	6160	5440	5430	5780	4950
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	0.3	0.9	0.9	0.9
Ion Percentage	%		5.3	3.0	0.5	0.8	0.5	3.0	0.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70A-5
Date			22-May-02	13-Jun-02	7-Nov-02	14-May-03	13-Nov-03	26-May-04	27-Nov-04	13-May-05	29-Nov-05	19-May-06	24-Nov-06	4-May-07	15-Nov-07
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	
Alkalinity (Total as CaCO3)	mg/L	30-500***	533	532	549	563	564	569	565	574	573	579	564	571	
Dissolved Boron (B)	mg/L	5.0*	0.64	0.72	0.38	0.31	0.47	0.29	0.41	0.58	0.40	0.37	0.57	0.42	
Dissolved Calcium (Ca)	mg/L		230	228	180	213	209	234	265	269	241	199	217	239	
Dissolved Chloride (Cl)	mg/L	250**	5	6	6	6	3	5	5	5	5	6	5	5	
Dissolved Iron (Fe)	mg/L	0.3**	1.32	<0.01	0.74	0.25	1.79	1.68	1.7	1.8	0.49	0.93	1.37	0.66	
Dissolved Magnesium (Mg)	mg/L		383	358	257	320	349	319	268	343	315	321	318	320	
Dissolved Organic Carbon	mg/L	5**	4.8	3.7	3.1	3.3	2.5	2.3	2.9	2.4	2.8	2.8	2.6	3.1	
Dissolved Potassium (K)	mg/L		6	6	7	5	8	6	5	5	5	4	5	4	
Dissolved Sodium (Na)	mg/L	200**	143	129	120	111	123	129	123	126	113	103	114	111	
Dissolved Sulphate (SO4)	mg/L	500**	1660	1630	1220	1900	1460	1480	1510	1500	1590	1510	1570	1430	
Nitrate (N)	mg/L	10.0*	<0.10	0.04	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Nitrite (N)	mg/L	1.0*													
NO3+NO2	mg/L	10.0*													
Total Ammonia-N	mg/L		0.08	0.04	0.03	0.07	0.08	0.05	0.02	0.20	<0.02	<0.02	0.02	0.03	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.24	0.13	0.17	<0.05	1.96	0.13	0.07	0.26	0.20	0.20	0.10	<0.05	
Ion Percentage	%		6.1	4.0	1.2	8.0	5.7	3.9	0.3	7.2	0.2	0.4	0.2	4.6	

COMPROMISED DURING CONSTRUCTION ACTIVITIES

Parameter	Units	ODWQS	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5
Date			22-May-08	5-Nov-08	14-May-09	19-Nov-09	20-May-10	17-Nov-10	12-May-11	2-Nov-11	9-May-12	6-Nov-12	9-May-13	6-Nov-13	6-May-14
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***			498	547	542	552	566	573	590	590	590	610	600
Conductivity	umho/cm				2750	2620	2470	2310	2250	2130	2200	2200	2100	2100	2100
Dissolved Barium (Ba)	mg/L	1*			0.020	0.020	0.016	0.019	0.017	0.019	0.016	0.017	0.014	0.016	0.013
Dissolved Boron (B)	mg/L	5.0*			0.70	0.66	0.56	0.50	0.52	0.58	0.46	0.54	0.40	0.55	0.49
Dissolved Cadmium (Cd)	mg/L	0.005*			<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001
Dissolved Calcium (Ca)	mg/L				190	160	160	130	140	140	130	130	120	130	130
Dissolved Chloride (Cl)	mg/L	250**			7	6	6	6	5	6	5	5	5	6	5
Dissolved Iron (Fe)	mg/L	0.3**			1.6	1.8	<0.1	<0.1	1.0	1.9	0.3	2.6	<0.10	3.5	2.1
Dissolved Lead (Pb)	mg/L	0.01*			<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005
Dissolved Magnesium (Mg)	mg/L		DRY	DRY	280	280	270	230	240	210	240	220	220	220	230
Dissolved Organic Carbon	mg/L	5**			7.4	5.9	3.4	3.4	3.1	3.5	2.9	2.8	3.8	3	3.3
Dissolved Potassium (K)	mg/L				8.3	8.2	6.9	6.4	6.0	5.8	5.6	5.7	4.9	5.5	5
Dissolved Sodium (Na)	mg/L	200**			100	100	98	85	87	81	93	87	82	89	92
Dissolved Sulphate (SO4)	mg/L	500**			1300	1200	1000	840	780	700	740	670	740	660	690
Nitrate (N)	mg/L	10.0*			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5			7.8	7.8	8.1	7.7	8.1	7.2	7.9	7.5	8.0	7.3	8.0
Total Ammonia-N	mg/L				<0.15	0.2	<0.15	<0.15	<0.15	<0.15	<0.15	0.18	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500			1750	1700	1590	1440	1340	1470	1660	1650	1650	1620	1550
Total Kjeldahl Nitrogen (TKN)	mg/L				<4	<7	2.0	<0.7	<0.7	<0.7	<0.7	0.8	<0.7	<0.7	<0.7
Ion Percentage	%				2.1	1.9	7.3	4.6	8.9	7.4	9.4	9.2	4.9	9.0	9.7

Parameter	Units	ODWQS	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5
Date			19-Nov-14	12-May-15	12-Nov-15	25-May-16	14-Nov-16	17-May-17	8-Nov-17	8-May-18	12-Nov-18	13-May-19	7-Nov-19	6-May-20	4-Nov-20
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	610	590	600	600	620	600	630	620	610	590	620	610	610
Conductivity	umho/cm		2200	1600	2100	2100	2200	2100	2100	2200	2000	2100	2100	2100	2000
Dissolved Barium (Ba)	mg/L	1*	0.013	0.013	0.014	0.013	0.012	0.011	0.012	0.012	0.014	0.011	0.013	0.01	0.012
Dissolved Boron (B)	mg/L	5.0*	0.47	0.47	0.52	0.53	0.55	0.45	0.5	0.44	0.53	0.42	0.51	0.43	0.51
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		120	130	130	130	120	110	130	120	130	120	130	120	130
Dissolved Chloride (Cl)	mg/L	250**	6	6	5.6	5.9	6.3	6.8	6.3	6.1	6.2	6.3	6.4	6.4	6.8
Dissolved Iron (Fe)	mg/L	0.3**	0.66	1.80	2.10	1.90	2.10	0.50	1.6	<0.1	2.5	0.1	2.5	<0.1	0.8
Dissolved Lead (Pb)	mg/L	0.01*	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		220	220	230	230	220	200	210	200	210	200	210	210	220
Dissolved Organic Carbon	mg/L	5**	3.5	3.0	3.2	2.6	2.7	3.0	2.7	2.8	3	2.8	2.9	2.8	2.9
Dissolved Potassium (K)	mg/L		5.1	5.0	5.5	5.1	5.3	4.6	5.1	4.5	5.1	4.3	5.0	4.4	5.2
Dissolved Sodium (Na)	mg/L	200**	88	90	94	92	90	93	90	88	92	87	90	90	93
Dissolved Sulphate (SO4)	mg/L	500**	730	690	690	670	660	670	620	640	690	640	630	660	650
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.9	8.0	7.7	7.9	7.8	7.8	7.8	7.9	7.8	7.7	7.8	7.8	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1690	1550	1640	1570	1550	1580	1430	1470	1480	1500	1500	1480	1540
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		5.1	8.4	9.8	10.5	7.9	4.3	8.7	5.6	6.5	6.5	8.6	6.7	9.7

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW70B-5	OW70B-5	OW70B-5	OW70B-5
Date			18-May-21	2-Nov-21	5-May-22	1-Nov-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	600	630	610	650
Conductivity	umho/cm		2100	2000	2100	2000
Dissolved Barium (Ba)	mg/L	1*	0.011	0.012	0.011	0.012
Dissolved Boron (B)	mg/L	5.0*	0.43	0.46	0.42	0.51
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		110	120	120	130
Dissolved Chloride (Cl)	mg/L	250**	7.0	6.4	6.8	7.2
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	0.3	0.1	1.40
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		200	210	210	220
Dissolved Organic Carbon	mg/L	5**	2.7	2.6	2.7	2.7
Dissolved Potassium (K)	mg/L		4.3	4.9	4.1	5.2
Dissolved Sodium (Na)	mg/L	200**	90	88	92	94
Dissolved Sulphate (SO4)	mg/L	500**	620	650	630	590
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.8	7.9	8.0	7.9
Total Ammonia-N	mg/L		<0.050	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1300	1330	1390	1320
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.1	<0.7	<0.7	<0.7
Ion Percentage	%		6.3	6.3	8.1	11.1

Parameter	Units	ODWQS	OW71-5	OW71-5	OW71-5	OW71-5	OW71-5	OW71-5	OW71-5	OW71-5	OW71-5	OW71-5
Date			21-Jun-04	27-Nov-04	13-May-05	24-Nov-06	5-May-07	16-Nov-07	22-May-08	4-Nov-08	19-May-09	18-Nov-09	17-May-10
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	371	452	467	472	484	469	438	458	350	314	255
Dissolved Chloride (Cl)	mg/L	250**	11	<1	6	9	10	7	13	11	20	22	11
Dissolved Sulphate (SO4)	mg/L	500**	191	122	167	236	252	200	406	351	230	230	120
Dissolved Calcium (Ca)	mg/L		96	89	101	108	117	98	130	110	87	81	58
Dissolved Magnesium (Mg)	mg/L		67	77	78	79	77	75	86	75	50	42	27
Dissolved Potassium (K)	mg/L		7	5	5	4	4	4	4.3	4.6	3.2	3.4	2.2
Dissolved Sodium (Na)	mg/L	200**	30	30	34	57	86	47	82	70	84	85	50
Dissolved Iron (Fe)	mg/L	0.3**	0.29	2.71	<0.01	0.03	<0.03	<0.03	<0.1	0.1	0.1	1.1	0.5
Total Ammonia-N	mg/L		0.08	0.05	<0.02	0.02	0.06	0.04	<0.15	<0.15	<0.15	<0.15	1.00
Total Kjeldahl Nitrogen (TKN)	mg/L		0.64	0.16	0.12	0.09	0.13	<0.10	<0.7	<0.7	<4	<4	2.5
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	0.26	<0.10	<0.1	<0.1	<0.1	<0.1	0.7
Dissolved Organic Carbon	mg/L	5**	11.6	3.3	1.8	1.8	2.0	2.4	1.5	1.4	3.1	4.7	3.4
Dissolved Boron (B)	mg/L	5.0*	0.20	0.18	0.24	0.23	0.15	0.20	0.16	0.18	0.13	0.16	0.09
Conductivity	umho/cm								1500	1370	1080	1030	739
Total Dissolved Solids	mg/L	500							932	880	695	675	472
pH	(pH units)	6.5-8.5							8.0	8.0	7.6	8.0	8.2
Dissolved Barium (Ba)	mg/L	1*							0.039	0.034	0.031	0.031	0.024
Dissolved Cadmium (Cd)	mg/L	0.005*							<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Lead (Pb)	mg/L	0.01*							0.00	<0.0005	<0.0005	<0.0005	<0.0005
Ion Percentage	%		6.9	10.8	7.8	6.2	9.0	5.1	3.9	0.8	5.0	3.5	96.2

Parameter	Units	ODWQS	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5
Date			12-May-11	2-Nov-11	9-May-12	6-Nov-12	9-May-13	6-Nov-13	6-May-14	24-Nov-14	12-May-15	12-Nov-15	25-May-16	16-Nov-16	17-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	407	412	450	450	440	460	440	440	430	440	420	430	430
Conductivity	umho/cm		1130	998	1100	1000	1100	1100	1100	1100	870	1100	1100	1100	1200
Dissolved Barium (Ba)	mg/L	1*	0.044	0.066	0.083	0.092	0.093	0.096	0.094	0.092	0.095	0.095	0.091	0.100	0.087
Dissolved Boron (B)	mg/L	5.0*	0.14	0.17	0.13	0.16	0.12	0.13	0.12	0.16	0.13	0.14	0.15	0.15	0.12
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		100	100	95	90	97	97	100	93	100	99	95	100	99
Dissolved Chloride (Cl)	mg/L	250**	11	11	10	10	11	14	14	16	17	16	19	20	22
Dissolved Iron (Fe)	mg/L	0.3**	0.1	0.9	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		73	81	79	68	76	73	78	74	77	75	77	81	76
Dissolved Organic Carbon	mg/L	5**	3.9	3.3	2.3	2.4	3.0	2.5	2	3.1	3.6	2.3	2.3	2.5	2.4
Dissolved Potassium (K)	mg/L		4.7	4.5	3.5	3.3	2.8	3.1	2.6	2.9	2.7	2.9	2.6	3.0	2.4
Dissolved Sodium (Na)	mg/L	200**	51	46	38	31	29	42	42	38	39	35	37	42	35
Dissolved Sulphate (SO4)	mg/L	500**	210	140	130	110	160	170	180	170	180	170	190	180	210
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.0	7.1	7.9	7.6	8.0	7.2	8.0	7.9	7.9	7.8	7.9	7.9	7.9
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	690	680	578	652	666	648	486	640	688	652	716	656	698
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		8.4	16.5	11.8	8.0	7.3	5.8	8.4	5.8	8.0	6.8	6.2	9.3	3.4

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5
Date			7-Nov-17	9-May-18	12-Nov-18	13-May-19	7-Nov-19	6-May-20	3-Nov-20	19-May-21	2-Nov-21	5-May-22	1-Nov-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	440	430	450	430	470	440	460	430	460	430	480
Conductivity	umho/cm		1200	1200	1100	1200	1200	1300	1300	1300	1300	1300	1300
Dissolved Barium (Ba)	mg/L	1*	0.09	0.082	0.096	0.099	0.099	0.084	0.087	0.087	0.086	0.073	0.076
Dissolved Boron (B)	mg/L	5.0*	0.14	0.12	0.15	0.11	0.14	0.12	0.16	0.12	0.14	0.12	0.13
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		100	100	110	110	110	110	120	120	120	130	120
Dissolved Chloride (Cl)	mg/L	250**	22	24	26	27	26	27	28	29	29	30	32
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	0.2	4.5	0.1	1.6	0.1	3.5	0.3	1.7	0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		79	74	80	84	84	88	88	92	92	95	91
Dissolved Organic Carbon	mg/L	5**	2.5	2.8	3.6	2.9	4.9	3.0	4.4	3.3	3.2	3.6	3.8
Dissolved Potassium (K)	mg/L		2.7	2.4	3	2.3	2.9	2.5	2.8	2.6	2.9	2.7	2.7
Dissolved Sodium (Na)	mg/L	200**	38	37	39	35	39	36	37	40	41	41	39
Dissolved Sulphate (SO4)	mg/L	500**	190	210	210	230	190	240	230	280	270	300	270
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.8	7.9	7.8	7.9	7.7	7.8	7.7	7.8	8.0	8.1	7.9
Total Ammonia-N	mg/L		<0.15	<0.15	0.74	0.15	1.46	0.20	1.33	0.25	0.68	<0.15	0.98
Total Dissolved Solids	mg/L	500	690	675	675	750	745	775	830	730	805	810	665
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	0.8	<0.7	2.1	<0.7	2.1	0.4	1.0	<0.7	1.1
Ion Percentage	%		6.2	3.1	5.6	5.6	7.2	5.5	6.8	6.1	5.3	7.0	3.3

Parameter	Units	ODWQS	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6
Date			8-Dec-05	19-May-06	24-Nov-06	5-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	19-Nov-09	20-May-10	22-Nov-10	10-May-11	2-Nov-11
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	345	426	350	491	518	521	517	525	536	522	530	519	503
Conductivity	umho/cm							2960	2940	2930	2940	2910	2920	2890	2840
Dissolved Barium (Ba)	mg/L	1*						0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.009
Dissolved Boron (B)	mg/L	5.0*	0.45	0.42	0.73	0.65	0.67	0.68	0.65	0.65	0.69	0.68	0.66	0.59	0.74
Dissolved Cadmium (Cd)	mg/L	0.005*						<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		272	264	239	268	234	220	220	220	220	220	210	210	200
Dissolved Chloride (Cl)	mg/L	250**	10	5	5	4	4	4	4	4	4	5	4	4	5
Dissolved Iron (Fe)	mg/L	0.3**	0.02	0.85	3.60	3.53	3.07	0.5	2.1	<0.1	0.5	0.5	1.1	0.3	0.6
Dissolved Lead (Pb)	mg/L	0.01*						0.00	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		344	325	294	322	312	300	280	330	320	330	310	310	270
Dissolved Organic Carbon	mg/L	5**	6.0	6.6	6.4	5.7	5.2	3.9	3.8	4.5	4.1	3.7	4.2	3.7	4.5
Dissolved Potassium (K)	mg/L		12	8	6	6	6	5.8	5.9	5.7	5.8	5.8	5.7	5.4	5.3
Dissolved Sodium (Na)	mg/L	200**	123	115	110	114	108	110	110	120	120	120	120	120	100
Dissolved Sulphate (SO4)	mg/L	500**	1800	1720	1760	1590	1500	1480	1480	1400	1500	1400	1300	1300	1300
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
pH	(pH units)	6.5-8.5						8.1	7.9	7.9	7.7	8.1	7.7	8.0	7.1
Total Ammonia-N	mg/L		0.16	0.05	0.09	0.08	0.06	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500						1720	1900	1860	1880	1850	1810	1770	1880
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	0.24	0.38	0.24	<0.10	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		4.2	2.2	2.1	4.1	2.7	1.2	0.8	6.7	2.9	6.7	6.9	7.2	1.5

Parameter	Units	ODWQS	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6
Date			9-May-12	6-Nov-12	10-May-13	6-Nov-13	6-May-14	24-Nov-14	12-May-15	12-Nov-15	26-May-16	16-Nov-16	18-May-17	7-Nov-17	9-May-18
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	530	540	530	550	540	570	540	550	560	570	560	580	570
Conductivity	umho/cm		2900	2900	2800	2800	2900	3000	2200	2800	2900	2900	2900	2600	3000
Dissolved Barium (Ba)	mg/L	1*	0.01	0.009	0.009	0.008	0.009	0.008	0.009	0.01	0.009	0.009	0.009	0.01	0.009
Dissolved Boron (B)	mg/L	5.0*	0.71	0.69	0.72	0.71	0.66	0.69	0.66	0.71	0.69	0.73	0.7	0.69	0.73
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		210	210	210	210	210	190	200	210	210	200	200	210	210
Dissolved Chloride (Cl)	mg/L	250**	4	4	4	5	4	5	4	4.6	4.8	5.1	4.9	4.7	4.6
Dissolved Iron (Fe)	mg/L	0.3**	0.74	0.70	0.40	0.28	0.23	<0.10	0.24	0.29	0.30	0.30	0.30	3.1	1.2
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		330	290	300	300	300	290	300	310	310	310	280	290	320
Dissolved Organic Carbon	mg/L	5**	3.9	4.0	4.8	4	4.2	5.3	5.6	4.2	4.2	3.8	3.7	4.2	3.9
Dissolved Potassium (K)	mg/L		5.7	5.4	5.2	5.4	4.8	4.9	5.2	5.4	5.3	5.2	4.9	5.3	5.1
Dissolved Sodium (Na)	mg/L	200**	120	110	110	110	110	100	110	120	120	120	110	110	120
Dissolved Sulphate (SO4)	mg/L	500**	1300	1200	1300	1300	1200	1300	1200	1300	1300	1300	1300	1300	1300
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.8	7.5	7.9	7.0	7.9	7.9	7.9	7.6	7.9	7.7	7.7	7.7	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	2420	2590	2470	2410	2480	2480	2690	2420	2470	2610	2460	2290	2390
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		8.9	7.1	5.4	4.9	8.1	1.5	7.5	6.4	6.2	5.4	1.9	3.2	7.0

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6
Date			12-Nov-18	14-May-19	7-Nov-19	8-May-20	3-Nov-20	21-May-21	2-Nov-21	5-May-22	1-Nov-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	560	540	560	560	560	550	560	620	570
Conductivity	umho/cm		2700	2800	2900	3000	2800	2900	2700	2100	2800
Dissolved Barium (Ba)	mg/L	1*	0.009	0.008	0.009	0.007	0.01	0.007	0.009	0.011	0.008
Dissolved Boron (B)	mg/L	5.0*	0.73	0.63	0.71	0.58	0.74	0.62	0.67	0.43	0.7
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		210	210	200	200	200	200	200	110	210
Dissolved Chloride (Cl)	mg/L	250**	4.6	5.1	4.8	4.8	4.7	5.1	4.7	6.5	4.8
Dissolved Iron (Fe)	mg/L	0.3**	1.5	<0.1	0.9	<0.1	0.1	<0.1	<0.1	<0.1	0.2
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		300	290	290	290	280	280	290	200	300
Dissolved Organic Carbon	mg/L	5**	4.1	4	3.8	4.2	3.8	3.7	3.7	3.0	3.9
Dissolved Potassium (K)	mg/L		5.4	4.6	5.1	4.7	4.9	5	5.1	4.4	5.4
Dissolved Sodium (Na)	mg/L	200**	120	110	110	110	110	110	110	87	120
Dissolved Sulphate (SO4)	mg/L	500**	1300	1300	1200	1300	1200	1300	1300	620	1200
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	7.8	7.6	7.8	7.7	7.8	7.8	8.1	7.81
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.050	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	2290	2480	2470	2470	2530	2230	2350	1400	2230
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.1	<0.7	<0.7	<0.7
Ion Percentage	%		5.2	4.1	6.0	3.0	4.9	2.1	3.0	5.4	7.9

Parameter	Units	ODWQS	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10
Date			30-Nov-05	19-May-06	24-Nov-06	5-May-07	16-Nov-07	22-May-08	5-Nov-08	19-May-09	18-Nov-09	19-May-10	22-Nov-10	10-May-11	2-Nov-11
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	338	337	331	321	329	326	332	329	331	326	326	326	320
Conductivity	umho/cm							2270	2260	2250	2230	2220	2230	2230	2210
Dissolved Barium (Ba)	mg/L	1*						0.01	0.011	0.01	0.010	0.010	0.010	0.009	0.01
Dissolved Boron (B)	mg/L	5.0*	0.92	0.87	1.23	0.90	1.07	1.1	1.1	1.1	1.1	1.1	1.0	0.93	1.1
Dissolved Cadmium (Cd)	mg/L	0.005*						<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		204	212	200	201	195	190	180	190	190	180	190	180	190
Dissolved Chloride (Cl)	mg/L	250**	7	6	5	6	5	5	5	5	5	5	5	5	6
Dissolved Iron (Fe)	mg/L	0.3**	0.09	0.17	0.43	0.15	5.22	0.7	3.7	0.8	4.1	1.8	1.9	0.6	2.3
Dissolved Lead (Pb)	mg/L	0.01*						<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		187	186	186	186	175	190	170	190	190	170	180	180	190
Dissolved Organic Carbon	mg/L	5**	2.1	1.8	2.3	2.6	1.9	1.2	1.3	2.5	1.8	1.4	1.6	1.2	1.5
Dissolved Potassium (K)	mg/L		7	6	6	6	5	5.1	4.6	5.2	5.0	4.7	4.8	4.8	5.1
Dissolved Sodium (Na)	mg/L	200**	105	108	109	119	107	120	99	120	120	110	120	120	120
Dissolved Sulphate (SO4)	mg/L	500**	1130	1010	1180	1050	1080	1070	1100	1000	1100	1000	980	990	950
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	0.40	0.23	0.3	0.1	0.4	<0.1	0.4	0.1	0.2	0.2
pH	(pH units)	6.5-8.5						8	7.9	7.9	7.8	7.8	7.64	8.01	7.51
Total Ammonia-N	mg/L		0.51	0.47	0.33	0.18	0.48	0.15	0.49	0.18	0.4	<0.15	0.25	<0.15	<0.15
Total Dissolved Solids	mg/L	500						1270	1400	1390	1430	1410	1310	1350	1430
Total Kjeldahl Nitrogen (TKN)	mg/L		0.85	0.78	0.42	0.17	0.88	<4	<4	<4	<4	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		1.5	6.8	0.2	5.6	1.3	4.4	2.2	7.0	3.1	2.7	6.5	5.3	9.2

Parameter	Units	ODWQS	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10
Date			9-May-12	6-Nov-12	10-May-13	6-Nov-13	6-May-14	24-Nov-14	12-May-15	12-Nov-15	26-May-16	16-Nov-16	18-May-17	7-Nov-17	9-May-18
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Maxxam	MAXXAM	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L	30-500***	320	340	310	340	320	340	330	340	350	350	340	340	
Conductivity	umho/cm		2200	2300	2200	2300	2300	2400	1800	2400	2500	2500	2500	2300	2700
Dissolved Barium (Ba)	mg/L	1*	0.01	0.011	0.011	0.011	0.010	0.014	0.011	0.011	0.010	0.011	0.011	0.01	0.011
Dissolved Boron (B)	mg/L	5.0*	1.1	1.0	1.1	1.1	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1	1.2
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		180	170	190	180	190	200	190	200	190	200	190	200	210
Dissolved Chloride (Cl)	mg/L	250**	5	5	6	6	5	6	5	6	5.6	5.9	5.6	5.5	5.5
Dissolved Iron (Fe)	mg/L	0.3**	0.98	1.3	2.0	0.6	1.5	0.94	0.7	2.0	2.3	1.9	7.5	1.8	2.7
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.00050	<0.0005	0.0014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		180	160	170	180	170	180	180	190	190	200	180	190	230
Dissolved Organic Carbon	mg/L	5**	1.4	1.3	1.7	1.7	2.0	2.2	3.2	1.9	1.7	1.7	1.8	1.7	1.7
Dissolved Potassium (K)	mg/L		4.9	4.8	4.8	5.1	4.7	5	5.3	5.1	5.0	5.2	4.9	4.9	5.1
Dissolved Sodium (Na)	mg/L	200**	120	140	110	140	130	140	150	160	150	160	140	150	160
Dissolved Sulphate (SO4)	mg/L	500**	1000	940	930	1000	940	1100	1000	1100	1100	1100	1200	1100	1200
Nitrate (N)	mg/L	10.0*	0.24	0.21	0.39	0.21	0.43	0.31	0.26	0.36	0.13	0.34	0.39	0.56	0.28
pH	(pH units)	6.5-8.5	7.91	7.65	8.01	7.19	8.03	7.85	7.89	7.75	7.96	7.77	7.83	7.89	7.88
Total Ammonia-N	mg/L		<0.15	<0.15	0.22	0.37	<0.15	0.21	0.22	0.15	0.49	0.37	0.26	0.18	0.42
Total Dissolved Solids	mg/L	500	1940	1940	1870	1840	1830	1900	1950	1950	2060	1980	2020	2020	2080
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	0.9	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		5.0	4.6	6.9	5.8	7.7	3.7	7.7	6.3	4.6	7.3	0.6	5.7	

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10
Date			12-Nov-18	14-May-19	7-Nov-19	8-May-20	3-Nov-20	18-May-21	2-Nov-21	3-May-22	1-Nov-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	370	340	340	340	330	350	380	340	390
Conductivity	umho/cm		2600	2600	2600	2600	2500	2700	2600	2700	2700
Dissolved Barium (Ba)	mg/L	1*	0.010	0.011	0.010	0.011	0.01	0.01	0.009	0.010	0.01
Dissolved Boron (B)	mg/L	5.0*	1.0	1.1	1.1	1.0	1.2	1.1	1.1	1.2	1.1
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		210	230	210	220	220	230	230	240	240
Dissolved Chloride (Cl)	mg/L	250**	5.6	5.9	5.5	5.2	5.3	6.3	5.3	5.7	5.4
Dissolved Iron (Fe)	mg/L	0.3**	1.6	2.9	0.9	2.5	0.5	2.4	3.5	5.1	3.3
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		200	210	210	220	210	230	220	240	240
Dissolved Organic Carbon	mg/L	5**	1.7	1.9	1.8	3.2	1.9	1.5	1.6	1.5	1.8
Dissolved Potassium (K)	mg/L		5.0	4.8	5.1	5.0	5.3	5.3	5.1	5.1	5.3
Dissolved Sodium (Na)	mg/L	200**	140	150	150	150	150	150	140	150	140
Dissolved Sulphate (SO4)	mg/L	500**	1200	1200	1200	1200	1200	1300	1300	1300	1300
Nitrate (N)	mg/L	10.0*	0.32	0.27	0.38	0.33	0.5	0.34	<0.10	0.38	<0.10
pH	(pH units)	6.5-8.5	7.8	7.7	7.9	7.9	7.7	8.1	8.0	7.8	7.82
Total Ammonia-N	mg/L		0.23	0.47	0.38	0.18	0.44	0.189	0.44	0.46	0.15
Total Dissolved Solids	mg/L	500	2180	2320	2070	2210	2230	1850	2110	2210	1900
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	0.4	0.7	0.9	<0.7
Ion Percentage	%		2.8	6.8	5.4	7.3	6.4	5.5	3.1	7.5	5.8

Parameter	Units	ODWQS	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6
Date			30-Nov-05	19-May-06	24-Nov-06	5-May-07	16-Nov-07	22-May-08	5-Nov-08	16-May-09	11-Jun-09	19-Nov-09	19-May-10	22-Jun-10	22-Nov-10
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	329	499	673	542	482	451	452	416	419	427	402		414
Conductivity	umho/cm							5240	5140	5130	5190	5130	5120		5080
Dissolved Barium (Ba)	mg/L	1*						0.013	0.014	<0.03	0.014	0.012	<0.05		0.011
Dissolved Boron (B)	mg/L	5.0*	0.62	0.50	0.85	1.1	1.00	0.93	0.96	1.1	1	1	0.9		1.0
Dissolved Cadmium (Cd)	mg/L	0.005*						<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.001		<0.0001
Dissolved Calcium (Ca)	mg/L		416	474	446	516	459	470	450	470	470	480	450		440
Dissolved Chloride (Cl)	mg/L	250**	10	8	8	6	6	7	6	6	6	6	6		6
Dissolved Iron (Fe)	mg/L	0.3**	1.44	1.38	1.21	3.3	3.37	0.2	2.4	3.3	3.0	1.0	2.0		1.4
Dissolved Lead (Pb)	mg/L	0.01*						<0.0005	<0.0005	<0.003	<0.0005	<0.0005	<0.005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		371	500	419	526	538	480	540	630	560	580	600		540
Dissolved Organic Carbon	mg/L	5**	7.0	4.0	4.1	3.9	4.0	3	2.9	4.5	4.1	3.4	2.9		3.2
Dissolved Potassium (K)	mg/L		11	9	9	9	9	8.8	8.2	8.9	8.9	8.8	8		7.9
Dissolved Sodium (Na)	mg/L	200**	191	189	563	344	267	320	200	230	230	230	210		190
Dissolved Sulphate (SO4)	mg/L	500**	2810	2980	3340	3190	3320	3430	3510	3300	3500	3500	3500		3200
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	0.1	0.1	0.2	0.1		0.1
pH	(pH units)	6.5-8.5						7.7	7.8	7.6	7.8	7.7	7.8		7.6
Total Ammonia-N	mg/L		0.41	0.27	0.38	0.25	0.32	<0.15	0.22	<0.15	<0.15	<0.15	<0.15		<0.15
Total Dissolved Solids	mg/L	500						3210	3250	3200	3160	3250	3040		1510
Total Kjeldahl Nitrogen (TKN)	mg/L		1.12	0.75	0.53	0.42	0.42	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7		<0.7
Ion Percentage	%		3.9	1.6	0.0	5.1	0.8	1.7	3.5	5.7	0.5	0.7	0.5		0.4

Parameter	Units	ODWQS	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6
Date			10-May-11	2-Nov-11	9-May-12	6-Nov-12	10-May-13	5-Nov-13	6-May-14	24-Nov-14	12-May-15	12-Nov-15	26-May-16	16-Nov-16	18-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	393	400	400	400	390	410	400	410	390	400	400	410	400
Conductivity	umho/cm		5040	5020	5100	5000	4900	5000	5000	5200	3900	4900	5100	5100	5200
Dissolved Barium (Ba)	mg/L	1*	0.010	0.011	0.010	<0.03	0.011	0.009	0.0	0.008	0.009	0.009	0.009	0.009	0.009
Dissolved Boron (B)	mg/L	5.0*	0.83	1.1	0.96	1.0	1.1	0.99	1.0	1	0.9	0.96	1.0	1.1	1.0
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		460	480	460	430	490	490	480	430	470	470	460	470	440
Dissolved Chloride (Cl)	mg/L	250**	6	6	6	5	6	6	6.0	6	6	5.9	5.5	5.8	5.7
Dissolved Iron (Fe)	mg/L	0.3**	0.8	1.3	1.4	1.1	2.7	<0.10	2.6	0.25	0.44	2.8	3.3	3.2	3.3
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.003	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		580	640	630	540	540	530	630	510	540	600	550	550	590
Dissolved Organic Carbon	mg/L	5**	2.9	3.3	3.1	3.0	3.5	10	2.9	3.2	3.3	3.1	3.0	3.0	2.8
Dissolved Potassium (K)	mg/L		7.8	9	8.2	7.4	8.3	8.6	7.5	7.5	8.2	7.8	8.1	8.6	7.7
Dissolved Sodium (Na)	mg/L	200**	220	230	220	190	200	210	200	180	190	200	200	210	190
Dissolved Sulphate (SO4)	mg/L	500**	3200	3200	3400	3000	3200	3300	3400	3200	3200	3300	3300	3300	3400
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.14	0.15	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.9	7.0	7.8	7.4	7.9	7.2	7.8	7.8	7.8	7.6	7.9	7.8	8.0
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	2950	3360	6650	5350	5240	5160	3310	5340	5600	5130	5280	5290	5240
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	0.8	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		4.3	8.0	3.9	3.2	2.6	0.8	4.0	1.8	1.7	3.6	0.7	1.2	0.5

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.
5) OW73-6 resampled for lead on June 22, 2010 due to elevated lead reportable detection limit for May 19, 2010.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6
Date			7-Nov-17	10-May-18	12-Nov-18	14-May-19	6-Nov-19	8-May-20	3-Nov-20	21-May-21	3-Nov-21	5-May-22	1-Nov-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	30-500***	410	410	430	400	430	460	460	490	510	710	530
Conductivity	umho/cm		5100	5100	4500	4700	4800	4800	4700	4500	4400	5800	4400
Dissolved Barium (Ba)	mg/L	1*	0.009	<0.03	0.008	0.007	0.007	0.008	0.009	<0.03	0.008	<0.03	0.008
Dissolved Boron (B)	mg/L	5.0*	1.1	1.1	1	0.81	0.76	0.78	1	0.9	0.84	1.0	0.86
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0005	<0.0001
Dissolved Calcium (Ca)	mg/L		470	470	470	490	460	460	460	460	480	450	520
Dissolved Chloride (Cl)	mg/L	250**	6.1	5.5	6.4	6.2	5.8	6.3	6.5	7.3	8.6	12	8.2
Dissolved Iron (Fe)	mg/L	0.3**	2.6	2.7	1.2	0.1	0.8	0.5	1.9	<0.5	0.5	2.9	0.5
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.0005
Dissolved Magnesium (Mg)	mg/L		550	580	520	510	490	450	440	410	400	650	410
Dissolved Organic Carbon	mg/L	5**	3	3.1	3.1	2.6	3	3	2.6	2.7	3.1	2.8	3.7
Dissolved Potassium (K)	mg/L		7.9	8	7.9	7.0	7.2	7	7.7	7	7.4	6.0	8.1
Dissolved Sodium (Na)	mg/L	200**	190	200	190	200	190	220	220	230	250	280	260
Dissolved Sulphate (SO4)	mg/L	500**	3200	3300	3100	3000	2800	2800	2800	2800	2600	3600	2600
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	7.7	7.6	7.6	7.6	7.8	7.6	7.7	7.8	7.7	7.62
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	0.24	<0.15	<0.15	<0.050	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	4930	5000	4890	4850	4770	4730	4630	4030	3220	5720	3670
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.1	0.7	<0.7	<0.7
Ion Percentage	%		2.0	2.5	1.6	3.8	4.1	2.4	1.8	0.1	3.6	0.4	5.7

Parameter	Units	ODWQS	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9
Date			30-Nov-05	19-May-06	24-Nov-06	5-Jan-07	5-May-07	16-Nov-07	22-May-08	5-Nov-08	19-May-09	18-Nov-09	19-May-10	22-Nov-10	10-May-11
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Alkalinity (Total as CaCO3)	mg/L	30-500***	258	306	297	288	273	261	270	260	260	262	253	254	252
Conductivity	umho/cm								3610	3480	3510	3490	3480	3490	3480
Dissolved Barium (Ba)	mg/L	1*							0.007	0.006	0.006	0.006	0.007	0.006	0.006
Dissolved Boron (B)	mg/L	5.0*	0.96	1.02	1.54	0.28	1.07	1.29	1.2	1.1	1.2	1.2	1.2	1.2	1.0
Dissolved Cadmium (Cd)	mg/L	0.005*							<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		356	399	381	406	375	382	380	360	360	350	360	340	350
Dissolved Chloride (Cl)	mg/L	250**	9	9	9	8	8	9	8	8	8	8	8	8	8
Dissolved Iron (Fe)	mg/L	0.3**	0.85	4.66	5.00	8.15	9.71	6.33	6.2	1.7	1.7	1.2	5.2	0.7	0.6
Dissolved Lead (Pb)	mg/L	0.01*							<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		281	296	288	308	286	297	280	260	300	280	280	260	290
Dissolved Organic Carbon	mg/L	5**	2.1	2.5	1.3	2.4	2.0	2.0	1.4	1.4	3.3	1.9	1.6	1.9	1.4
Dissolved Potassium (K)	mg/L		7	6	6	6	6	6	5.8	5.8	6	5.8	5.9	5.6	5.8
Dissolved Sodium (Na)	mg/L	200**	186	181	185	185	192	186	170	160	190	180	180	170	190
Dissolved Sulphate (SO4)	mg/L	500**	2030	2210	2340	2290	2100	2180	2120	2240	2000	2100	1900	1900	2000
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10	0.12	0.36	0.4	0.4	0.4	0.4	0.5	0.2	0.4
pH	(pH units)	6.5-8.5							8.0	7.7	7.6	7.7	7.9	7.8	7.9
Total Ammonia-N	mg/L		0.70	0.61	0.62	0.67	0.54	0.25	0.19	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500							2280	2300	2170	2210	2200	2080	1970
Total Kjeldahl Nitrogen (TKN)	mg/L		1.26	0.89	0.59	0.68	0.63	0.29	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		2.1	0.6	3.2	0.7	1.9	1.4	0.4	5.2	4.7	0.2	5.0	1.8	3.5

Parameter	Units	ODWQS	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9
Date			2-Nov-11	9-May-12	6-Nov-12	10-May-13	6-Nov-13	6-May-14	24-Nov-14	12-May-15	12-Nov-15	26-May-16	16-Nov-16	18-May-17	7-Nov-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Maxxam	MAXXAM	Maxxam
Alkalinity (Total as CaCO3)	mg/L	30-500***	237	250	260	250	260	250	270	250	260	260	260	260	270
Conductivity	umho/cm		3400	3500	3500	3400	3500	3500	3700	2800	3600	3700	3700	3700	3700
Dissolved Barium (Ba)	mg/L	1*	0.007	0.006	<0.01	0.006	0.007	0.008	0.008	0.007	0.007	0.008	0.008	0.007	0.007
Dissolved Boron (B)	mg/L	5.0*	1.3	1.2	1.2	1.3	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0002	<0.0001	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		370	350	340	360	350	380	340	350	360	390	380	350	360
Dissolved Chloride (Cl)	mg/L	250**	9	8	8	7	13	9	9	8	8.8	8.9	8.1	8.2	8.5
Dissolved Iron (Fe)	mg/L	0.3**	0.8	1.1	0.65	0.78	1.5	6.4	1.2	<0.10	3.3	6.1	3.8	2.1	3.5
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.001	<0.0005	<0.00050	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		310	300	270	280	280	290	280	290	280	330	310	280	290
Dissolved Organic Carbon	mg/L	5**	1.7	1.7	1.4	1.8	2.2	2.2	2.2	2	2.7	2.0	1.8	1.9	2
Dissolved Potassium (K)	mg/L		6.3	5.9	5.6	6.0	5.9	5.5	6	6.1	5.9	6.5	6.5	5.9	5.9
Dissolved Sodium (Na)	mg/L	200**	200	190	180	180	190	190	180	190	200	220	220	190	210
Dissolved Sulphate (SO4)	mg/L	500**	1900	1900	1800	2000	1900	2000	2000	2000	2100	2100	2100	2200	2100
Nitrate (N)	mg/L	10.0*	0.4	0.39	0.39	0.39	0.35	0.51	<0.10	0.57	0.63	0.55	0.54	0.67	0.69
pH	(pH units)	6.5-8.5	7.2	7.9	7.6	8.0	7.3	8.0	7.8	7.9	7.7	8.0	7.7	7.9	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	0.16	<0.15	0.25	0.19	<0.15	<0.15	0.3	0.3	<0.15	<0.15
Total Dissolved Solids	mg/L	500	2240	3350	3370	3300	3210	5270	3350	3460	3340	3510	3360	3500	3220
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.9	<0.7	<0.7	<0.7
Ion Percentage	%		9.0	6.7	5.4	2.8	4.7	5.0	1.4	3.5	1.2	7.3	5.4	1.8	2.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.
5) OW73-6 resampled for lead on June 22, 2010 due to elevated lead reportable detection limit for May 19, 2010.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9
Date			**10-May-18**	**12-Nov-18**	**14-May-19**	**6-Nov-19**	**8-May-20**	**3-Nov-20**	**18-May-21**	**3-Nov-21**	**3-May-22**	**1-Nov-22**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	270	370	260	270	270	280	280	280	270	290
Conductivity	umho/cm		3900	2600	3700	3800	3900	3700	3900	3800	3900	3900
Dissolved Barium (Ba)	mg/L	1*	<0.03	0.01	0.006	0.007	0.007	0.008	0.006	0.007	0.006	0.007
Dissolved Boron (B)	mg/L	5.0*	1.3	1	1.1	1.1	1.1	1.4	1.1	1.2	1.2	1.3
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		380	210	390	390	380	400	390	420	420	390
Dissolved Chloride (Cl)	mg/L	250**	8.1	5.6	8.4	7.8	8.2	8.2	8.9	8.1	8.3	7.7
Dissolved Iron (Fe)	mg/L	0.3**	4.9	1.6	0.6	3.7	2.4	3.5	1.1	2.5	3.1	2.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		310	200	300	310	310	320	320	330	340	340
Dissolved Organic Carbon	mg/L	5**	1.7	1.7	1.8	2.0	1.9	2.2	1.7	1.7	1.8	2
Dissolved Potassium (K)	mg/L		6	5	6	6.2	5.9	6.3	6.3	6.1	6.1	6.2
Dissolved Sodium (Na)	mg/L	200**	220	140	210	230	220	220	230	230	240	230
Dissolved Sulphate (SO4)	mg/L	500**	2200	1200	2300	2200	2200	2300	2400	2500	2400	2400
Nitrate (N)	mg/L	10.0*	0.61	0.32	0.56	0.54	0.57	0.42	0.45	0.6	0.61	0.6
pH	(pH units)	6.5-8.5	7.9	7.8	7.9	7.7	8.0	7.7	8.0	7.9	7.9	7.87
Total Ammonia-N	mg/L		0.17	0.23	<0.15	0.46	<0.15	0.31	0.108	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	3340	2180	3750	3500	3660	3780	2940	3620	3680	3280
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.3	1.1	<0.7	<0.7
Ion Percentage	%		3.1	2.8	0.6	4.0	3.1	2.6	0.6	0.8	3.9	1.9

Parameter	Units	ODWQS	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5
Date			**20-May-09**	**17-May-10**	**12-May-11**	**16-May-12**	**8-May-13**	**5-May-14**	**13-May-15**	**27-May-16**	**17-May-17**	**8-May-18**	**15-May-19**	**6-May-20**	**21-May-21**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	478	446	412	490	420	470	480	490	510	520	480	480	420
Conductivity	umho/cm		1610	1710	1670	1800	1600	2000	1700	1600	1700	1700	1700	1500	1200
Dissolved Barium (Ba)	mg/L	1*	0.010	0.013	0.017	0.022	0.022	0.024	0.021	0.026	0.023	0.024	0.023	0.023	0.020
Dissolved Boron (B)	mg/L	5.0*	0.13	0.12	0.13	0.12	0.10	0.09	0.08	0.16	0.13	0.12	0.09	0.09	0.09
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		160	140	140	140	130	160	130	140	120	130	120	120	110
Dissolved Chloride (Cl)	mg/L	250**	15	17	17	27	33	36	36	60	73	77	38	43	26
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		110	110	110	120	100	140	120	120	100	100	110	97	92
Dissolved Organic Carbon	mg/L	5**	3.5	2.2	2.1	2.5	2.4	4.0	2.9	2.7	2.9	2.7	3.3	3.1	2.8
Dissolved Potassium (K)	mg/L		3.7	3.3	2.9	3.1	3.0	2.7	2.7	3.1	3.0	3.1	2.4	2.5	2.6
Dissolved Sodium (Na)	mg/L	200**	61	76	96	110	110	130	100	110	91	87	110	94	90
Dissolved Sulphate (SO4)	mg/L	500**	430	460	470	520	430	600	410	340	380	320	400	340	250
Nitrate (N)	mg/L	10.0*	<0.1	0.3	0.5	0.39	0.29	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.5	8.1	7.9	7.9	7.9	8.0	8.0	7.8	8.0	8.0	7.7	8.0	8.0
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.050
Total Dissolved Solids	mg/L	500	1020	1050	1010	1210	1200	1430.0	1170	1080	1100	935	1110	980	625
Total Kjeldahl Nitrogen (TKN)	mg/L		<4	1.3	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.1
Ion Percentage	%		7.2	5.7	8.8	5.2	7.8	8.7	9.0	13.0	0.0	3.7	7.2	6.0	14.4

Parameter	Units	ODWQS	OW79-5
Date			**5-May-22**
Laboratory			**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	460
Conductivity	umho/cm		1400
Dissolved Barium (Ba)	mg/L	1*	0.023
Dissolved Boron (B)	mg/L	5.0*	0.06
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001
Dissolved Calcium (Ca)	mg/L		110
Dissolved Chloride (Cl)	mg/L	250**	26
Dissolved Iron (Fe)	mg/L	0.3**	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005
Dissolved Magnesium (Mg)	mg/L		93
Dissolved Organic Carbon	mg/L	5**	3.3
Dissolved Potassium (K)	mg/L		2.0
Dissolved Sodium (Na)	mg/L	200**	90
Dissolved Sulphate (SO4)	mg/L	500**	310
Nitrate (N)	mg/L	10.0*	<0.10
pH	(pH units)	6.5-8.5	8.04
Total Ammonia-N	mg/L		<0.15
Total Dissolved Solids	mg/L	500	830
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7
Ion Percentage	%		7.7

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7
Date			**14-May-09**	**17-May-10**	**22-Jun-10**	**23-Dec-10**	**12-May-11**	**28-Jun-11**	**16-May-12**	**8-May-13**	**5-May-14**	**13-May-15**	**27-May-16**	**17-May-17**	**8-May-18**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	516	550	520	525	500	545	560	540	550	530	560	550	
Conductivity	umho/cm		1490	1650	1600	1580	1650	1740	1700	1700	1700	1600	1600	1600	1700
Dissolved Barium (Ba)	mg/L	1*	0.023	0.033	0.031	0.030	0.028	0.028	0.026	0.025	0.026	0.025	0.025	0.025	0.024
Dissolved Boron (B)	mg/L	5.0*	0.26	0.21	0.23	0.25	0.22	0.23	0.23	0.22	0.25	0.21	0.25	0.24	0.25
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	140	140	140	150	150	140	140	150	130	130	130	140
Dissolved Chloride (Cl)	mg/L	250**	100	140	140	130	160	160	130	140	130	130	120	140	130
Dissolved Iron (Fe)	mg/L	0.3**	2.2	1.9	<0.1	2.0	1.2	0.8	1.0	0.49	0.21	<0.10	<0.10	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		100	110	110	110	110	100	110	100	110	100	100	98	110
Dissolved Organic Carbon	mg/L	5**	4.4	5.1	3.4	3.0	2.9	3.0	2.9	2.7	3.6	3.1	3.1	3.3	2.9
Dissolved Potassium (K)	mg/L		4.3	4.3	4.4	4.2	3.9	3.9	3.8	3.7	3.7	3.9	3.5	3.5	3.8
Dissolved Sodium (Na)	mg/L	200**	60	59	58	64	63	63	65	61	66	63	60	58	64
Dissolved Sulphate (SO4)	mg/L	500**	190	180	200	160	180	170	190	190	170	140	140	150	150
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.8	7.9	7.9	7.5	7.9	7.7	7.9	7.7	7.8	7.9	7.8	7.9	7.8
Total Ammonia-N	mg/L		0.28	0.34	0.28	0.25	<0.15	<0.15	<0.15	0.21	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	970	1030	1000	1040	1040	1050	1010	1040	976	932	954	982	930
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	13	3	1.0	2	<2	<0.7	1.1	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		7.2	6.2	6.2	10.2	8.6	4.9	6.5	4.0	9.7	7.5	6.5	3.8	47.1

Parameter	Units	ODWQS	OW79-7	OW79-7	OW79-7	OW79-7
Date			**15-May-19**	**6-May-20**	**21-May-21**	**5-May-22**
Laboratory			**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	520	550	530	540
Conductivity	umho/cm		1600	1600	1600	1700
Dissolved Barium (Ba)	mg/L	1*	0.024	0.025	0.023	0.027
Dissolved Boron (B)	mg/L	5.0*	0.24	0.22	0.22	0.21
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	130	130	150
Dissolved Chloride (Cl)	mg/L	250**	150	140	140	160
Dissolved Iron (Fe)	mg/L	0.3**	0.3	0.2	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		110	100	98	98
Dissolved Organic Carbon	mg/L	5**	3.0	3.4	2.8	2.9
Dissolved Potassium (K)	mg/L		3.6	3.6	3.5	3.5
Dissolved Sodium (Na)	mg/L	200**	68	62	62	59
Dissolved Sulphate (SO4)	mg/L	500**	140	140	140	130
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.7	7.7	7.7	8.0
Total Ammonia-N	mg/L		<0.15	<0.15	0.069	<0.15
Total Dissolved Solids	mg/L	500	975	905	965	900
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	0.1	<0.7
Ion Percentage	%		9.1	5.4	6.0	6.8

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26
Date			**20-May-09**	**18-May-10**	**12-May-11**	**16-May-12**	**8-May-13**	**5-May-14**	**13-May-15**	**27-May-16**	**17-May-17**	**8-May-18**	**15-May-19**	**6-May-20**	**21-May-21**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	261	270	263	280	270	270	260	260	270	280	260	270	270
Conductivity	umho/cm		747	713	789	770	810	830	830	820	840	870	850	860	840
Dissolved Barium (Ba)	mg/L	1*	0.025	0.018	0.026	0.025	0.022	0.027	0.023	0.021	0.020	0.022	0.021	0.023	0.022
Dissolved Boron (B)	mg/L	5.0*	1.6	1.5	1.6	1.6	1.5	1.6	1.5	1.6	1.5	1.6	1.5	1.5	1.7
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		22	19	24	26	26	28	27	28	25	28	28	32	31
Dissolved Chloride (Cl)	mg/L	250**	31	27	32	29	30	30	29	28	29	28	28	28	28
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	0.3	0.3	0.43	<0.10	<0.10	<0.10	<0.10	<0.1	<0.1	0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		11	10	11	13	10	11	12	13	12	15	15	15	15
Dissolved Organic Carbon	mg/L	5**	3.6	1.8	1.8	2.6	2.9	2.0	1.5	1.7	1.7	1.5	1.6	1.8	1.4
Dissolved Potassium (K)	mg/L		6.0	4.4	6.3	6.9	5.7	5.6	6.4	6.1	5.6	5.7	6.1	5.7	6.6
Dissolved Sodium (Na)	mg/L	200**	220	130	140	150	130	140	140	140	130	140	140	130	140
Dissolved Sulphate (SO4)	mg/L	500**	72	57	86	83	86	98	100	110	110	110	120	120	120
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.1	8.3	8.1	8.2	8.1	8.2	8.3	8.1	8.1	8.2	8.1	8.1	8.2
Total Ammonia-N	mg/L		0.33	0.31	<0.15	<0.15	0.16	0.24	0.15	<0.15	<0.15	<0.15	0.18	<0.15	0.166
Total Dissolved Solids	mg/L	500	480	454	468	444	462	458	486	488	562	480	510	465	405
Total Kjeldahl Nitrogen (TKN)	mg/L		<4	4	2	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.3
Ion Percentage	%		27.9	8.7	9.1	12.2	6.0	8.0	9.3	8.7	3.4	7.5	8.3	5.8	8.1

Parameter	Units	ODWQS	OW79-26
Date			**5-May-22**
Laboratory			**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	260
Conductivity	umho/cm		860
Dissolved Barium (Ba)	mg/L	1*	0.022
Dissolved Boron (B)	mg/L	5.0*	1.6
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001
Dissolved Calcium (Ca)	mg/L		29
Dissolved Chloride (Cl)	mg/L	250**	28
Dissolved Iron (Fe)	mg/L	0.3**	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005
Dissolved Magnesium (Mg)	mg/L		13
Dissolved Organic Carbon	mg/L	5**	1.5
Dissolved Potassium (K)	mg/L		5.4
Dissolved Sodium (Na)	mg/L	200**	130
Dissolved Sulphate (SO4)	mg/L	500**	130
Nitrate (N)	mg/L	10.0*	0.16
pH	(pH units)	6.5-8.5	8.1
Total Ammonia-N	mg/L		<0.15
Total Dissolved Solids	mg/L	500	470
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7
Ion Percentage	%		3.6

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3
Date			**19-May-09**	**11-Jun-09**	**16-Dec-09**	**17-May-10**	**29-Jun-10**	**12-May-11**	**16-May-12**	**9-May-13**	**5-May-14**	**14-May-15**	**27-May-16**	**16-May-17**	**8-May-18**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	333	327	358	338	353	339	370	320	460	430	340	400	410
Conductivity	umho/cm		3450	3470	3550	3540	3440	3530	3500	920	1900	1400	2000	2600	3000
Dissolved Barium (Ba)	mg/L	1*	0.12	0.11	0.12	0.13	0.13	0.11	0.11	0.031	0.068	0.05	0.073	0.09	0.1
Dissolved Boron (B)	mg/L	5.0*	0.09	0.12	0.11	0.09	0.09	0.09	0.09	0.05	0.06	0.06	0.07	0.07	0.08
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		220	210	200	200	200	190	180	92	140	110	150	150	170
Dissolved Chloride (Cl)	mg/L	250**	830	840	820	870	830	860	750	81	260	150	340	470	590
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	0.28	<0.10	0.17	<0.10	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		160	180	160	160	150	150	160	35	76	48	83	91	100
Dissolved Organic Carbon	mg/L	5**	4.0	5.3	3.3	3.2	3.1	3.0	3.3	8.9	7.5	8	5.7	5.3	4.3
Dissolved Potassium (K)	mg/L		2.9	3.6	2.9	2.6	2.5	2.2	2.1	2.8	2.5	2.7	2.8	2.5	2.5
Dissolved Sodium (Na)	mg/L	200**	240	300	270	280	260	310	310	76	180	110	180	220	240
Dissolved Sulphate (SO4)	mg/L	500**	150	160	160	160	180	180	180	39	96	55	110	160	160
Nitrate (N)	mg/L	10.0*	0.8	0.6	0.3	0.2	0.2	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.5	7.9	7.9	8.1	7.9	8.0	7.8	8.0	7.8	7.9	7.9	8.2	7.8
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	0.18	<0.15	<0.15	<0.15	0.32	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	2150	2110	2260	2200	2200	2030	2210	684	1010	832	1190	1500	1650
Total Kjeldahl Nitrogen (TKN)	mg/L		<1	<4	<7	5.1	1.5	<0.7	<0.7	0.9	0.7	<1	<0.7	<0.7	<0.7
Ion Percentage	%		4.2	8.7	4.1	3.1	1.3	2.8	7.3	13.7	11.6	7.6	12.3	3.3	1.2

Parameter	Units	ODWQS	OW80-3	OW80-3	OW80-3	OW80-3
Date			**15-May-19**	**6-May-20**	**21-May-21**	**5-May-22**
Laboratory			**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	450	380	320	320
Conductivity	umho/cm		2200	1200	1200	830
Dissolved Barium (Ba)	mg/L	1*	0.064	0.059	0.046	0.037
Dissolved Boron (B)	mg/L	5.0*	0.07	0.04	0.04	0.03
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	110	110	110
Dissolved Chloride (Cl)	mg/L	250**	360	140	160	67
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	2.3	0.3	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		83	49	47	24
Dissolved Organic Carbon	mg/L	5**	5.3	6.9	6.5	8.9
Dissolved Potassium (K)	mg/L		2.1	2.4	3.1	4.7
Dissolved Sodium (Na)	mg/L	200**	230	130	130	70
Dissolved Sulphate (SO4)	mg/L	500**	130	39	35	23
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	0.12	0.22
pH	(pH units)	6.5-8.5	7.7	7.8	7.9	8.1
Total Ammonia-N	mg/L		<0.15	<0.15	<0.050	<0.15
Total Dissolved Solids	mg/L	500	1260	650	555	445
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	0.4	<0.7
Ion Percentage	%		7.5	16.7	18.5	17.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6
Date			**19-May-09**	**11-Jun-09**	**16-Dec-09**	**18-May-10**	**29-Jun-10**	**12-May-11**	**16-May-12**	**9-May-13**	**5-May-14**	**14-May-15**	**27-May-16**	**16-May-17**	**8-May-18**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Alkalinity (Total as CaCO3)	mg/L	30-500***	399	410	421	411	409	395	410	410	410	410	410	410	
Conductivity	umho/cm		1330	1350	1360	1460	1400	1390	1400	1400	1400	1400	1400	1400	1500
Dissolved Barium (Ba)	mg/L	1*	0.049	0.054	0.052	0.061	0.067	0.062	0.061	0.063	0.064	0.064	0.061	0.057	0.058
Dissolved Boron (B)	mg/L	5.0*	0.22	0.22	0.24	0.20	0.20	0.21	0.21	0.20	0.20	0.22	0.23	0.20	0.22
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		130	130	130	120	130	130	120	130	140	130	130	120	130
Dissolved Chloride (Cl)	mg/L	250**	170	160	160	170	180	180	140	150	170	180	160	170	160
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	1.10	1.20	<0.1	0.1	<0.1	0.14	0.11	<0.10	<0.10	<0.10	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		77	82	78	76	76	78	79	75	84	75	81	71	84
Dissolved Organic Carbon	mg/L	5**	3.6	3.3	2.3	2.2	2.5	1.9	1.9	2.1	3.3	2.2	1.9	1.9	2
Dissolved Potassium (K)	mg/L		6.5	6.4	6.5	5.5	5.1	4.4	4.1	3.8	3.6	3.7	3.6	3.4	3.7
Dissolved Sodium (Na)	mg/L	200**	49	50	48	47	46	48	49	47	52	49	52	47	56
Dissolved Sulphate (SO4)	mg/L	500**	73	75	75	76	91	72	76	73	70	74	71	73	68
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.9	7.7	7.9	8.0	7.8	8.1	8.0	8.1	7.9	7.9	7.8	7.9	7.9
Total Ammonia-N	mg/L		0.20	0.20	0.22	0.24	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	850	840	851	900	900	832	822	866	868	784	794	810	850
Total Kjeldahl Nitrogen (TKN)	mg/L		<4	<1	<7	7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		8.7	10.4	8.4	5.4	4.8	7.9	9.8	9.2	11.8	6.1	10.5	4.0	45.8

Parameter	Units	ODWQS	OW80-6	OW80-6	OW80-6	OW80-6
Date			**15-May-19**	**6-May-20**	**20-May-21**	**5-May-22**
Laboratory			**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	410	410	410	240
Conductivity	umho/cm		1400	1500	1400	450
Dissolved Barium (Ba)	mg/L	1*	0.056	0.058	0.055	0.020
Dissolved Boron (B)	mg/L	5.0*	0.21	0.20	0.21	0.05
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	0.0017
Dissolved Calcium (Ca)	mg/L		130	130	130	59
Dissolved Chloride (Cl)	mg/L	250**	180	180	190	4.2
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	1.9	<0.1	0.2
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		81	76	76	17
Dissolved Organic Carbon	mg/L	5**	1.9	1.8	1.6	4.5
Dissolved Potassium (K)	mg/L		3.4	3.4	3.4	3.4
Dissolved Sodium (Na)	mg/L	200**	54	53	55	3.4
Dissolved Sulphate (SO4)	mg/L	500**	73	73	71	3.7
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10	0.36
pH	(pH units)	6.5-8.5	7.8	7.8	7.8	8.3
Total Ammonia-N	mg/L		<0.15	<0.15	<0.050	<0.15
Total Dissolved Solids	mg/L	500	865	795	890	230
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.1	<0.7
Ion Percentage	%		8.4	7.0	6.4	6.3

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27
Date			**19-May-09**	**18-May-10**	**12-May-11**	**16-May-12**	**9-May-13**	**5-May-14**	**14-May-15**	**27-May-16**	**16-May-17**	**8-May-18**	**15-May-19**	**6-May-20**	**20-May-21**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	286	313	285	300	290	290	290	300	290	300	290	290	280
Conductivity	umho/cm		779	1050	832	790	790	770	780	750	780	810	770	770	760
Dissolved Barium (Ba)	mg/L	1*	0.044	0.059	0.035	0.032	0.032	0.032	0.033	0.039	0.040	0.042	0.042	0.043	0.046
Dissolved Boron (B)	mg/L	5.0*	2.0	1.6	1.6	1.7	1.7	1.7	1.9	1.8	1.7	2	1.8	1.9	1.8
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		13	38	25	21	15	18	15	18	14	15	15	14	14
Dissolved Chloride (Cl)	mg/L	250**	49	120	57	45	45	48	48	48	47	46	46	45	47
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	0.1	0.7	0.82	0.34	<0.10	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		7.3	23	14	11	7.9	8.4	7.8	8.2	7.7	8.2	9	7.7	7.6
Dissolved Organic Carbon	mg/L	5**	2.0	1.3	1.9	2.1	1.3	9.0	1.9	1.8	1.9	1.3	2.1	1.4	1.4
Dissolved Potassium (K)	mg/L		2.1	2.8	2.5	2.6	2.3	2.3	2.2	2.5	2.2	2.3	2.3	2.2	2.3
Dissolved Sodium (Na)	mg/L	200**	160	150	140	160	150	160	140	150	140	160	150	150	150
Dissolved Sulphate (SO4)	mg/L	500**	49	50	44	36	30	30	31	30	32	30	31	28	30
Nitrate (N)	mg/L	10.0*	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.1	8.3	8.4	8.3	8.4	8.3	8.2	8.2	8.2	8.3	8.2	8.2	8.4
Total Ammonia-N	mg/L		0.27	0.19	<0.15	<0.15	0.24	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.087
Total Dissolved Solids	mg/L	500	520	660	504	424	462	392	434	430	426	415	465	410	325
Total Kjeldahl Nitrogen (TKN)	mg/L		<4	0.9	1	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.2
Ion Percentage	%		8.0	4.5	9.0	13.3	9.5	12.6	5.9	8.8	5.6	10.9	9.7	9.4	9.9

Parameter	Units	ODWQS	OW80-27
Date			**5-May-22**
Laboratory			**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	280
Conductivity	umho/cm		760
Dissolved Barium (Ba)	mg/L	1*	0.047
Dissolved Boron (B)	mg/L	5.0*	1.9
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001
Dissolved Calcium (Ca)	mg/L		14
Dissolved Chloride (Cl)	mg/L	250**	47
Dissolved Iron (Fe)	mg/L	0.3**	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005
Dissolved Magnesium (Mg)	mg/L		7.0
Dissolved Organic Carbon	mg/L	5**	1.5
Dissolved Potassium (K)	mg/L		2.2
Dissolved Sodium (Na)	mg/L	200**	140
Dissolved Sulphate (SO4)	mg/L	500**	27
Nitrate (N)	mg/L	10.0*	<0.10
pH	(pH units)	6.5-8.5	8.2
Total Ammonia-N	mg/L		<0.15
Total Dissolved Solids	mg/L	500	415
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7
Ion Percentage	%		7.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW81-5	OW81-5	OW81-5
Date			**11-May-20**	**21-May-21**	**5-May-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	420	400	400
Conductivity	umho/cm		2900	2900	2800
Dissolved Barium (Ba)	mg/L	1*	0.031	0.026	0.022
Dissolved Boron (B)	mg/L	5.0*	0.61	0.54	0.54
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		290	270	280
Dissolved Chloride (Cl)	mg/L	250**	20	20	20
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		190	190	190
Dissolved Organic Carbon	mg/L	5**	2.2	2.1	2.0
Dissolved Potassium (K)	mg/L		6.2	5.6	5.0
Dissolved Sodium (Na)	mg/L	200**	170	170	180
Dissolved Sulphate (SO4)	mg/L	500**	1300	1400	1300
Nitrate (N)	mg/L	10.0*	0.11	<0.10	<0.10
pH	(pH units)	6.5-8.5	7.8	7.8	7.9
Total Ammonia-N	mg/L		<0.15	<0.050	<0.15
Total Dissolved Solids	mg/L	500	2420	2130	2270
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.1	<0.7
Ion Percentage	%		4.1	0.2	4.4

Parameter	Units	ODWQS	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7
Date			**11-May-20**	**22-Jul-20**	**3-Nov-20**	**20-May-21**	**9-Jun-21**	**2-Nov-21**	**5-May-22**	**2-Jun-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	360	350	370	360	350	360	340	350
Conductivity	umho/cm		2600	2800	2600	2600	2800	2500	2500	2207
Dissolved Barium (Ba)	mg/L	1*	0.026	0.024	0.026	0.026	0.023	0.023	0.022	0.019
Dissolved Boron (B)	mg/L	5.0*	0.56	0.58	0.61	0.53	0.56	0.55	0.54	0.58
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		240	260	240	220	240	250	220	230
Dissolved Chloride (Cl)	mg/L	250**	210	250	210	220	260	210	200	210
Dissolved Iron (Fe)	mg/L	0.3**	0.7	2.3	1.3	0.7	0.9	1.1	1.1	1.6
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		170	200	160	160	180	170	160	160
Dissolved Organic Carbon	mg/L	5**	2.8	3	3.4	2.8	3	2.8	3.0	2.9
Dissolved Potassium (K)	mg/L		5.5	5.8	5.3	5.1	5.3	4.8	5.1	5.1
Dissolved Sodium (Na)	mg/L	200**	110	120	110	120	120	120	120	110
Dissolved Sulphate (SO4)	mg/L	500**	780	840	790	810	880	810	760	840
Nitrate (N)	mg/L	10.0*	0.13	<0.10	<0.10	0.1	<0.10	<0.10	0.16	0.12
pH	(pH units)	6.5-8.5	7.9	7.7	7.7	7.7	7.6	8.0	8.1	7.2
Total Ammonia-N	mg/L		<0.15	0.29	0.65	0.129	0.34	0.23	<0.15	<0.15
Total Dissolved Solids	mg/L	500	1930	2240	1990	1730	2120	1770	1810	1880
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	0.2	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		4.7	6.9	2.7	0.8	1.1	5.1	4.3	0.6

Parameter	Units	ODWQS	OW81-27	OW81-27	OW81-27
Date			**11-May-20**	**20-May-21**	**5-May-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	280	260	330
Conductivity	umho/cm		1500	1100	1400
Dissolved Barium (Ba)	mg/L	1*	0.1	0.062	0.072
Dissolved Boron (B)	mg/L	5.0*	1.8	1.9	1.9
Dissolved Cadmium (Cd)	mg/L	0.005*	<0.0001	<0.0001	<0.0001
Dissolved Calcium (Ca)	mg/L		47	48	30
Dissolved Chloride (Cl)	mg/L	250**	40	48	30
Dissolved Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1
Dissolved Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005
Dissolved Magnesium (Mg)	mg/L		38	40	19
Dissolved Organic Carbon	mg/L	5**	2.1	2	1.9
Dissolved Potassium (K)	mg/L		2.7	2.4	2.6
Dissolved Sodium (Na)	mg/L	200**	190	190	180
Dissolved Sulphate (SO4)	mg/L	500**	370	280	370
Nitrate (N)	mg/L	10.0*	<0.10	<0.10	<0.10
pH	(pH units)	6.5-8.5	8.2	8.3	7.8
Total Ammonia-N	mg/L		0.23	0.346	<0.15
Total Dissolved Solids	mg/L	500	965	615	895
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	0.5	<0.7
Ion Percentage	%		4.7	4.7	4.7

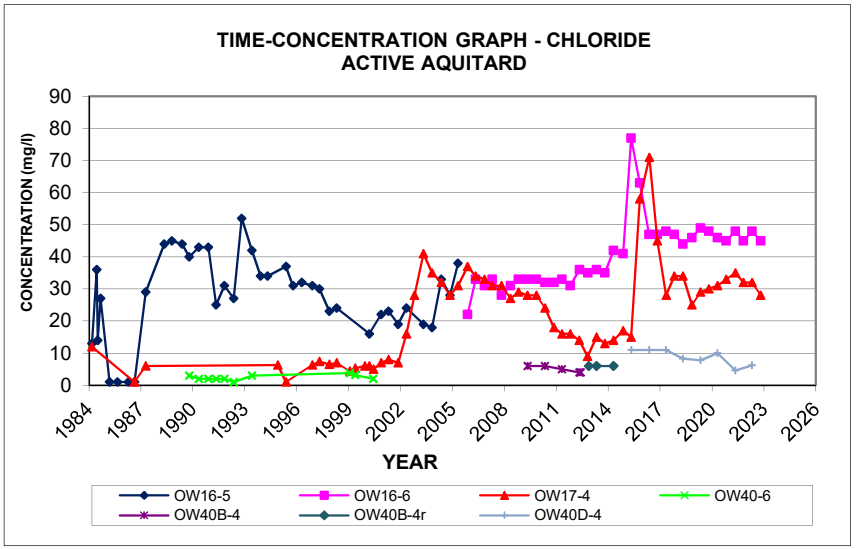
NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.

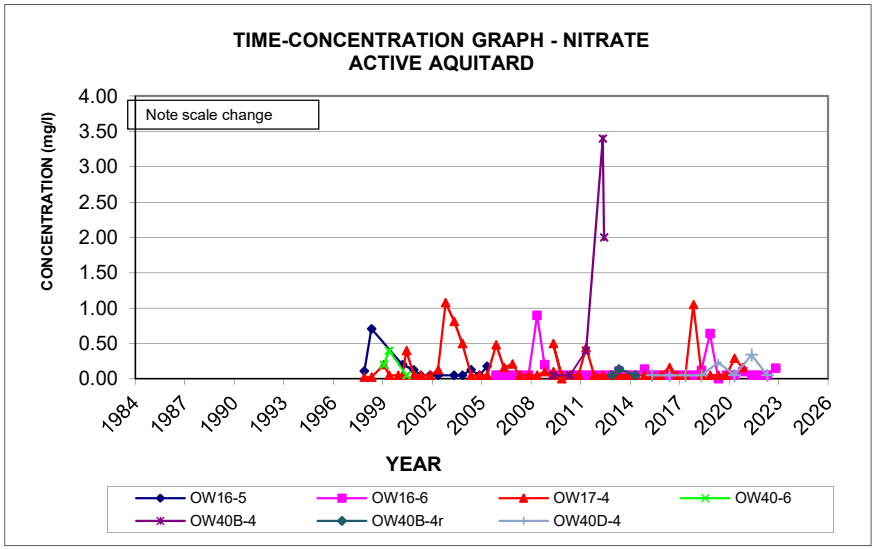
Table D-1
Groundwater - General Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well
Date			**23-May-08**	**20-May-09**	**18-May-10**	**12-May-11**	**16-May-12**	**9-May-13**	**5-May-14**	**14-May-15**	**27-May-16**	**16-May-17**	**8-May-18**	**15-May-19**	**6-May-20**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	160	221	250	204	240	180	210	190	210	230	230	230	230
Conductivity	umho/cm		349	431	483	418	460	370	420	420	430	470	460	460	450
Total Barium (Ba)	mg/L	1*	0.015	0.022	0.023	0.019	0.021	0.017	0.020	0.020	0.022	0.023	0.02	0.022	0.02
Total Boron (B)	mg/L	5.0*	0.019	0.02	0.02	<0.02	0.03	0.02	0.024	0.034	0.03	0.03	0.03	0.03	0.03
Total Cadmium (Cd)	mg/L	0.005*	0.0001	0.0003	0.0002	0.0001	<0.0001	0.0002	0.00015	0.00023	0.00010	0.00030	0.0005	0.0002	0.0003
Total Calcium (Ca)	mg/L		45	60	66	57	64	51	63	59	60	64	59	70	59
Total Chloride (Cl)	mg/L	250**	5	6	6	6	4	4	5	15	8.4	6.2	5.2	4.3	2.9
Total Iron (Fe)	mg/L	0.3**	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	0.16	0.10	0.40	0.5	0.6	0.4
Total Lead (Pb)	mg/L	0.01*	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.00050	0.00051	<0.0005	0.0015	0.0019	0.0008	0.001
Total Magnesium (Mg)	mg/L		14	17	21	17	19	15	19	17	17	19	17	20	18
Dissolved Organic Carbon	mg/L	5**	2.6	4.6	2.5	3.2	3.5	4.1	3.7	3.6	12	4.4	3	3.6	3.1
Total Potassium (K)	mg/L		3.4	3.6	3.6	3.4	3.7	3.1	3.6	4.1	3.9	3.6	3.5	4.0	3.5
Total Sodium (Na)	mg/L	200**	3.3	3.7	4.3	3.5	3.7	3.1	3.9	6.5	4.1	4.1	3.5	3.7	3.3
Total Sulphate (SO4)	mg/L	500**	9	7	6	7	6	8	7	7	5.9	6.1	5.9	5.5	5.2
Nitrate (N)	mg/L	10.0*	0.5	0.6	0.3	0.9	0.38	0.77	0.83	0.92	<0.10	0.43	0.33	0.93	0.43
pH	(pH units)	6.5-8.5	7.9	8.5	8.3	8.3	8.2	8.2	8.1	8.1	8.1	8.1	8.2	8.1	8.2
Total Ammonia-N	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Dissolved Solids	mg/L	500	226	285	320	254	254	250	240	244	238	250	235	255	245
Total Kjeldahl Nitrogen (TKN)	mg/L		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Ion Percentage	%		11.3	9.4	10.5	11.2	10.3	11.7	15.3	13.5	11.4	11.6	7.5	16.0	9.2

Parameter	Units	ODWQS	Cemetery Well	Cemetery Well
Date			**21-May-21**	**6-May-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**
Alkalinity (Total as CaCO3)	mg/L	30-500***	230	230
Conductivity	umho/cm		450	450
Total Barium (Ba)	mg/L	1*	0.021	0.020
Total Boron (B)	mg/L	5.0*	0.03	0.03
Total Cadmium (Cd)	mg/L	0.005*	0.0001	0.0021
Total Calcium (Ca)	mg/L		61	61
Total Chloride (Cl)	mg/L	250**	4.4	3.8
Total Iron (Fe)	mg/L	0.3**	<0.1	1.0
Total Lead (Pb)	mg/L	0.01*	<0.0005	0.0060
Total Magnesium (Mg)	mg/L		19	18
Dissolved Organic Carbon	mg/L	5**	7.6	4.7
Total Potassium (K)	mg/L		4.4	3.3
Total Sodium (Na)	mg/L	200**	3.6	3.5
Total Sulphate (SO4)	mg/L	500**	7	4.4
Nitrate (N)	mg/L	10.0*	0.98	0.33
pH	(pH units)	6.5-8.5	8.0	8.14
Total Ammonia-N	mg/L		<0.050	<0.15
Total Dissolved Solids	mg/L	500	185	235
Total Kjeldahl Nitrogen (TKN)	mg/L		0.1	<0.7
Ion Percentage	%		10.5	10.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) *denotes health related ODWQS.
** denotes aesthetic objective for ODWQS.
*** denotes operational guideline for ODWQS.
4) mg/L denotes milligrams per litre.
5) OW85-5 resampled for lead on June 22, 2010 due to elevated lead reportable detection limit for May 20, 2010.
6) Metals analysis for Cemetery Well is for Total Metals


TIME-CONCENTRATION GRAPH - CHLORIDE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
YEAR
OW16-5
OW16-6
OW17-4
OW40-6
OW40B-4
OW40B-4r
OW40D-4


TIME-CONCENTRATION GRAPH - NITRATE
ACTIVE AQUITARD
Note scale change
CONCENTRATION (mg/l)
YEAR
OW16-5
OW16-6
OW17-4
OW40-6
OW40B-4
OW40B-4r
OW40D-4

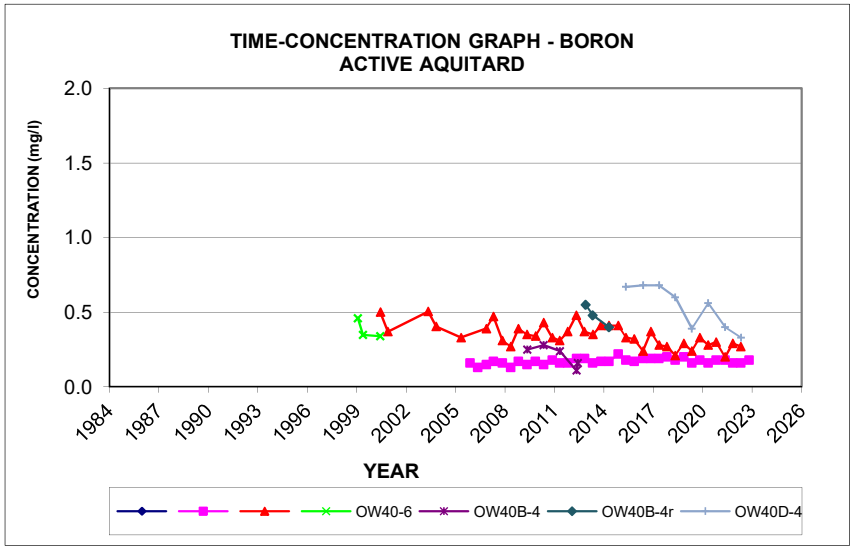
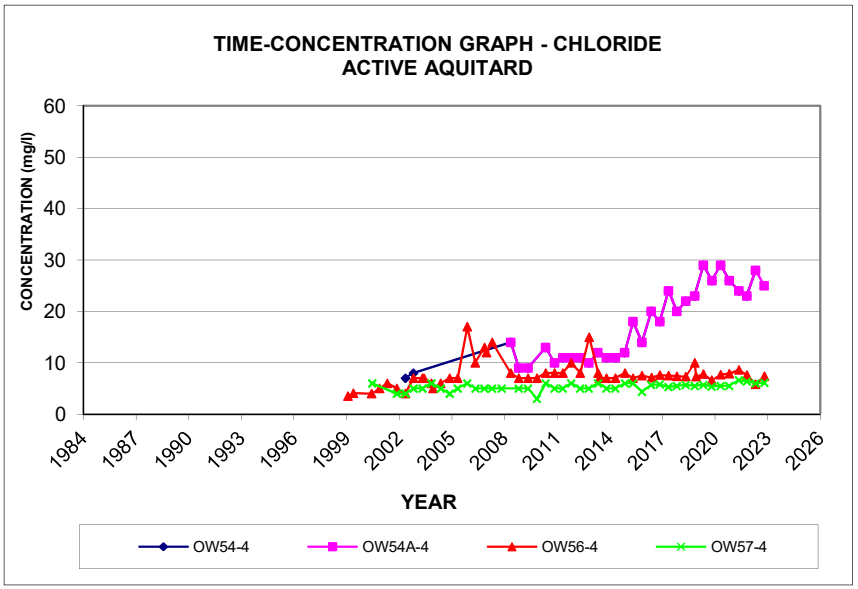
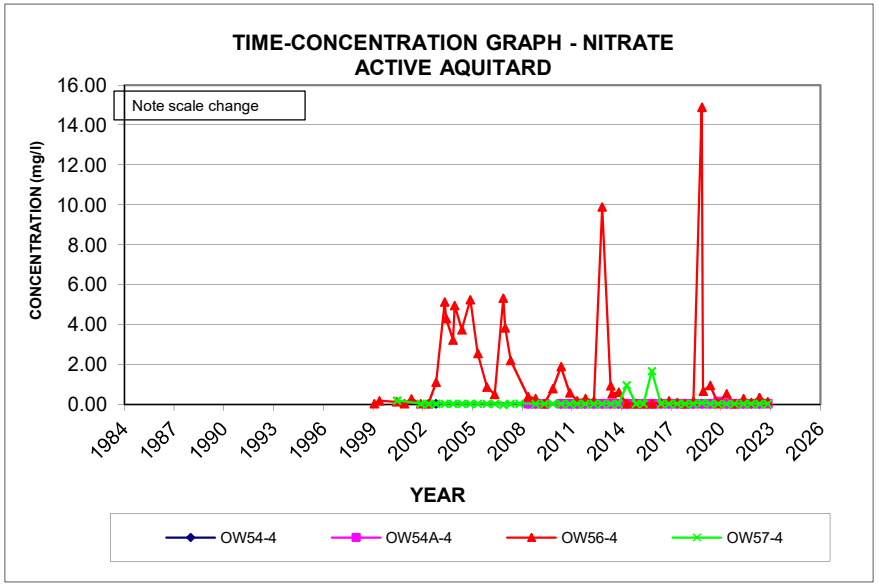

TIME-CONCENTRATION GRAPH - BORON
ACTIVE AQUITARD
CONCENTRATION (mg/l)
YEAR
OW40-6
OW40B-4
OW40B-4r
OW40D-4

FIGURE D-1


TIME-CONCENTRATION GRAPH - CHLORIDE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW54-4
OW54A-4
OW56-4
OW57-4


TIME-CONCENTRATION GRAPH - NITRATE
ACTIVE AQUITARD
Note scale change
CONCENTRATION (mg/l)
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW54-4
OW54A-4
OW56-4
OW57-4

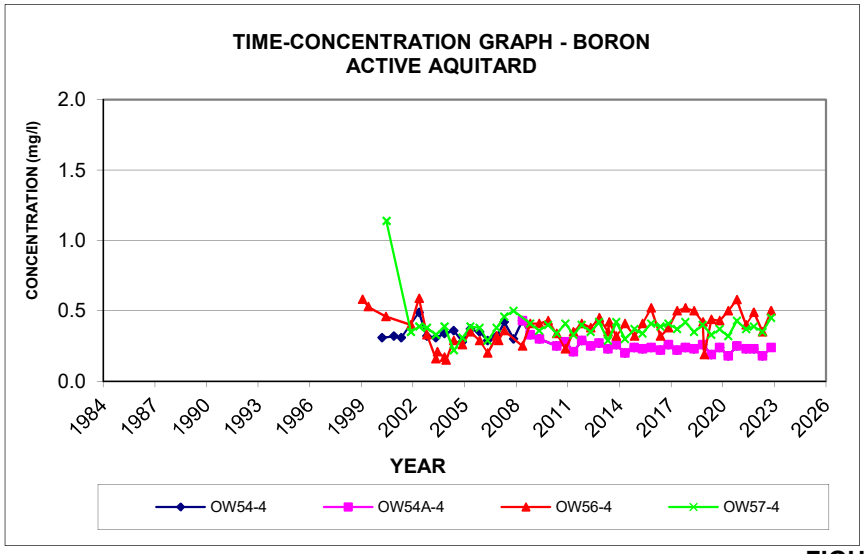
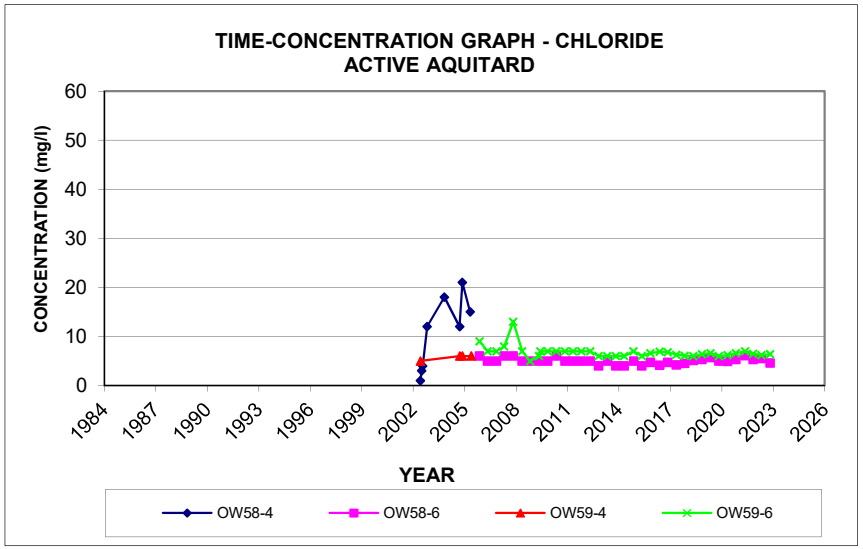
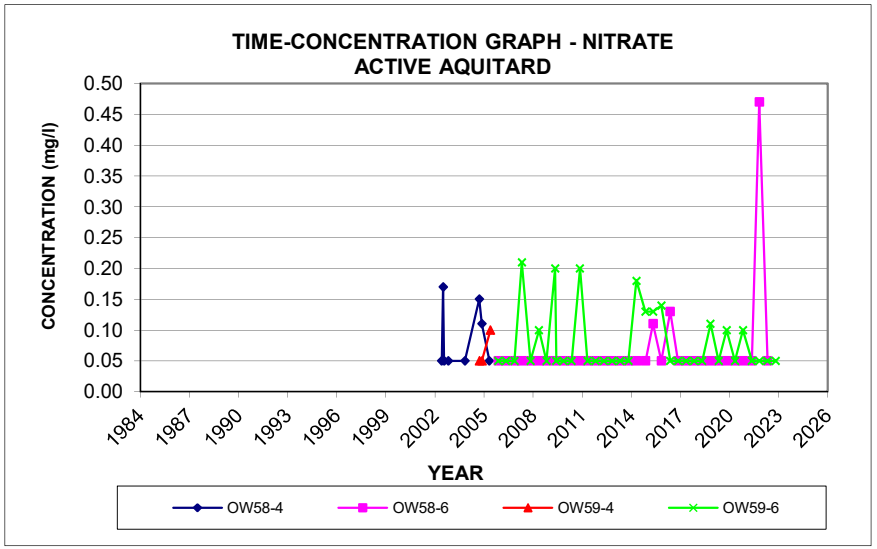

TIME-CONCENTRATION GRAPH - BORON
ACTIVE AQUITARD
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW54-4
OW54A-4
OW56-4
OW57-4

FIGURE D-2


TIME-CONCENTRATION GRAPH - CHLORIDE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW58-4
OW58-6
OW59-4
OW59-6


TIME-CONCENTRATION GRAPH - NITRATE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW58-4
OW58-6
OW59-4
OW59-6

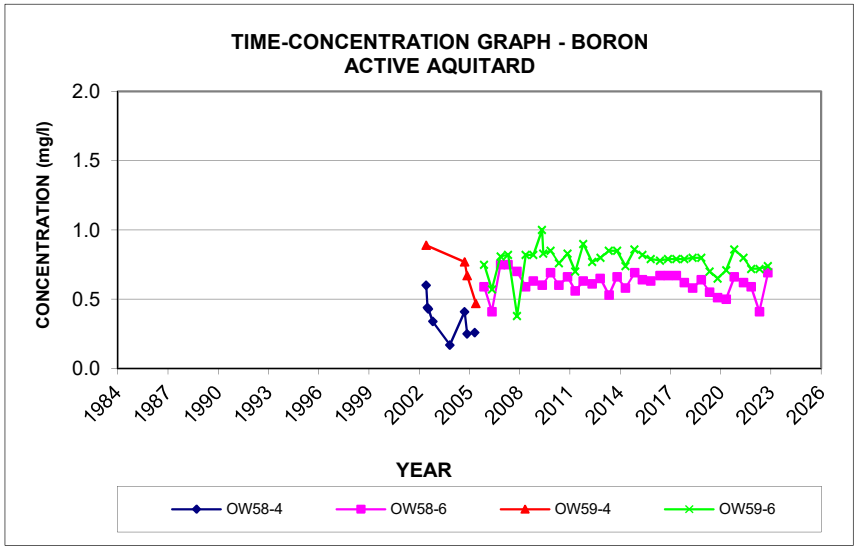
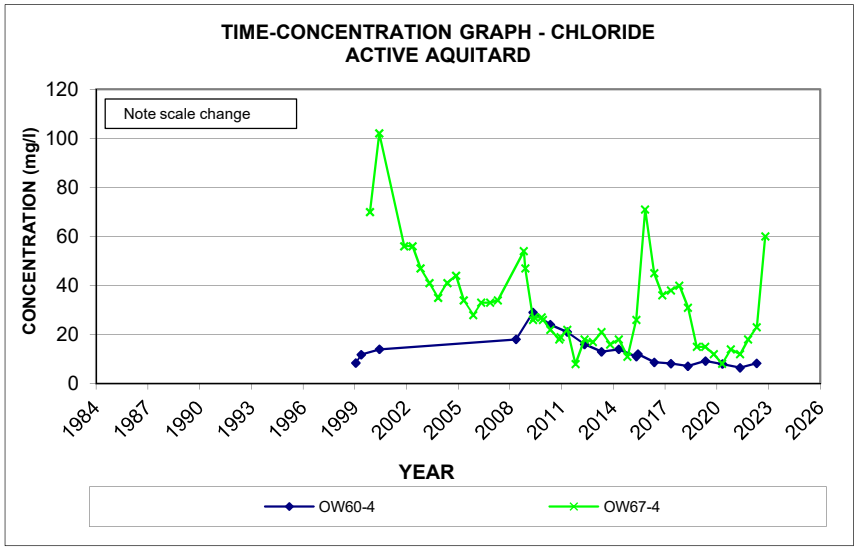
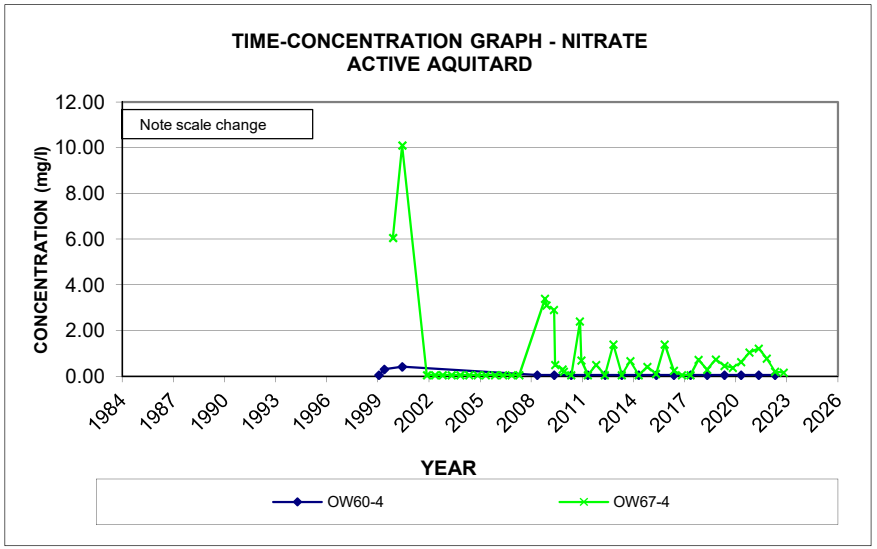

TIME-CONCENTRATION GRAPH - BORON
ACTIVE AQUITARD
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW58-4
OW58-6
OW59-4
OW59-6

FIGURE D-3


TIME-CONCENTRATION GRAPH - CHLORIDE
ACTIVE AQUITARD
Note scale change
CONCENTRATION (mg/l)
120
100
80
60
40
20
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW60-4
OW67-4


TIME-CONCENTRATION GRAPH - NITRATE
ACTIVE AQUITARD
Note scale change
CONCENTRATION (mg/l)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW60-4
OW67-4

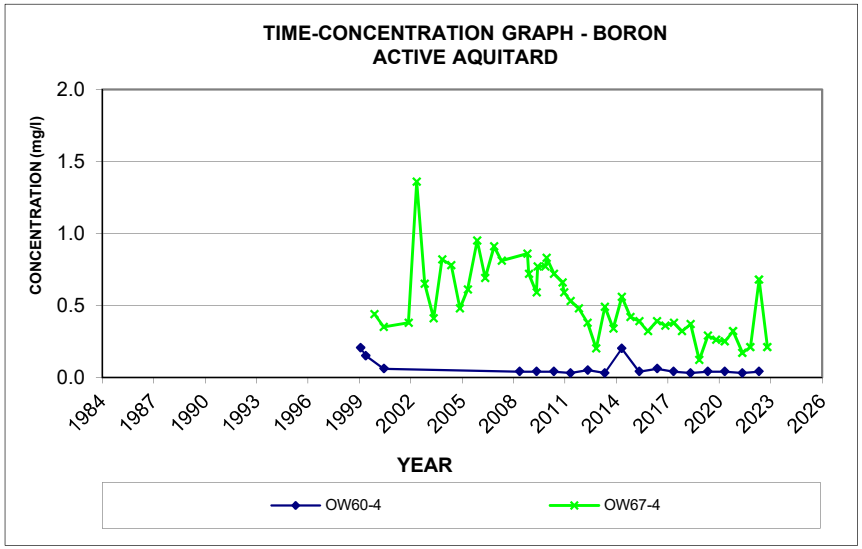
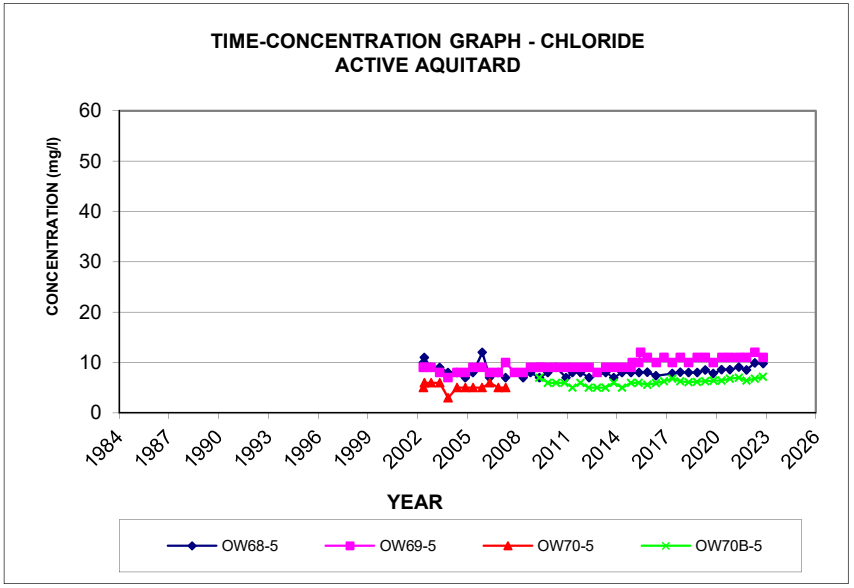
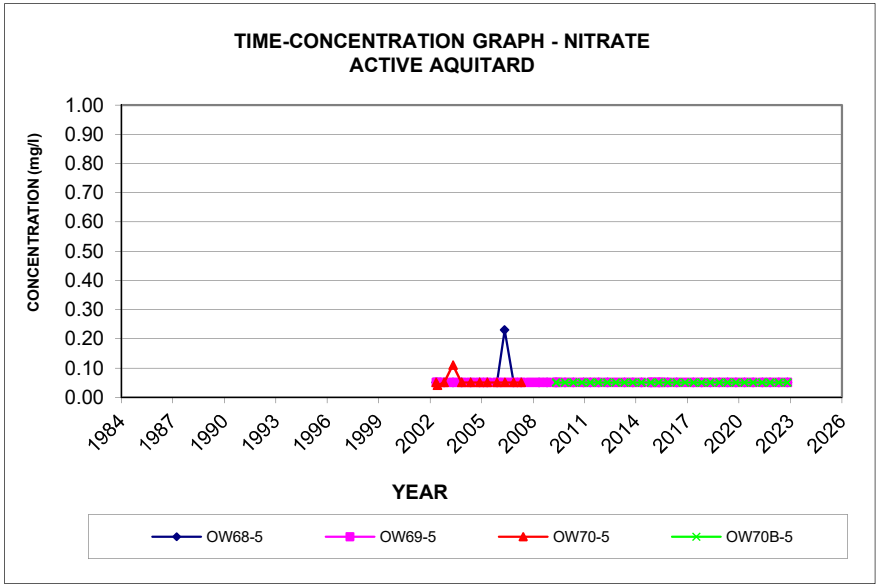

TIME-CONCENTRATION GRAPH - BORON
ACTIVE AQUITARD
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW60-4
OW67-4

FIGURE D-4


TIME-CONCENTRATION GRAPH - CHLORIDE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW68-5
OW69-5
OW70-5
OW70B-5


TIME-CONCENTRATION GRAPH - NITRATE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW68-5
OW69-5
OW70-5
OW70B-5

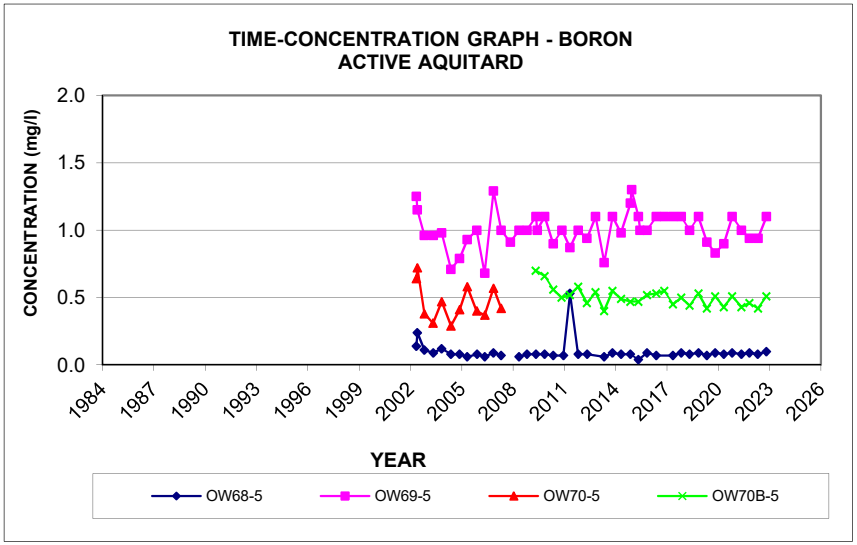
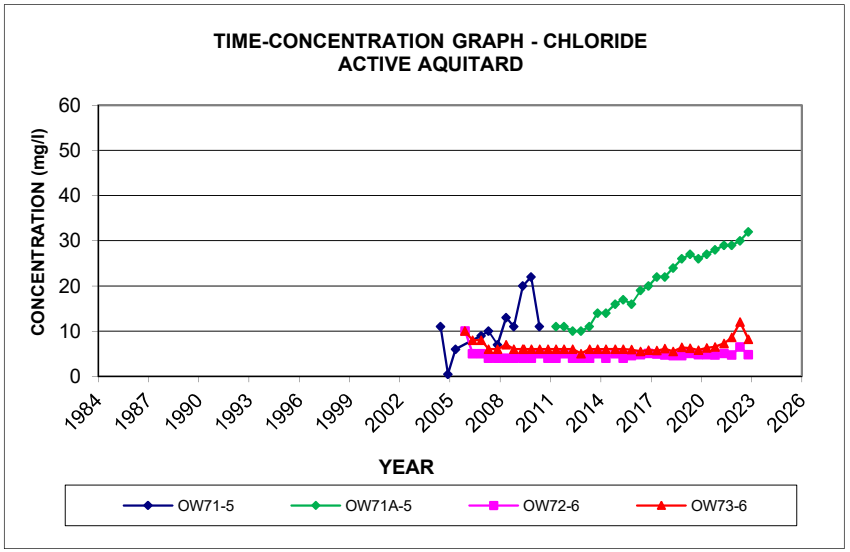
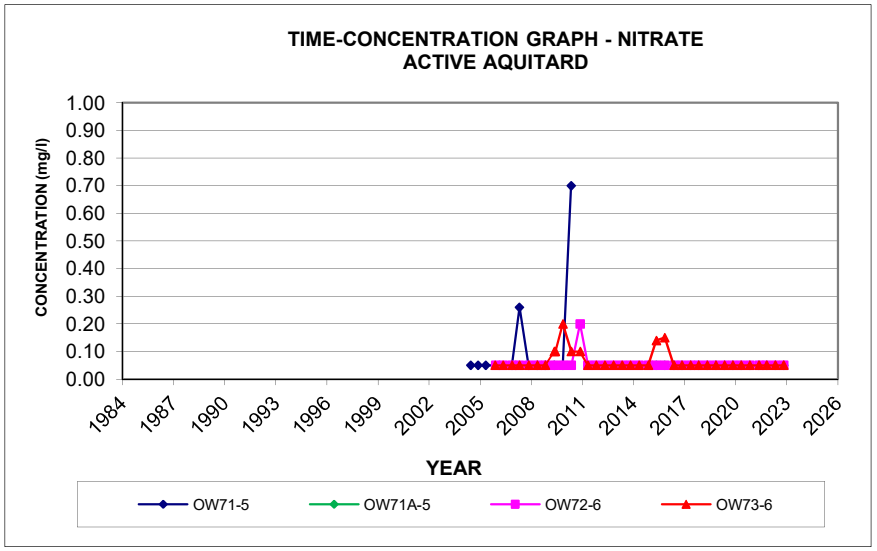

TIME-CONCENTRATION GRAPH - BORON
ACTIVE AQUITARD
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW68-5
OW69-5
OW70-5
OW70B-5

FIGURE D-5


TIME-CONCENTRATION GRAPH - CHLORIDE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW71-5
OW71A-5
OW72-6
OW73-6


TIME-CONCENTRATION GRAPH - NITRATE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW71-5
OW71A-5
OW72-6
OW73-6

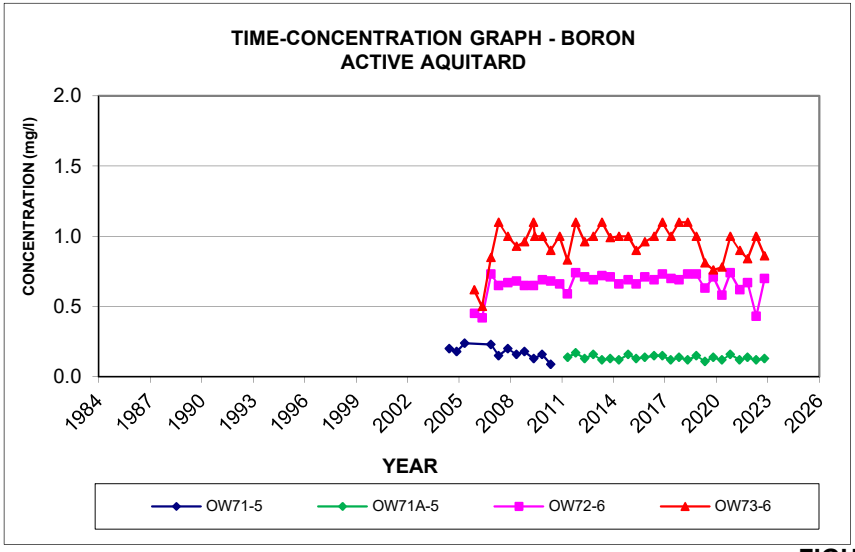
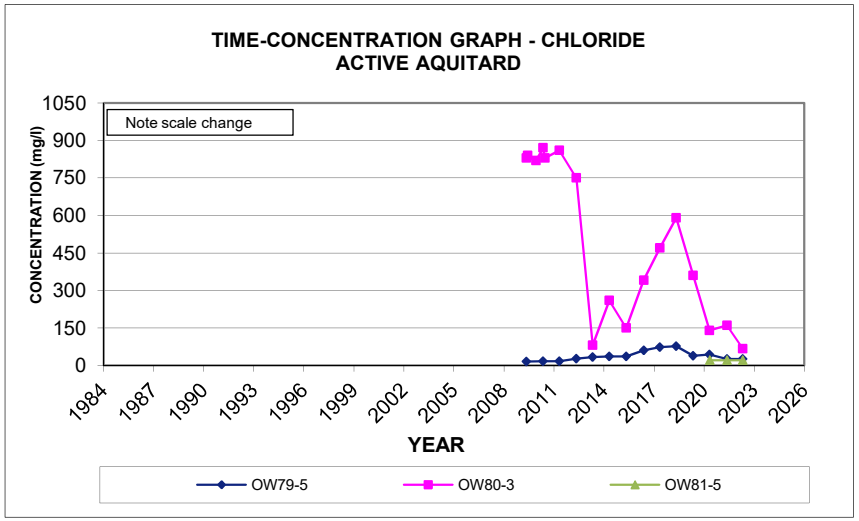
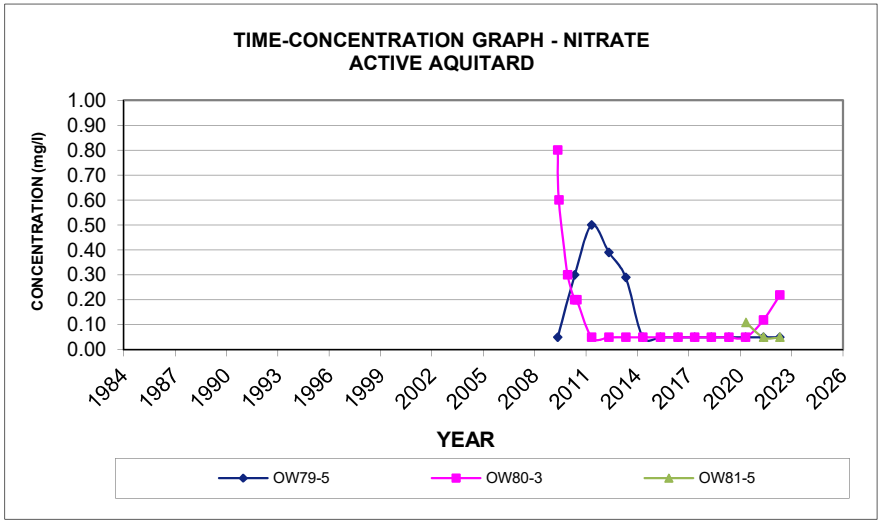

TIME-CONCENTRATION GRAPH - BORON
ACTIVE AQUITARD
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW71-5
OW71A-5
OW72-6
OW73-6

FIGURE D-6


TIME-CONCENTRATION GRAPH - CHLORIDE
ACTIVE AQUITARD
Note scale change
CONCENTRATION (mg/l)
1050
900
750
600
450
300
150
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-5
OW80-3
OW81-5


TIME-CONCENTRATION GRAPH - NITRATE
ACTIVE AQUITARD
CONCENTRATION (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-5
OW80-3
OW81-5

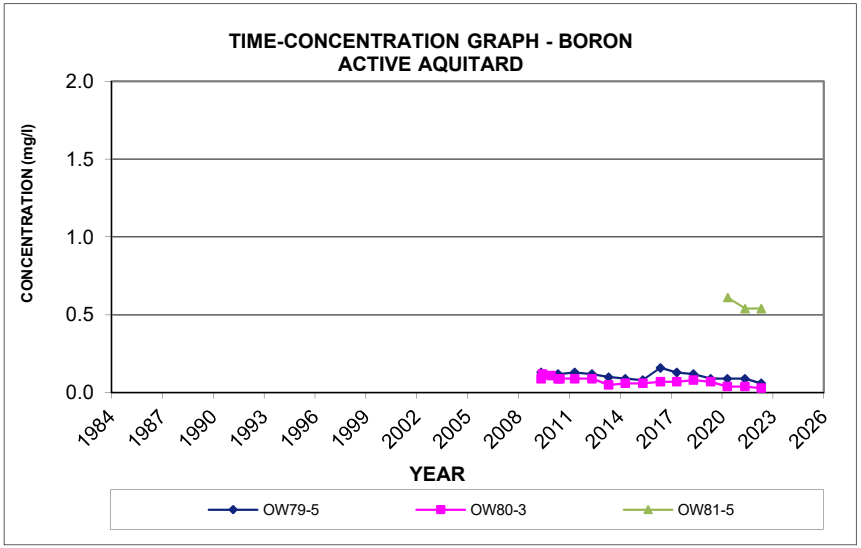
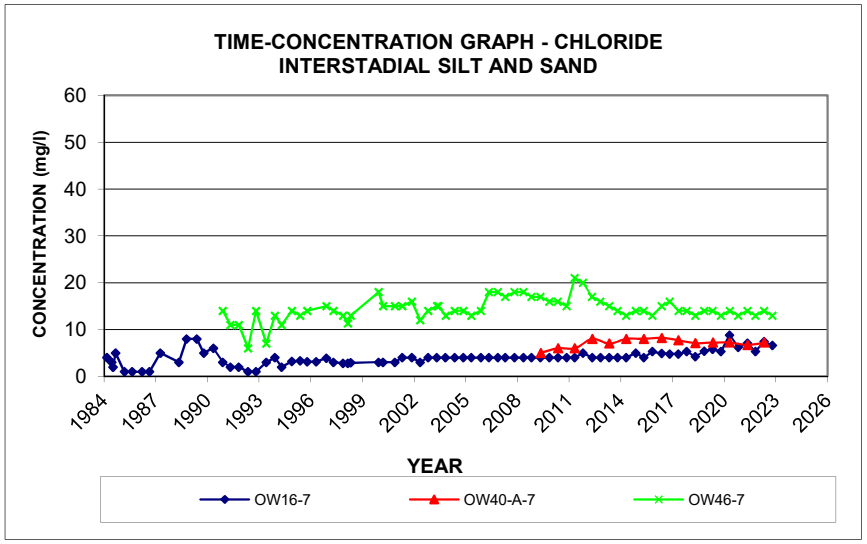
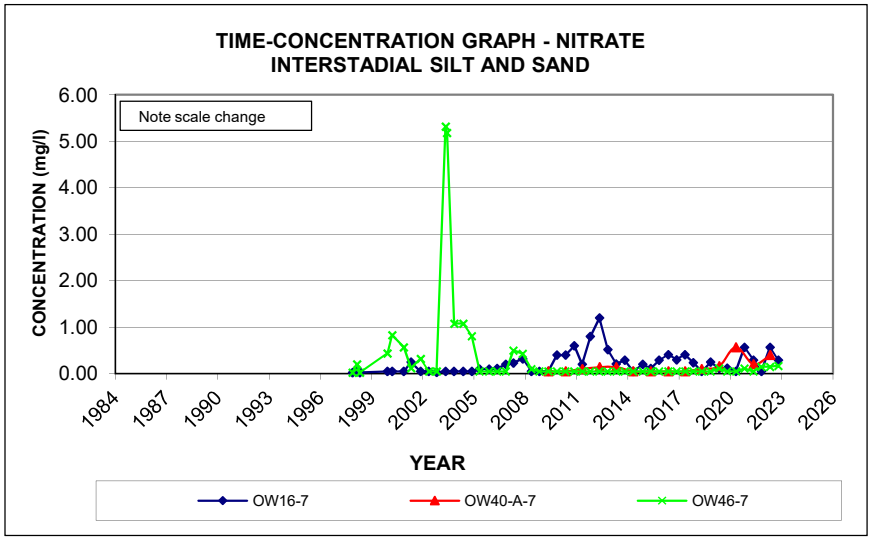

TIME-CONCENTRATION GRAPH - BORON
ACTIVE AQUITARD
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-5
OW80-3
OW81-5

FIGURE D-7


TIME-CONCENTRATION GRAPH - CHLORIDE
INTERSTADIAL SILT AND SAND
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW16-7
OW40-A-7
OW46-7


TIME-CONCENTRATION GRAPH - NITRATE
INTERSTADIAL SILT AND SAND
Note scale change
CONCENTRATION (mg/l)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW16-7
OW40-A-7
OW46-7

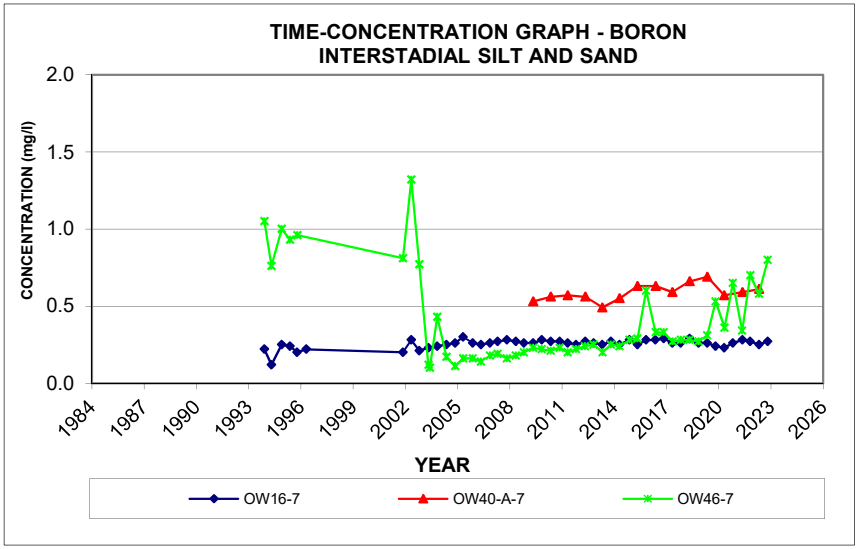
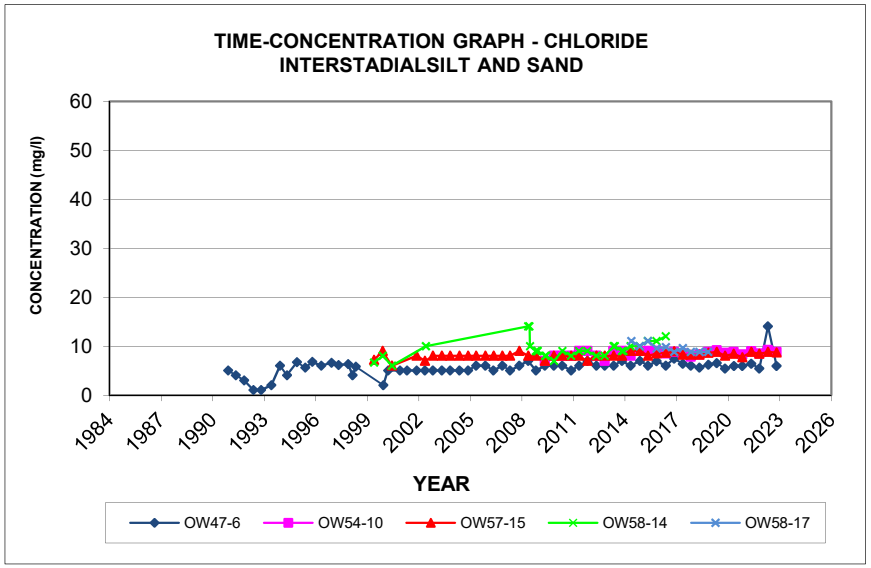
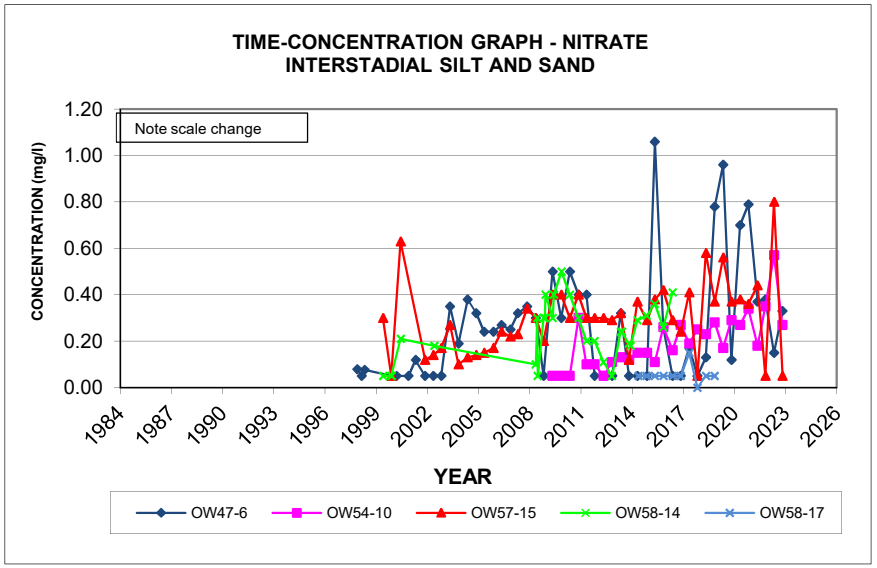

TIME-CONCENTRATION GRAPH - BORON
INTERSTADIAL SILT AND SAND
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW16-7
OW40-A-7
OW46-7

FIGURE D-8


TIME-CONCENTRATION GRAPH - CHLORIDE
INTERSTADIALSILT AND SAND
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW47-6
OW54-10
OW57-15
OW58-14
OW58-17


TIME-CONCENTRATION GRAPH - NITRATE
INTERSTADIAL SILT AND SAND
Note scale change
CONCENTRATION (mg/l)
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW47-6
OW54-10
OW57-15
OW58-14
OW58-17

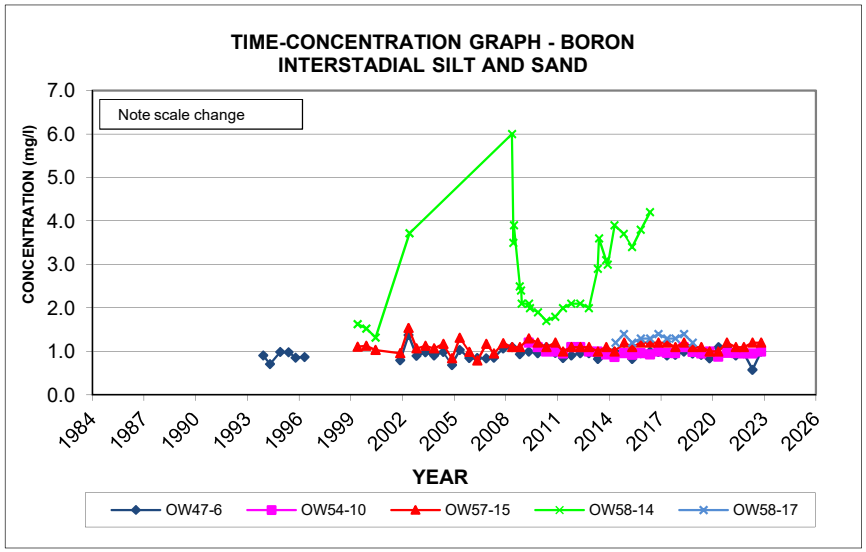
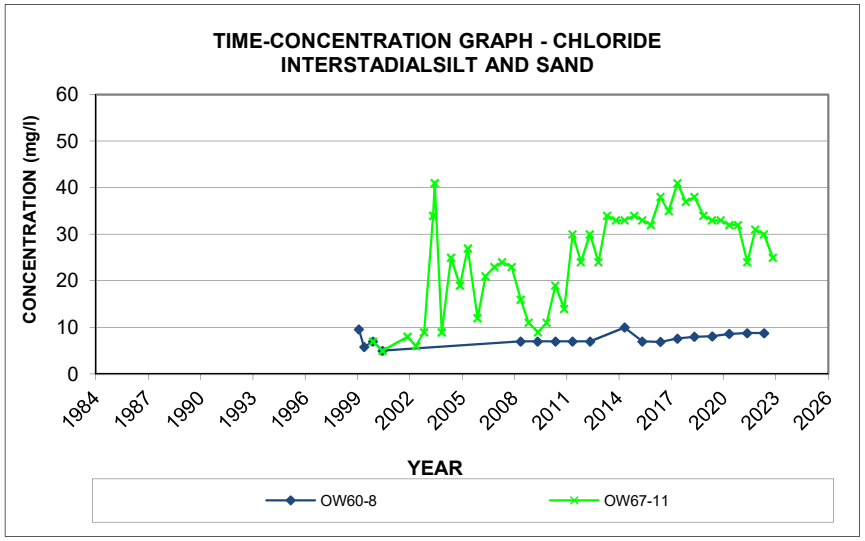
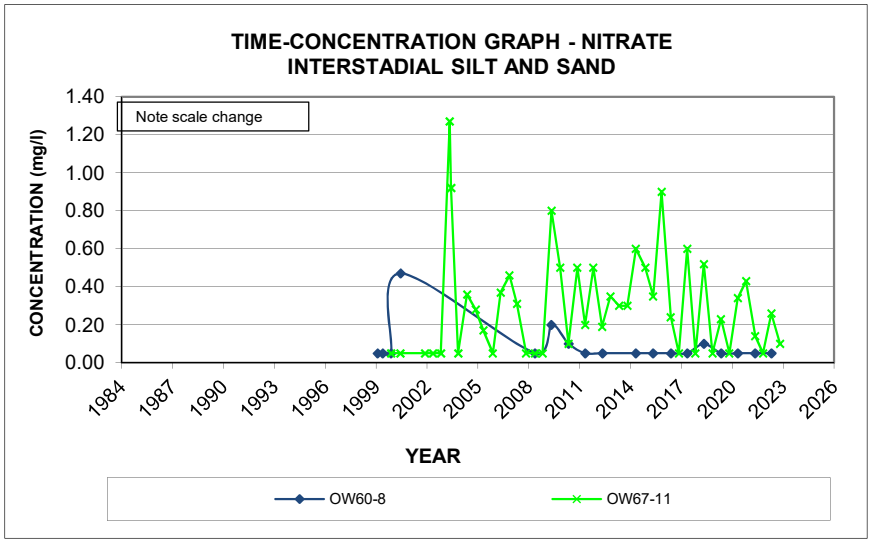

TIME-CONCENTRATION GRAPH - BORON
INTERSTADIAL SILT AND SAND
Note scale change
CONCENTRATION (mg/l)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW47-6
OW54-10
OW57-15
OW58-14
OW58-17

FIGURE D-9


TIME-CONCENTRATION GRAPH - CHLORIDE
INTERSTADIALSILT AND SAND
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW60-8
OW67-11


TIME-CONCENTRATION GRAPH - NITRATE
INTERSTADIAL SILT AND SAND
Note scale change
CONCENTRATION (mg/l)
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW60-8
OW67-11

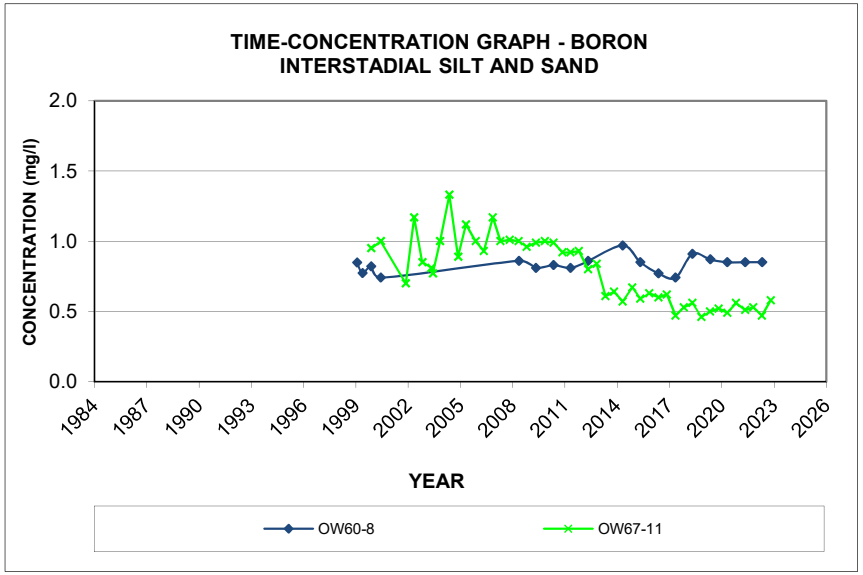
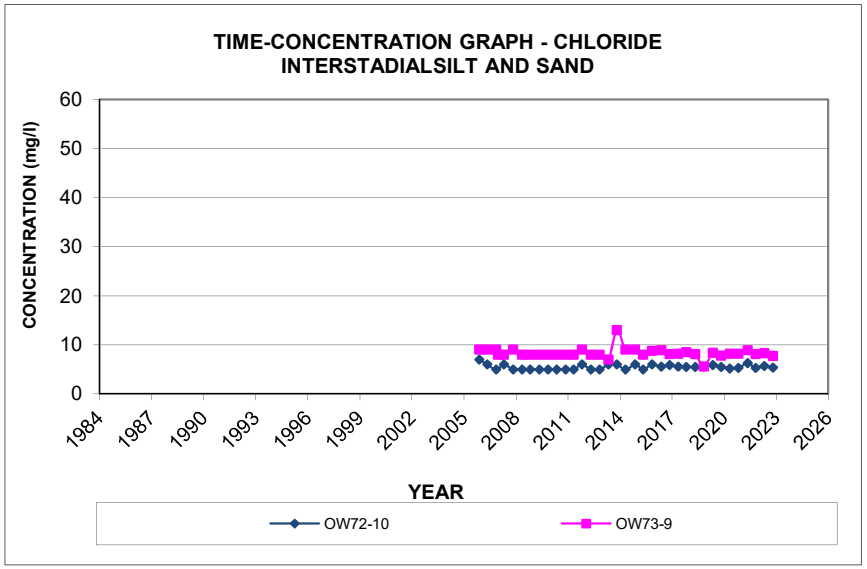
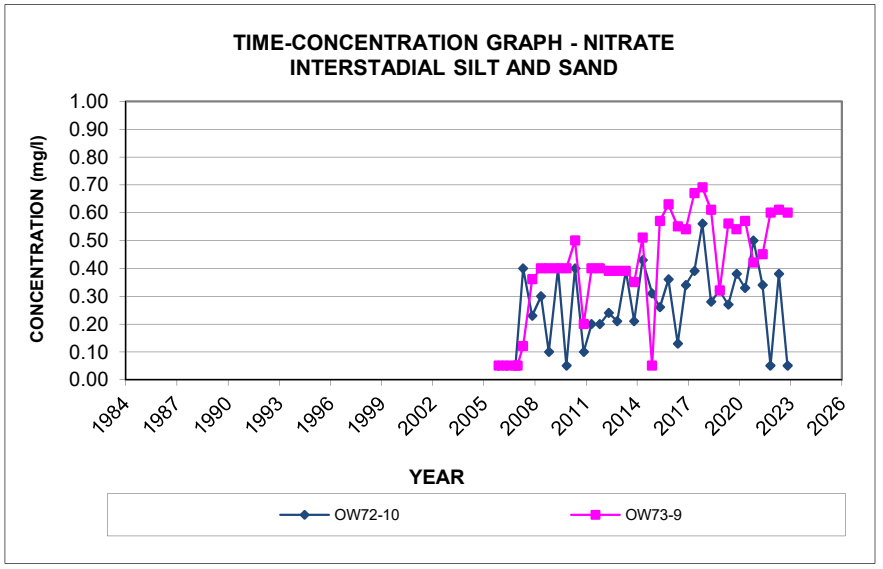

TIME-CONCENTRATION GRAPH - BORON
INTERSTADIAL SILT AND SAND
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW60-8
OW67-11

FIGURE D-10


TIME-CONCENTRATION GRAPH - CHLORIDE
INTERSTADIALSILT AND SAND
CONCENTRATION (mg/l)
60
50
40
30
20
10
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW72-10
OW73-9


TIME-CONCENTRATION GRAPH - NITRATE
INTERSTADIAL SILT AND SAND
CONCENTRATION (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW72-10
OW73-9

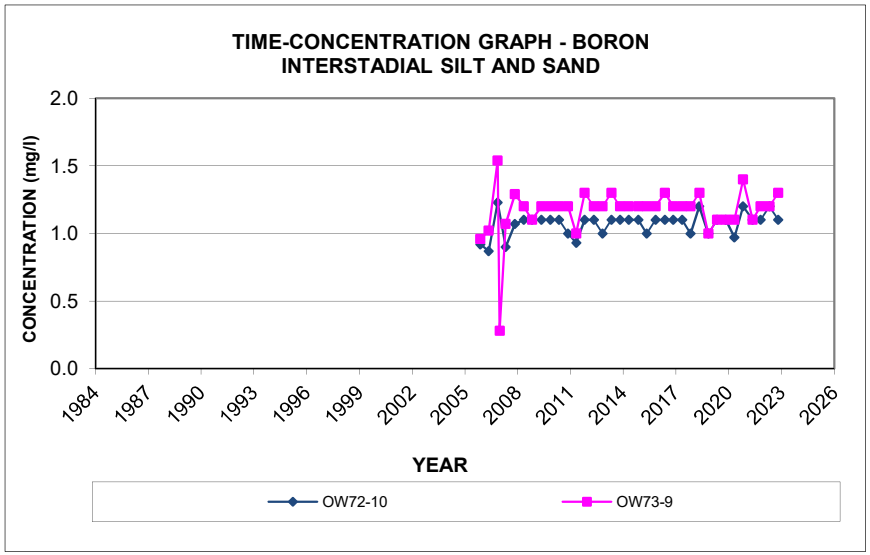
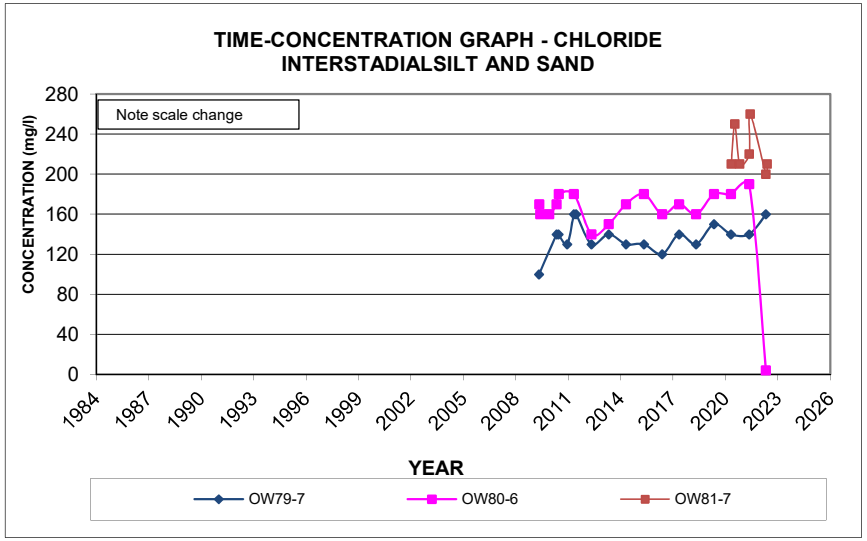
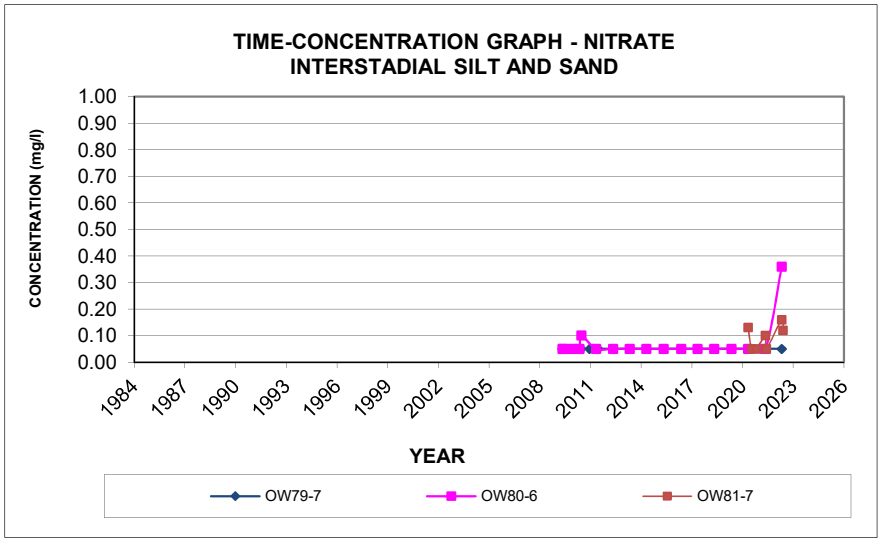

TIME-CONCENTRATION GRAPH - BORON
INTERSTADIAL SILT AND SAND
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW72-10
OW73-9

FIGURE D-11


TIME-CONCENTRATION GRAPH - CHLORIDE
INTERSTADIALSILT AND SAND
Note scale change
CONCENTRATION (mg/l)
280
240
200
160
120
80
40
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-7
OW80-6
OW81-7


TIME-CONCENTRATION GRAPH - NITRATE
INTERSTADIAL SILT AND SAND
CONCENTRATION (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-7
OW80-6
OW81-7

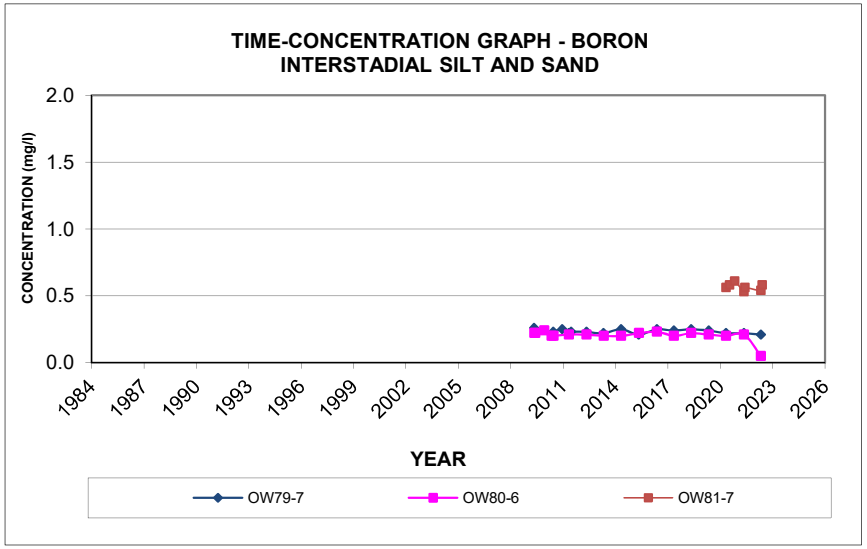
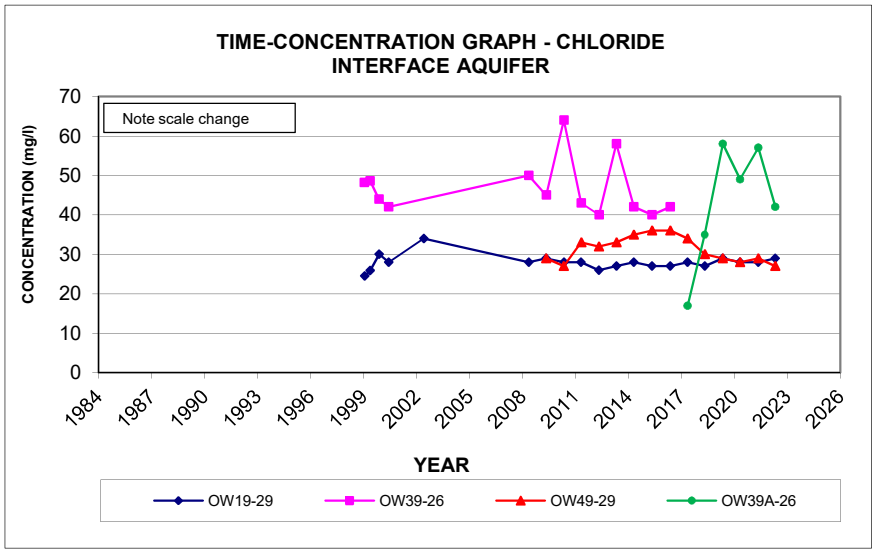
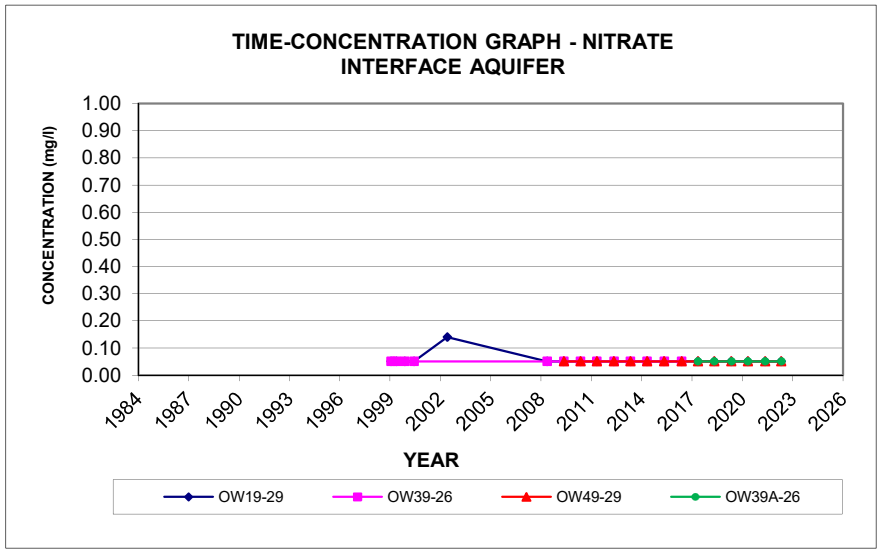

TIME-CONCENTRATION GRAPH - BORON
INTERSTADIAL SILT AND SAND
CONCENTRATION (mg/l)
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-7
OW80-6
OW81-7

FIGURE D-12


TIME-CONCENTRATION GRAPH - CHLORIDE
INTERFACE AQUIFER
Note scale change
CONCENTRATION (mg/l)
YEAR
OW19-29
OW39-26
OW49-29
OW39A-26


TIME-CONCENTRATION GRAPH - NITRATE
INTERFACE AQUIFER
CONCENTRATION (mg/l)
YEAR
OW19-29
OW39-26
OW49-29
OW39A-26

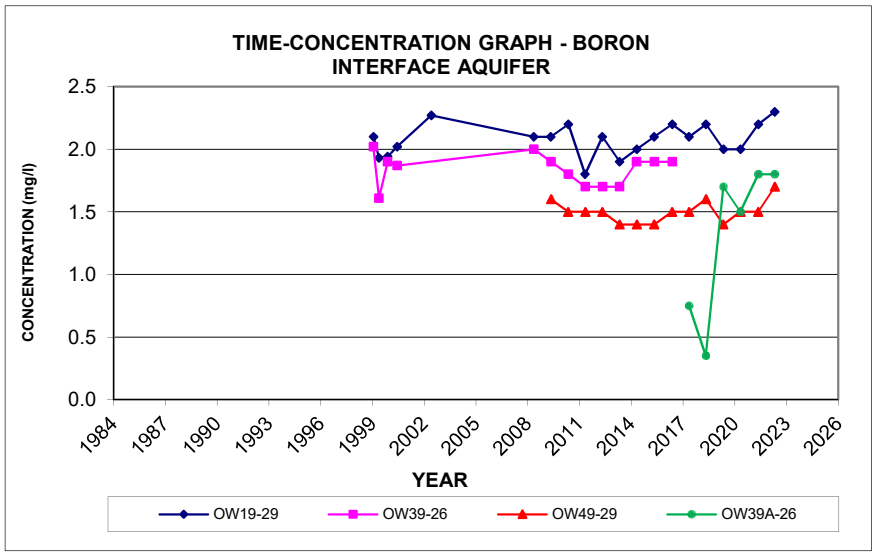
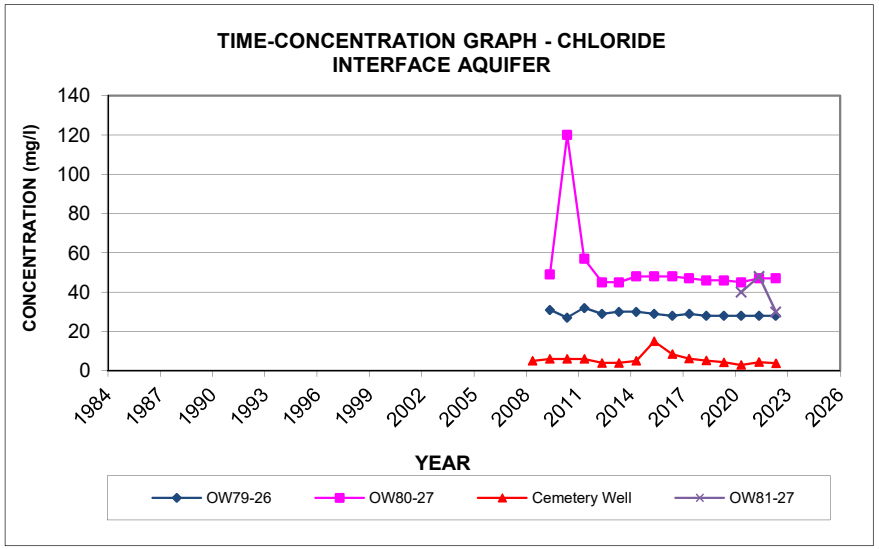
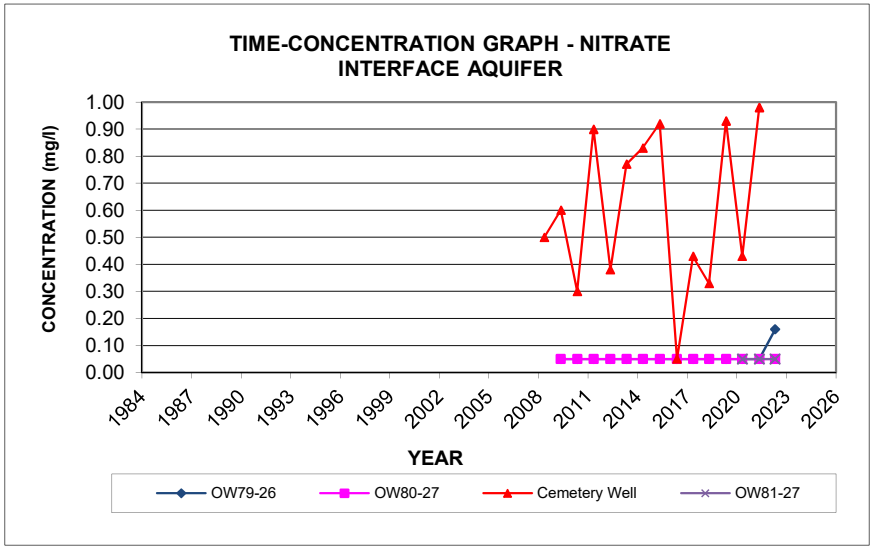

TIME-CONCENTRATION GRAPH - BORON
INTERFACE AQUIFER
CONCENTRATION (mg/l)
YEAR
OW19-29
OW39-26
OW49-29
OW39A-26

FIGURE D-13


TIME-CONCENTRATION GRAPH - CHLORIDE
INTERFACE AQUIFER
CONCENTRATION (mg/l)
140
120
100
80
60
40
20
0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-26
OW80-27
Cemetery Well
OW81-27


TIME-CONCENTRATION GRAPH - NITRATE
INTERFACE AQUIFER
CONCENTRATION (mg/l)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-26
OW80-27
Cemetery Well
OW81-27

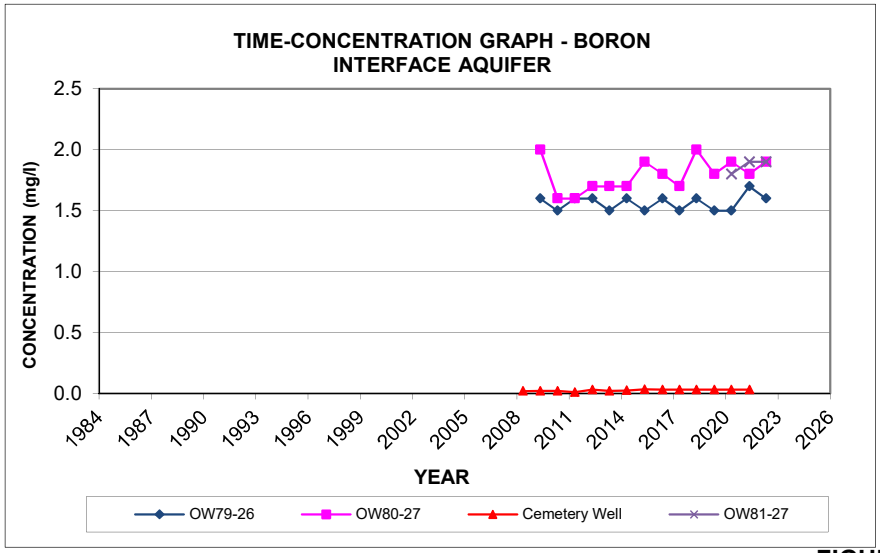

TIME-CONCENTRATION GRAPH - BORON
INTERFACE AQUIFER
CONCENTRATION (mg/l)
2.5
2.0
1.5
1.0
0.5
0.0
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011
2014
2017
2020
2023
2026
YEAR
OW79-26
OW80-27
Cemetery Well
OW81-27

FIGURE D-14

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5	OW16-5
Date			29-May-92	17-Jun-93	6-Jun-95	22-May-02	11-Jun-02	14-May-03	25-May-04	13-May-05	19-May-06	5-May-07
Laboratory			Enviroclean	Enviroclean	Enviroclean	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Benzene	µg/L	1	<0.2	<0.2	<0.2	<1.3	<0.5	<1.3	<1.3	<1.3	<0.5	<0.5
Toluene	µg/L	60	<0.2	<0.2	<0.4	<1.5	<0.5	<1.5	<1.5	<1.6	<0.5	<0.5
Ethylbenzene	µg/L	140	<0.2	<0.2	<0.4	<1.6	<0.5	<1.6	<1.6	<1.5	<0.5	<0.5
m&p-Xylenes	µg/L	90	<0.2	<0.2	<0.5	<3.4	<1.0	<3.4	<3.4	<3.4	<1.0	<1.0
o-Xylene	µg/L	90	<0.2	<0.2		<2.7	<0.5	<2.7	<2.7	<2.7	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2								
Dichloromethane	µg/L	50	<1.0	<1.0								
Vinyl Chloride	µg/L	1	<0.5	<0.5								

Parameter	Units	ODWQS	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6
Date			22-May-08	5-Nov-08	16-May-09	18-Nov-09	20-May-10	23-Nov-10	11-May-11	3-Nov-11	15-May-12	8-Nov-12	9-May-13
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6
Date			6-May-14	24-Nov-14	13-May-15	12-Nov-15	25-May-16	16-Nov-16	16-May-17	7-Nov-17	8-May-18	14-Nov-18	14-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20		<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20		<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20		<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20		<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20		<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50		<0.50
Dichloromethane	µg/L	50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0		<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20		<0.20

Parameter	Units	ODWQS	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6	OW16-6
Date			7-Nov-19	7-May-20	4-Nov-20	19-May-21	2-Nov-21	4-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.40	<0.40	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			14-Nov-91	29-May-92	17-Jun-93	12-May-94	22-May-08	5-Nov-08	16-May-09	18-Nov-09	20-May-10	24-Nov-10	12-May-11
Laboratory			Enviroclean	Enviroclean	Enviroclean	Enviroclean	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	µg/L	140	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m&p-Xylenes	µg/L	90	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o-Xylene	µg/L	90	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dichloromethane	µg/L	50	<1.0	<1.0	<1.1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	µg/L	1	<0.5	<0.5	<0.5		<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			3-Nov-11	15-May-12	8-Nov-12	9-May-13	6-May-14	24-Nov-14	13-May-15	12-Nov-15	25-May-16	16-Nov-16	16-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	0.3	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7	OW16-7
Date			7-Nov-17	8-May-18	14-Nov-18	14-May-19	5-Nov-19	7-May-20	4-Nov-20	19-May-21	2-Nov-21	4-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.50	<0.50	<0.50	<0.50	<0.40	<0.40	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	0.22	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-5	OW17-4	OW17-4	OW17-4
Date			22-May-02	14-Jun-02	5-Nov-02	14-May-03	25-May-04	13-May-05	19-May-06	4-May-07	22-May-08	16-May-09
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	<0.1	<0.1
Toluene	µg/L	60	<1.5	<0.5	<1.5	<1.5	<1.5	<1.6	<0.5	<0.5	<0.2	<0.2
Ethylbenzene	µg/L	140	<1.6	<0.5	<1.6	<1.6	<1.6	<1.5	<0.5	<0.5	<0.1	<0.1
m&p-Xylenes	µg/L	90	<3.4	<1.0	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0	<0.1	<0.1
o-Xylene	µg/L	90	<2.7	<0.5	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5	<0.1	<0.1
1,4-Dichlorobenzene	µg/L	5									<0.2	<0.2
Dichloromethane	µg/L	50									<0.5	<0.5
Vinyl Chloride	µg/L	1									<0.2	<0.2

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4	OW17-4
Date			20-May-10	10-May-11	10-May-12	13-May-13	6-May-14	13-May-15	27-May-16	19-May-17	10-May-18	14-May-19	11-May-20
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas
Benzene	µg/L	1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50	<0.40
Dichloromethane	µg/L	50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW17-4	OW17-4
Date			20-May-21	3-May-22
Laboratory			Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20

Parameter	Units	ODWQS	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29	OW19-29
Date			2-Dec-99	11-Jun-02	22-May-08	19-May-10	10-May-11	9-May-12	6-May-14	12-May-15	26-May-16	10-May-18	8-May-20
Laboratory			Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas
Benzene	µg/L	1	<1.3	<0.5	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Toluene	µg/L	60	<1.5	<0.5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<1.6	<0.5	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<3.4	<1.0	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	90	<2.7	<0.5	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5			<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.50	<0.40
Dichloromethane	µg/L	50			<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1			<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW19-29
Date			4-May-22
Laboratory			Bureau Veritas
Benzene	µg/L	1	<0.20
Toluene	µg/L	60	<0.20
Ethylbenzene	µg/L	140	<0.20
m&p-Xylenes	µg/L	90	<0.20
o-Xylene	µg/L	90	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40
Dichloromethane	µg/L	50	<2.0
Vinyl Chloride	µg/L	1	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26	OW39-26
Date			20-Nov-99	10-Jun-02	22-May-08	18-May-10	11-May-11	16-May-12	5-May-14	14-May-15	27-May-16	8-May-18	6-May-20
Laboratory			Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas
Benzene	µg/L	1	<1.3	<0.5	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	0.33	<0.20
Toluene	µg/L	60	<1.5	<0.5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<1.6	<0.5	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<3.4	<1.0	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	0.21	<0.20
o-Xylene	µg/L	90	<2.7	<0.5	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5			<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.50	<0.40
Dichloromethane	µg/L	50			<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1			<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW39-26
Date			5-May-22
Laboratory			Bureau Veritas
Benzene	µg/L	1	<0.20
Toluene	µg/L	60	<0.20
Ethylbenzene	µg/L	140	<0.20
m&p-Xylenes	µg/L	90	<0.20
o-Xylene	µg/L	90	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40
Dichloromethane	µg/L	50	<2.0
Vinyl Chloride	µg/L	1	<0.20

Parameter	Units	ODWQS	OW40B-4	OW40B-4	OW40B-4	OW40B-4	OW40B-4	OW40B-4r	OW40B-4r	OW40B-4r	OW40D-4	OW40D-4	OW40D-4
Date			19-May-09	21-May-10	12-May-11	15-May-12	12-Jun-12	3-Dec-12	8-May-13	6-May-14	14-May-15	27-May-16	17-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW40D-4	OW40D-4	OW40D-4	OW40D-4	OW40D-4
Date			**8-May-18**	**15-May-19**	**7-May-20**	**20-May-21**	**5-May-22**
Laboratory			**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7	OW40A-7
Date			**19-May-09**	**20-May-10**	**12-May-11**	**15-May-12**	**9-May-13**	**5-May-14**	**14-May-15**	**27-May-16**	**17-May-17**	**8-May-18**	**15-May-19**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<2.5	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<10	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<1.0	<0.20

Parameter	Units	ODWQS	OW40A-7	OW40A-7	OW40A-7
Date			**7-May-20**	**20-May-21**	**5-May-22**
Laboratory			**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7
Date			6-Jun-95	22-May-08	16-May-09	19-May-10	10-May-11	10-May-12	13-May-13	6-May-14	13-May-15	27-May-16	19-May-17
Laboratory			Enviroclean	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.4	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.4	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.4	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5		<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50		<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1		<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW46-7	OW46-7	OW46-7	OW46-7	OW46-7
Date			10-May-18	14-May-19	11-May-20	18-May-21	4-May-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6
Date			6-Jun-95	22-May-08	16-May-09	19-May-10	10-May-11	10-May-12	13-May-13	6-May-14	13-May-15	27-May-16	19-May-17
Laboratory			Zenon	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.4	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.4	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.4	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5		<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50		<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1		<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW47-6	OW47-6	OW47-6	OW47-6	OW47-6
Date			10-May-18	14-May-19	11-May-20	18-May-21	4-May-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29	OW49-29
Date			19-May-09	18-May-10	11-May-11	9-May-12	6-May-14	12-May-15	25-May-16	8-May-18	7-May-20	3-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.50	<0.40	<0.40
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54-4	OW54A-4
Date			22-Dec-99	29-Mar-00	23-May-02	6-Nov-02	15-May-03	26-May-04	12-May-05	19-May-06	4-May-07	22-May-08
Laboratory					Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM
Benzene	µg/L	1	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	<0.1
Toluene	µg/L	60	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.6	<0.5	<0.5	<0.2
Ethylbenzene	µg/L	140	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.5	<0.5	<0.5	<0.1
m&p-Xylenes	µg/L	90	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0	<0.1
o-Xylene	µg/L	90	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5	<0.1
1,4-Dichlorobenzene	µg/L	5										<0.2
Dichloromethane	µg/L	50										<0.5
Vinyl Chloride	µg/L	1										<0.2

Parameter	Units	ODWQS	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4	OW54A-4
Date			19-May-09	20-May-10	11-May-11	9-May-12	10-May-13	6-May-14	12-May-15	25-May-16	18-May-17	9-May-18	14-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Toluene	µg/L	60	3.1	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW54A-4	OW54A-4	OW54A-4
Date			8-May-20	19-May-21	4-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10	OW54-10
Date			14-May-09	17-May-10	11-May-11	9-May-12	10-May-13	6-May-14	12-May-15	25-May-16	18-May-17	9-May-18	14-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW54-10	OW54-10	OW54-10
Date			8-May-20	18-May-21	3-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4
Date			22-May-02	10-Jun-02	6-Nov-02	15-May-03	16-Jun-03	25-May-04	12-May-05	18-May-06	5-May-07	22-May-08
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<1.3	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	<0.1
Toluene	µg/L	60	<1.5	<0.5	<1.5	<1.5	<1.5	<1.5	<1.6	<0.5	<0.5	<0.2
Ethylbenzene	µg/L	140	<1.6	<0.5	<1.6	<1.6	<1.6	<1.6	<1.5	<0.5	<0.5	<0.1
m&p-Xylenes	µg/L	90	<3.4	<1.0	<3.4	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0	<0.1
o-Xylene	µg/L	90	<2.7	<0.5	<2.7	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5	<0.1
1,4-Dichlorobenzene	µg/L	5										<0.2
Dichloromethane	µg/L	50										<0.5
Vinyl Chloride	µg/L	1										<0.2

Parameter	Units	ODWQS	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4	OW56-4
Date			16-May-09	19-May-10	10-May-11	10-May-12	13-May-13	6-May-14	13-May-15	27-May-16	19-May-17	10-May-18	14-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW56-4	OW56-4	OW56-4
Date			11-May-20	19-May-21	4-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-5	OW57-4	OW57-4	OW57-4
Date			22-May-02	10-Jun-02	6-Nov-02	15-May-03	26-May-04	12-May-05	19-May-06	5-May-07	22-May-08	16-May-09
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	DRY	<0.1
Toluene	µg/L	60	<1.5	<0.5	<1.5	<1.5	<1.5	<1.6	<0.5	<0.5		<0.2
Ethylbenzene	µg/L	140	<1.6	<0.5	<1.6	<1.6	<1.6	<1.5	<0.5	<0.5		<0.1
m&p-Xylenes	µg/L	90	<3.4	<1.0	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0		<0.1
o-Xylene	µg/L	90	<2.7	<0.5	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5		<0.1
1,4-Dichlorobenzene	µg/L	5										<0.2
Dichloromethane	µg/L	50										<0.5
Vinyl Chloride	µg/L	1										<0.2

Parameter	Units	ODWQS	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4	OW57-4
Date			19-May-10	10-May-11	9-May-12	13-May-13	6-May-14	12-May-15	26-May-16	19-May-17	10-May-18	14-May-19	8-May-20
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas
Benzene	µg/L	1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50	<0.40
Dichloromethane	µg/L	50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW57-4	OW57-4
Date			19-May-21	3-May-22
Laboratory			Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

PARAMETER	UNITS	ODWQS	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15
Date			**22-May-08**	**16-May-09**	**19-May-10**	**10-May-11**	**9-May-12**	**13-May-13**	**6-May-14**	**12-May-15**	**26-May-16**	**19-May-17**	**10-May-18**
Laboratory			**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

PARAMETER	UNITS	ODWQS	OW57-15	OW57-15	OW57-15	OW57-15	OW57-15
Date			**22-May-08**	**16-May-19**	**8-May-20**	**18-May-21**	**3-May-22**
Laboratory			**MAXXAM**	**MAXXAM**	**Bureau Veritas**	**Bureau Veritas**	**Bureau Veritas**
Benzene	µg/L	1	<0.1	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.5	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.20	<0.20	<0.20	<0.20

PARAMETER	UNITS	ODWQS	OW58-4	OW58-4	OW58-4	OW58-4
Date			**15-Jun-02**	**22-Jul-02**	**6-Aug-02**	**12-May-05**
Laboratory			**Accutest**	**Accutest**	**Accutest**	**Accutest**
Benzene	µg/L	1	<0.5	<1.3	<1.3	<1.3
Toluene	µg/L	60	<0.5	<1.5	<1.5	<1.6
Ethylbenzene	µg/L	140	<0.5	<1.6	<1.6	<1.5
m&p-Xylenes	µg/L	90	<1.0	<3.4	<3.4	<3.4
o-Xylene	µg/L	90	<0.5	<2.7	<2.7	<2.7

PARAMETER	UNITS	ODWQS	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6
Date			**19-May-06**	**5-May-07**	**22-May-08**	**19-May-09**	**19-May-10**	**10-May-11**	**9-May-12**	**13-May-13**	**6-May-14**	**12-May-15**
Laboratory			**Accutest**	**Accutest**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**	**MAXXAM**
Benzene	µg/L	1	<0.5	<0.5	<0.1	<0.1	<0.2	<0.1	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.5	<0.5	<0.2	<0.2	<0.4	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.5	<0.5	<0.1	<0.1	<0.2	<0.1	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<1.0	<1.0	<0.1	<0.1	<0.2	<0.1	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.5	<0.5	<0.1	<0.1	<0.2	<0.1	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5			<0.2	<0.2	<0.4	<0.2	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50			<0.5	<0.5	<1	<0.5	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1			<0.2	<0.2	<0.4	<0.2	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

PARAMETER	UNITS	ODWQS	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6	OW58-6
Date			26-May-16	19-May-17	10-May-18	14-May-19	8-May-20	19-May-21	4-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

PARAMETER	UNITS	ODWQS	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14	OW58-14
Date			22-May-08	19-May-09	11-Jun-09	20-May-10	10-May-11	9-May-12	13-May-13	6-May-14	12-May-15	26-May-16
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20

PARAMETER	UNITS	ODWQS	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17	OW58-17
Date			27-May-14	12-May-15	27-May-16	19-May-17	10-May-18	14-May-19	8-May-20	18-May-21	3-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	0.13	0.11	<0.10	0.12	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6
Date			19-May-06	5-May-07	22-May-08	16-May-09	11-Jun-09	19-May-10	10-May-11	9-May-12	10-May-13	6-May-14
Laboratory			Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<1.0	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5			<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50			<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1			<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6	OW59-6
Date			12-May-15	26-May-16	18-May-17	10-May-18	14-May-19	8-May-20	19-May-21	4-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4
Date			23-May-08	19-May-09	21-May-10	12-May-11	15-May-12	9-May-13	6-May-14	13-May-15	27-May-16	16-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW60-4	OW60-4	OW60-4	OW60-4	OW60-4
Date			8-May-18	15-May-19	7-May-20	19-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8
Date			23-May-08	14-May-09	21-May-10	12-May-11	15-May-12	9-May-13	6-May-14	13-May-15	27-May-16	16-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW60-8	OW60-8	OW60-8	OW60-8	OW60-8
Date			8-May-18	15-May-19	7-May-20	19-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	13	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4
Date			22-May-02	12-Jun-02	6-Nov-02	15-May-03	25-May-04	12-May-05	19-May-06	4-May-07	22-May-08	16-May-09
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	DRY	<0.1
Toluene	µg/L	60	<1.5	<0.5	<1.5	<1.5	<1.5	<1.5	<0.5	<0.5		<0.2
Ethylbenzene	µg/L	140	<1.6	<0.5	<1.6	<1.6	<1.6	<1.6	<0.5	<0.5		<0.1
m&p-Xylenes	µg/L	90	<3.4	<1.0	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0		<0.1
o-Xylene	µg/L	90	<2.7	<0.5	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5		<0.1
1,4-Dichlorobenzene	µg/L	5										<0.2
Dichloromethane	µg/L	50										<0.5
Vinyl Chloride	µg/L	1										<0.2

Parameter	Units	ODWQS	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4
Date			11-Jun-09	15-Dec-09	20-May-10	11-May-11	9-May-12	9-May-13	6-May-14	12-May-15	25-May-16	17-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW67-4	OW67-4	OW67-4	OW67-4	OW67-4
Date			8-May-18	13-May-19	6-May-20	20-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11
Date			22-May-08	19-May-09	20-May-10	11-May-11	9-May-12	9-May-13	6-May-14	12-May-15	25-May-16	17-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11	OW67-11
Date			14-Nov-18	8-May-18	13-May-19	6-May-20	18-May-21	3-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	0.21	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	0.58	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW68-5	OW68-5	OW68-5	OW68-5	OW68-4	OW68-4	OW68-4	OW68-5	OW68-5	OW68-5
Date			22-May-02	12-Jun-02	5-Nov-02	15-May-03	25-May-04	25-May-04	13-May-05	18-May-06	4-May-07	22-May-08
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<1.3	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	<0.1
Toluene	µg/L	60	<1.5	<0.5	<1.5	<1.5	<1.5	<1.5	<1.6	<0.5	<0.5	<0.2
Ethylbenzene	µg/L	140	<1.6	<0.5	<1.6	<1.6	<1.6	<1.6	<1.5	<0.5	<0.5	<0.1
m&p-Xylenes	µg/L	90	<3.4	<1.0	<3.4	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0	<0.1
o-Xylene	µg/L	90	<2.7	<0.5	<2.7	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5	<0.1
1,4-Dichlorobenzene	µg/L	5										<0.2
Dichloromethane	µg/L	50										<0.5
Vinyl Chloride	µg/L	1										<0.2

Parameter	Units	ODWQS	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5	OW68-5
Date			16-May-09	20-May-10	11-May-11	15-May-12	13-May-13	6-May-14	13-May-15	25-May-16	16-May-17	8-May-18	14-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW68-5	OW68-5	OW68-5
Date			7-May-20	20-May-21	4-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-6	OW69-5	OW69-5	OW69-5
Date			22-May-02	12-Jun-02	5-Nov-02	15-May-03	26-May-04	13-May-05	19-May-06	5-May-07	22-May-08	16-May-09
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	MAXXAM	MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	<0.1	<0.1
Toluene	µg/L	60	<1.5	<0.5	<1.5	<1.5	<1.5	<1.6	<0.5	<0.5	<0.2	<0.2
Ethylbenzene	µg/L	140	<1.6	<0.5	<1.6	<1.6	<1.6	<1.5	<0.5	<0.5	<0.1	<0.1
m&p-Xylenes	µg/L	90	<3.4	<1.0	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0	<0.1	<0.1
o-Xylene	µg/L	90	<2.7	<0.5	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5	<0.1	<0.1
1,4-Dichlorobenzene	µg/L	5									<0.2	<0.2
Dichloromethane	µg/L	50									<0.5	<0.5
Vinyl Chloride	µg/L	1									<0.2	<0.2

Parameter	Units	ODWQS	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5	OW69-5
Date			11-Jun-09	19-May-10	10-May-11	10-May-12	13-May-13	6-May-14	12-May-15	27-May-16	19-May-17	10-May-18	14-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW69-5	OW69-5	OW69-5
Date			11-May-20	20-May-21	5-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-5	OW70-6	OW70-5	OWB70-5	OW70B-5
Date			22-May-02	12-Jun-02	5-Nov-02	14-May-03	26-May-04	13-May-05	19-May-06	4-May-07	17-Jul-08	14-May-09
Laboratory			Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest		MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<1.3	<1.3	<1.3	<1.3	<0.5	<0.5	DRY	<0.1
Toluene	µg/L	60	<1.5	<0.5	<1.5	<1.5	<1.5	<1.6	<0.5	<0.5		<0.2
Ethylbenzene	µg/L	140	<1.6	<0.5	<1.6	<1.6	<1.6	<1.5	<0.5	<0.5		<0.1
m&p-Xylenes	µg/L	90	<3.4	<1.0	<3.4	<3.4	<3.4	<3.4	<1.0	<1.0		<0.1
o-Xylene	µg/L	90										<0.1
1,4-Dichlorobenzene	µg/L	5										<0.2
Dichloromethane	µg/L	50										<0.5
Vinyl Chloride	µg/L	1	<2.7	<0.5	<2.7	<2.7	<2.7	<2.7	<0.5	<0.5		<0.2

Parameter	Units	ODWQS	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5	OW70B-5
Date			20-May-10	11-May-11	9-May-12	9-May-13	6-May-14	12-May-15	25-May-16	17-May-17	8-May-18	13-May-19	6-May-20
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas
Benzene	µg/L	1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50	<0.40
Dichloromethane	µg/L	50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW70B-5	OW70B-5
Date			18-May-21	5-May-22
Laboratory			Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20

Parameter	Units	ODWQS	OW71-5	OW71-5	OW71-5	OW71-5	OW71-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5
Date			21-Jun-04	5-May-07	22-May-08	19-May-09	17-May-10	11-May-11	9-May-12	9-May-13	6-May-14	12-May-15
Laboratory			Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<1.3	<0.5	<0.1	<0.1	<0.3	<0.1	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<1.5	<0.5	<0.2	<0.2	<0.5	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<1.6	<0.5	<0.1	<0.1	<0.3	<0.1	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<3.4	<1.0	<0.1	<0.1	<0.3	<0.1	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<2.7	<0.5	<0.1	<0.1	<0.3	<0.1	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5			<0.2	<0.2	<0.5	<0.2	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50			<0.5	<5	<1	<0.5	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1			<0.2	<0.2	<0.5	<0.2	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5	OW71A-5
Date			25-May-16	17-May-17	9-May-18	13-May-19	6-May-20	19-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<1.0	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<1.0	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<1.0	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<1.0	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<2.5	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<10	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6
Date			19-May-06	5-May-07	22-May-08	16-May-09	20-May-10	10-May-11	9-May-12	10-May-13	6-May-14	12-May-15
Laboratory			Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<1.0	<1.0	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5			<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50			<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	1.2
Vinyl Chloride	µg/L	1			<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6	OW72-6
Date			26-May-16	18-May-17	9-May-18	14-May-19	8-May-20	21-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10
Date			22-May-08	19-May-09	19-May-10	10-May-11	9-May-12	10-May-13	6-May-14	12-May-15	26-May-16	18-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	1.1	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW72-10	OW72-10	OW72-10	OW72-10	OW72-10
Date			9-May-18	14-May-19	8-May-20	18-May-21	3-May-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6
Date			19-May-06	5-May-07	22-May-08	16-May-09	11-Jun-09	19-May-10	10-May-11	9-May-12	10-May-13	6-May-14
Laboratory			Accutest	Accutest	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.5	<1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<1.0	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5			<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50			<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1			<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6	OW73-6
Date			12-May-15	26-May-16	18-May-17	10-May-18	14-May-19	8-May-20	21-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	1.4	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9
Date			22-May-08	19-May-09	19-May-10	10-May-11	9-May-12	10-May-13	6-May-14	12-May-15	26-May-16	18-May-17
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	1.1	<0.50	<0.50
Vinyl Chloride	µg/L	1	0.2	0.3	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW73-9	OW73-9	OW73-9	OW73-9	OW73-9
Date			10-May-18	14-May-19	8-May-20	18-May-21	3-May-22
Laboratory			MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW74-6	OW74-6
Date			19-May-06	5-May-07
Laboratory			Accutest	Accutest
Benzene	µg/L	1	<0.5	<0.5
Toluene	µg/L	60	<0.5	<1.0
Ethylbenzene	µg/L	140	<0.5	<0.5
m&p-Xylenes	µg/L	90	<1.0	<0.5
o-Xylene	µg/L	90	<0.5	<0.5

Parameter	Units	ODWQS	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5	OW79-5
Date			15-May-09	17-May-10	12-May-11	16-May-12	8-May-13	5-May-14	13-May-15	27-May-16	17-May-17	8-May-18	15-May-19
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW79-5	OW79-5	OW79-5
Date			6-May-20	21-May-21	5-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7
Date			14-May-09	17-May-10	22-Jun-10	23-Dec-10	12-May-11	28-Jun-11	16-May-12	8-May-13	5-May-14	13-May-15
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	1.1
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7	OW79-7
Date			27-May-16	17-May-17	8-May-18	15-May-19	6-May-20	21-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26	OW79-26
Date			20-May-09	18-May-10	12-May-11	16-May-12	5-May-14	13-May-15	27-May-16	27-May-16	8-May-18	6-May-20	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.40	<0.40
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3
Date			19-May-09	11-Jun-09	16-Dec-09	17-May-10	29-Jun-10	11-May-11	16-May-12	9-May-13	5-May-14	14-May-15
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3	OW80-3
Date			27-May-16	16-May-17	8-May-18	15-May-19	6-May-20	21-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6
Date			19-May-09	11-Jun-09	16-Dec-09	18-May-10	29-Jun-10	11-May-11	16-May-12	9-May-13	5-May-14	14-May-15
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6	OW80-6
Date			27-May-16	16-May-17	8-May-18	15-May-19	6-May-20	20-May-21	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<0.50	<0.50	<2.0	<2.0	<2.0	6.3	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27	OW80-27
Date			14-May-09	18-May-10	11-May-11	16-May-12	5-May-14	14-May-15	27-May-16	8-May-18	6-May-20	5-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.50	<0.40	<0.40
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-2
Groundwater - Organic Analytical Results
Twin Creeks Environmental Centre

Parameter	Units	ODWQS	OW81-5	OW81-5	OW81-5
Date			11-May-20	20-May-21	5-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7	OW81-7
Date			11-May-20	22-Jul-20	3-Nov-20	20-May-21	9-Jun-21	2-Nov-21	5-May-22	2-Jun-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0	9	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	OW81-27	OW81-27	OW81-27
Date			11-May-20	20-May-21	5-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.40	<0.40	<0.40
Dichloromethane	µg/L	50	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.20	<0.20	<0.20

Parameter	Units	ODWQS	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well	Cemetery Well
Date			23-May-08	18-May-10	11-May-11	16-May-12	5-May-14	14-May-15	27-May-16	8-May-18	15-May-19	6-May-20	6-May-22
Laboratory			MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas
Benzene	µg/L	1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	60	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	140	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20
m&p-Xylenes	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	90	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	5	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50	<0.40	<0.40
Dichloromethane	µg/L	50	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0
Vinyl Chloride	µg/L	1	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES: 1) Blank denotes data not available.
2) ODWQS denotes O. Reg. 169/03: Ontario Drinking Water Quality Standards (as amended).
3) All units are in µg/L.
4) µg/L denotes micrograms per litre.

Table D-3
MECP-Approved Changes to Site EMP - Groundwater Monitoring
Twin Creeks Environmental Centre

Monitoring Station	Date	MECP Approved Change
Groundwater		
OW80-3	5-Aug-10	Chloride removed as part of Trigger Assessment per MOE letter, dated August 5, 2010, ref # 02970051.34. Chloride still monitored for comparative purposes.
OW80-6	5-Aug-10	Chloride removed as part of Trigger Assessment per MOE letter, dated August 5, 2010, ref # 02970051.34. Chloride still monitored for comparative purposes.
OW61, OW62, OW75, OW76, OW77, OW78, OW85	01-Jun-11 (Waste ECA) 20-Feb-13 (Sewage ECA)	Groundwater monitoring at these locations temporarily idle and will resume 2 months prior to irrigation application and 2 years after cessation of irrigation liquid application. Waste ECA Condition 8.7 (r) and Notice No. 1 of the Sewage ECA.
OW79-7	12-Dec-11	Chloride removed as part of Trigger Assessment per MOE letter, dated December 12, 2011. Chloride still monitored for comparative purposes.
OW58-17	24-Mar-14	Groundwater monitoring well OW58-17 will replace OW58-14 with the following conditions: 1) OW58-14 will continue to be sampled during routine monitoring events along with OW58-17, 2) OW58-14 is not subject re-verification process, however, replacement well OW58-17 is subject to verification requirements, and 3) Following four (4) consecutive acceptable groundwater quality monitoring events for OW58-17, monitoring well OW58-14 may be decommissioned and OW58-17 be utilized as the replacement monitoring well. These conditions are presented in the MECP letter dated March 24, 2014.
OW58-14	10-Aug-16	Monitoring well OW58-14 was decommissioned on October 3, 2016 per MECP written approval.
OW60-4	2-Oct-20	Lead removed as part of Trigger Assessment per MOE letter, dated October 2, 2020. Lead still monitored for comparative purposes.
OW81-7	18-Aug-22	Chloride removed as part of Trigger Assessment per MECP letter, dated August 18, 2022. Chloride still monitored for comparative purposes.

E

Nearby Water Supply Well Survey and Records

WATER SUPPLY WELL PROPERTY OWNER SURVEY

Please complete the survey below to the best of your knowledge. If there are multiple water supply wells on the property, then additional survey forms are included to be filled out. Responses will remain confidential.

PROPERTY/WELL OWNER	
NAME(S) (Personal and/or Company):	TELEPHONE:
ADDRESS:	EMAIL:
OCCUPANT SERVED BY WELL (If different than property/well owner)	
NAME(S) (Personal and/or Company):	TELEPHONE:
ADDRESS:	EMAIL:

WELL DETAILS	
WELL ID:	APPROXIMATE WELL DEPTH (Metres or feet): (m); or (ft)
APPROXIMATE WELL DIAMETER (Centimetres or inches): (cm); or (inches)	
DATE INSTALLED:	IS THE WELL UTILIZED AT THE PROPERTY?: Yes: ☐, No: ☐.
HOW MANY YEARS HAS THE WELL BEEN UTILIZED AT THE PROPERTY?:	
IS THERE PUMPING EQUIPMENT INSTALLED IN THE WELL? Yes: ☐, No: ☐.	
IF "Yes" PROVIDE PUMP INFORMATION IF KNOWN (i.e. Pump Type, Size, Capacity, etc.): _____ _____ _____	
IS THE WELL INACTIVE? Yes: ☐, No: ☐. IF "YES", WHEN DID THE WELL BECOME INACTIVE:	
IF THE WELL IS INACTIVE, WOULD THE WELL POTENTIALLY BECOME ACTIVE AGAIN IN THE FUTURE? Yes: ☐, No: ☐.	

WELL USE (If answered "Yes" above to the question "IS THE WELL UTILIZED AT THE PROPERTY?")
WHAT IS THE WATER FROM THE WELL(S) USED FOR (Please check all that apply)? Domestic (Drinking): ☐, Monitoring: ☐, Farm (Livestock): ☐, Irrigation: ☐, Lawn Care: ☐, Commercial: ☐, Other: _____
HOW OFTEN IS THE WELL UTILIZED FOR THE LISTED USE(S) (Please check all that apply)? Daily: ☐, Weekly: ☐, Monthly: ☐, Seasonally: ☐, Yearly: ☐
DOES THE PROPERTY OWNER HAVE/REQUIRE A PERMIT TO TAKE WATER FOR THE WATER USE? Yes: ☐, No: ☐
IF "Yes", PLEASE PROVIDE PERMIT TO TAKE WATER NUMBER: _____

Name:	**Signature:**	**Date:**

Figure 1: Twin Creeks Environmental Centre: Water Supply Wells in the Offsite Study Area

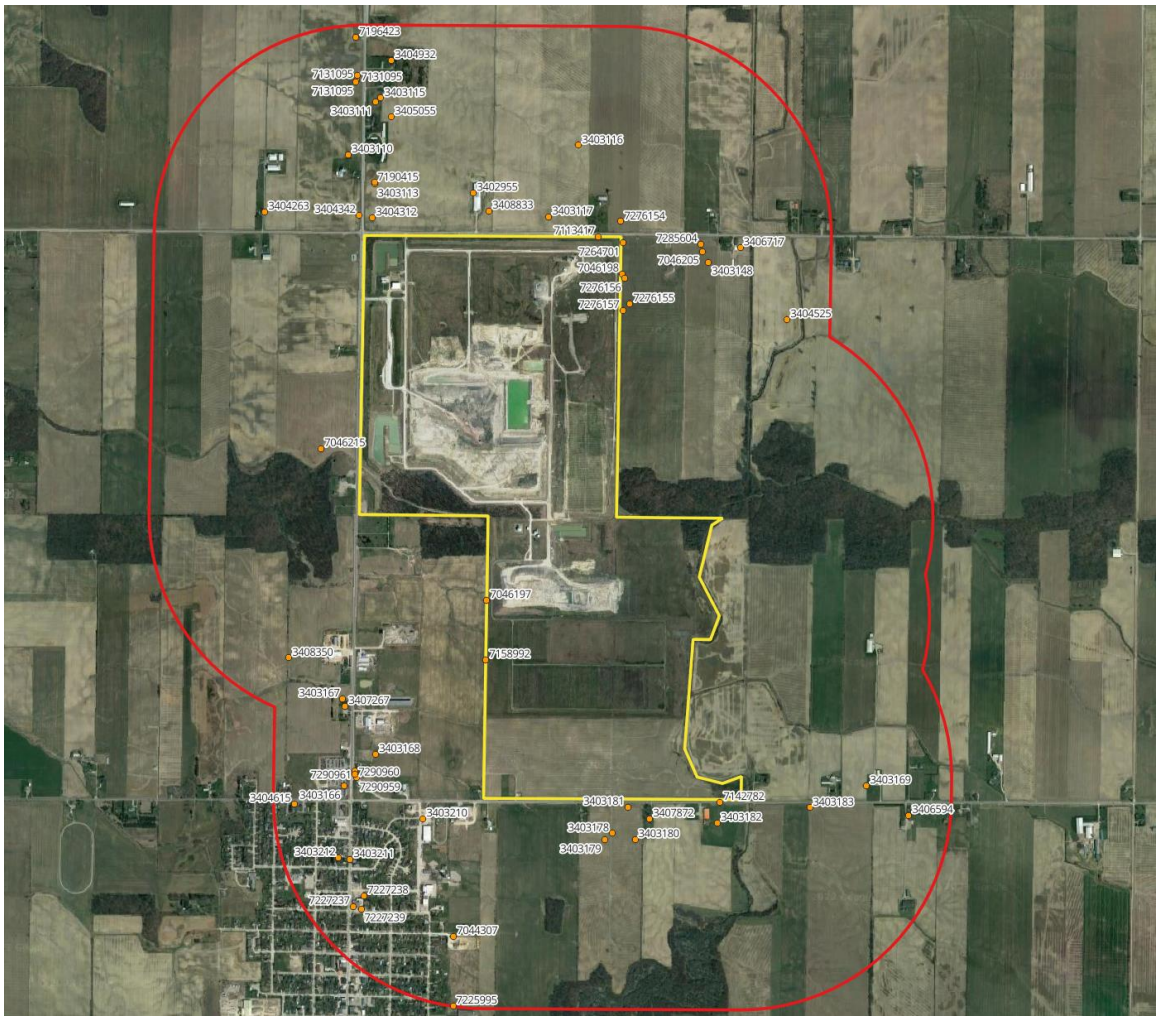


Figure 2: Water Supply Well Owner Property Figures

<Property owner specific property figure here>

WATER SUPPLY WELL PROPERTY OWNER SURVEY

Please complete the survey below to the best of your knowledge. If there are multiple water supply wells on the property, then additional survey forms are included to be filled out. Responses will remain confidential.

PROPERTY/WELL OWNER	
NAME(S) (Personal and/or Company): [redacted]	TELEPHONE: [redacted]
ADDRESS: 8163 Zion Line, Watford ON	EMAIL:
OCCUPANT SERVED BY WELL (If different than property/well owner)	
NAME(S) (Personal and/or Company):	TELEPHONE:
ADDRESS:	EMAIL:

WELL DETAILS	
WELL ID: 3406717	APPROXIMATE WELL DEPTH (Metres or feet): (m); or 94 (ft)
APPROXIMATE WELL DIAMETER (Centimetres or inches): (cm); or 5 (inches)	
DATE INSTALLED: July 24, 1979	IS THE WELL UTILIZED AT THE PROPERTY?: Yes: ☒, No: ☐.
HOW MANY YEARS HAS THE WELL BEEN UTILIZED AT THE PROPERTY?: 43	
IS THERE PUMPING EQUIPMENT INSTALLED IN THE WELL? Yes: ☒, No: ☐.	
IF "Yes" PROVIDE PUMP INFORMATION IF KNOWN (i.e. Pump Type, Size, Capacity, etc.): _____	
IS THE WELL INACTIVE? Yes: ☐, No: ☒. IF "YES", WHEN DID THE WELL BECOME INACTIVE:	
IF THE WELL IS INACTIVE, WOULD THE WELL POTENTIALLY BECOME ACTIVE AGAIN IN THE FUTURE? Yes: ☐, No: ☐.	

WELL USE (If answered "Yes" above to the question "IS THE WELL UTILIZED AT THE PROPERTY?")
WHAT IS THE WATER FROM THE WELL(S) USED FOR (Please check all that apply)? Domestic (Drinking): ☐, Monitoring: ☐, Farm (Livestock): ☐, Irrigation: ☒, Lawn Care: ☐, Commercial: ☒, Other: _____
HOW OFTEN IS THE WELL UTILIZED FOR THE LISTED USE(S) (Please check all that apply)? Daily: ☐, Weekly: ☒, Monthly: ☐, Seasonally: ☐, Yearly: ☐
DOES THE PROPERTY OWNER HAVE/REQUIRE A PERMIT TO TAKE WATER FOR THE WATER USE? Yes: ☐, No: ☒
IF "Yes", PLEASE PROVIDE PERMIT TO TAKE WATER NUMBER: _____

Name: [redacted]	**Signature:** [redacted]	**Date:** July 6, 2023