Supporting Document 1-4

Surface Water Quality Existing Conditions Report

Twin Creeks Environmental Centre Landfill Optimization Project Environmental Assessment

WM Canada

Watford, Ontario

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Executive Summary

RWDI AIR Inc. (RWDI) was contracted by HDR Corporation on behalf of WM Canada (WM) to prepare this Surface Water Quality 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 surface water quality 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 6 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 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.

Surface water quality data collected from the TCEC was evaluated to document the Existing Conditions as it pertains to its quality prior to off-site discharge in consideration of the On-Site Study Area (Existing Landfill and Expansion Landfill). The On-Site Study Area consists of the TCEC. Surface water at the TCEC is managed through on-site drainage features such as ditches and swales, as well as four (4) sedimentation ponds. Surface water that is managed by the Sedimentation Ponds typically consists of runoff that originates from the footprint of the waste fill areas of the TCEC. An Off-Site Study Area was established to assess Existing Conditions within the drainage ditch of the northbound lane to Lambton County Road 79 (Nauvoo Road) extending approximately 1 km north and 500 m south from the entrance to the TCEC. Field monitoring to assess surface water Existing Conditions were completed in 2022 to evaluate potential impacts to surface water quality associated with ASR track-outs along the road allowance. PAHs were identified as a contaminant of concern that had the potential to adversely affect off-site surface water quality nearby the TCEC.

The TCEC comprises of two (2) surface water monitoring programs, with 1) compliance monitoring program for three (3) open ditch surface water monitoring stations and four (4) sedimentation ponds, and 2) an open ditch surface water monitoring program consisting of three (3) monitoring stations to assess for Poplar System irrigation liquid effects to surface water quality within the perimeter ditch of the southern half of Existing Landfill.

Both the Compliance and Poplar System Surface Water Monitoring Programs are effective in evaluating potential landfill leachate effects to surface water quality based on surface water quality Existing Conditions. The selected Leachate Indicator List parameters, for evaluating potential leachate effects on surface water quality as outlined in the 2007 EMP, remain relevant based on leachate constituent concentrations remaining below the predicted peak leachate values tabulated within Table 6-9 of the 2008 D&O Report and overall surface water quality Existing Conditions. As such, the established trigger concentration mechanism continues to be suitable for discerning potential landfill leachate impacts to surface water quality.

PLIL parameter concentration trends within the surface water are observed to be relatively consistent at the TCEC. Minor deviations in surface water quality do occur over time that primarily relate to erosional effects from exposed soil surfaces during periods of construction activity (i.e., infrastructure construction, waste cell excavation, soil and material movement, etc.) since 2008.

Ongoing quality monitoring data indicated that surface water quality is generally not negatively impacted by the TCEC. The PLIL parameter concentrations generally satisfy the triggering mechanisms that form part of the surface water quality evaluation procedures for the TCEC.

The surface water quality routinely satisfies the triggering mechanisms for acceptable off-site discharge.

TSS concentrations correspondingly and expectedly influence heavy metal concentrations within the surface watercourse.

The off-site temporary supplemental surface water monitoring program completed in 2022 showed low level detections of one (1) PAH parameter for one (1) of four (4) monitoring events at two (2) of the five (5) off-Site surface water monitoring stations during the first quarter of 2022. No other PAH parameter was detected at the Off-Site surface water monitoring stations for the 1-year short-term monitoring period in 2022.

Acronyms, Units and Glossary

Acronyms

Acronym	Definition
ASR	Automobile Shredder Residue
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
COD	Chemical Oxygen Demand
D&O	2008 Design & Operations Report for the Expansion Landfill
DOC	Dissolved Organic Carbon
EA	Environmental Assessment
ECA	Environmental Compliance Approval
EMP	Environmental Monitoring Plan
LMP	Leachate Management Plan
MECP	Ministry of Environment, Conservation and Parks
OEAA	Ontario Environmental Assessment Act
PAH	Polycyclic Aromatic Hydrocarbons
PHC	Petroleum Hydrocarbon
PLIL	Primary Leachate Indicator List
PWQMN	Provincial Water Quality Monitoring Network
PWQO	Provincial Water Quality Objectives
RDL	Reportable Detection Limit (laboratory data-related)
ROW	Right-of-way
SCRCA	St. Clair Region Conservation Authority
SGRA	Significant Groundwater Recharge Area
SLIL	Secondary Leachate Indicator List
SVOC	Semi-volatile Organic Compounds
TCEC	Twin Creeks Environmental Centre
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
VOC	Volatile Organic Compound
WM	WM Canada

Units

Unit	Definition
ha	Hectare

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D&O	2008 Design & Operations Report for the Expansion Landfill
DOC	Dissolved Organic Carbon
km	Kilometre
L	Litre
m	Metre
mASL	Metres Above Sea Level
mbgs	Metres below ground surface
m^3	Cubic metres
M	Million
mg	Milligram
ppm	Parts per million
µg	Microgram
µm	Micrometer

Glossary

Term	Definition
Approval	Permission granted by an authorized individual or organization for an undertaking 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).

Acronyms

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ASR	Automobile Shredder Residue
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D&O	2008 Design & Operations Report for the Expansion Landfill
DOC	Dissolved Organic Carbon
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 undertaking 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.
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 initiated 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.
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.
Proponent	A person who: • carries out or proposes to carry out an undertaking; or • is the owner or person having charge, management, or control of an undertaking.
Receptor	The person, plant or wildlife species that may be affected due to exposure to a contaminant.
Sewage ECA	Amended ECA for an Industrial Sewage Works No. 2403-BE6LZ4, dated August 21, 2019
Terms of Reference (ToR)	A terms of reference is a document that sets out detailed requirements for the preparation of an Environmental Assessment.

Acronyms

Acronym	Definition
ASR	Automobile Shredder Residue
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COD	Chemical Oxygen Demand
D&O	2008 Design & Operations Report for the Expansion Landfill
DOC	Dissolved Organic Carbon
Undertaking	Is defined in the Environmental Assessment Act as follows: • An enterprise or activity or a proposal, plan or program in respect of an enterprise or activity by or on behalf of Her Majesty in right of Ontario, by a public body or public bodies or by a municipality or municipalities. • A major commercial or business enterprise or activity or a proposal, plan or program in respect of a major commercial or business enterprise or activity of a person or persons other than a person or persons referred to in clause (1) that is designated by the regulations; or • An enterprise or activity or a proposal, plan or program in respect of an enterprise or activity of a person or persons, other than a person or persons referred to in clause (a), if an agreement is entered into under section 3.0.1 in respect of the enterprise, activity, proposal, plan or program ("enterprise").
Waste	Refuse from places of human or animal habitation; unwanted materials left over from a manufacturing process.
Waste ECA	Amended Environmental Compliance Approval (ECA) No. A032203, dated December 19, 2020

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Appendices

Appendix A. Leachate and Irrigation Liquid Chemical Results
Appendix B. Surface Water Chemical Results

1 Introduction

This report presents a description of the Existing Conditions for Surface Water Quality 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 *Ontario Environmental Assessment Act* (*OEAA*) 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 6 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 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 Surface Water Quality 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 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.

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.

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 proposed for the purposes of the EA are shown on **Figure 1**, whereby a slight deviation to the Off-Site Study Area that is presented in **Figure 1**, is shown on **Figure 2** and described below.

- On-Site Study Area: the existing TCEC.
- Off-Site Study Area (vicinity): the lands immediately west of the TCEC property boundary from approximately 1 km north and 500 m south of the entrance to the TCEC along the roadside ditch of Nauvoo Road, as depicted on **Figure 2**.

Surface water quality at the TCEC is evaluated for compliance with established MECP-approved site-specific criteria. A monitoring program was developed to monitor off-site surface water quality within the eastern roadside ditch of Nauvoo Road for a 12-month period in concert with the current surface water quality monitoring program. Surface water quality was evaluated toward its Existing Conditions as it relates to the potential for PAH impacts from ASR track-out material.

Figure 2 shows the surface water monitoring locations forming the off-Site 12-month monitoring program.

Figure 3 shows an expanded view of the surface water flow path system on the operational portion of the Site.

Figure 4 shows the established surface water quality system including monitoring locations, which outlines the flow path onto the TCEC, as well as on-Site prior to off-site discharge.

3 Methods

This Surface Water Quality 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 Surface Water Quality as per the approved ToR are provided in **Table 3-1.**

Table 3-1. Evaluation Criteria, Indicators and Data Sources for Surface Water Quality

Evaluation Criteria	Rationale	Indicators	Data Sources
Natural Environment			
Surface Water Environment			
Surface Water Quality	The landfill optimization has the potential to affect surface water quality through either possible leachate seepage through the landfill cap increased erosion of the landfill clayey soil cap or track-out of ASR wastes off-site.	• Predicted effects on surface water quality on-site prior to off-site discharge. • Predicted effects from PAHs, in ASR, on surface water quality within the roadside ditch of the northbound lane of Nauvoo Road from the TCEC to Hwy 402 in the Off-Site Study Area.	• 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. • Surface water quality monitoring data at each on-site background, internal, and discharge (compliance) monitoring stations. • PWQMN. • Topographic maps and aerial photos. • On-site stormwater management system design for the TCEC. • Quarterly and Annual TCEC compliance monitoring reports. • Leachate generation and management assessments, as outlined in the LMP, (HDR, March 2023). • Proposed facility characteristics. • Testing for potential PAH impacts from ASR track-out within the surface water of the roadside ditch along the northbound lane of Nauvoo Road in the Off-Site Study Area.

3.1 Data Collection and Review

The review of historical surface water quality data at the TCEC included analytical data and precipitation data sources noted in **Table 3-1** to provide information as it relates to:

- Existing surface water quality chemical trends;
- Clayey soil erosional effects to surface water quality; and

- An interpretation of surface water quality findings of a one-year study on the predicted impacts from ASR within the roadside ditch of the northbound lane from the TCEC to Hwy 402 in the Off-Site Study Area.

Surface water 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 following summary provides the dataset ranges over time of the assessed surface water monitoring stations at the TCEC.

Table 3-2. Surface Water Monitoring Station Analytical Dataset Collection Timelines

Task	Monitoring Station Designations	Dataset Monitoring Period
Surface Water Environmental Monitoring Program	SS1	April 2003 to November 2022
	SS10	April 2003 to November 2022
	SS16	March 2008 to May 2022
	SP1	November 2011 to October 2022
	SP2	September 2008 to January 2023
	SP3	November 2008 to October 2022
	SP4	May 2010 to October 2022
Surface Water Poplar System Monitoring Program	SS14A	April 2003 to October 2022
	SS14B	
	SS15A	October 2009 to October 2022
Surface Water Poplar Plantation Monitoring Program	SS17A	October 2009 to January 2013
	SS17B	
	SS18A	
	SS18B	

The dates at which surface water monitoring stations related to the Sedimentation Ponds (SP1 to SP4) and Poplar Plantation (SS17A, SS17B, SS18A, and SS18B) came into effect varied based on the progress of construction for the Expansion Landfill.

A comparison of surface water analytical data was also made to leachate chemical analytical data of the Expansion Landfill to assess whether the current monitoring program is sufficient to monitor for potential leachate impacts to surface water resources. The assessment considered current potential effects of landfilling operations on surface water quality on-site, as well as within the defined Off-Site Study

Area for surface water quality. The findings of this assessment will allow for an evaluation of the potential effects of the landfill optimization project on surface water quality.

The above-noted data evaluations were used to ascertain the effects of clayey soil erosion, landfilling operations, and potential leachate influence on surface water quality on-site, and potential water quality impacts from PAHs from ASR track-outs onto Nauvoo Road from the Site entrance, northbound towards Highway 402.

3.2 Field Studies

As required by the Waste and Sewage ECA's, field monitoring and evaluation activities have been on-going at the TCEC on a routine frequency that ranges from quarterly monitoring to annually for surface water quality. If necessary, the monitoring frequency is enhanced to include verification monitoring to address triggering criteria that may be identified within surface water samples collected during the routine monitoring events. The monitoring entails an evaluation of the surface water within and around the Existing and Expansion Landfills. These field studies are further described below.

On-site surface water quality monitoring field studies as required by the Waste and Sewage ECA's, are outlined in **Section 3.2.1**. Off-site surface water quality field studies, which were completed as part of the EA efforts are outlined in **Section 3.2.2**.

3.2.1 On-Site Surface Water Quality Field Studies/Monitoring

The on-site Surface Water Quality field studies, which are governed by the Waste and Sewage ECAs, consisted of the following.

- Continuous monitoring of climatic conditions to track precipitation amounts that trigger the need to complete a surface water quality monitoring event.
- Completing the quarterly sampling of surface water at established surface water monitoring stations, where sufficient flowing conditions allow for proper sampling.
    - Field sampling included measuring field chemical parameters and flow rates at the time of sampling.
- Completing the biological monitoring annually in the spring.
- Evaluating the chemical analytical data from the collected samples from the routine monitoring events and determining whether verification monitoring events are warranted.
    - Completing verification monitoring events, as required, including chemically testing the verification samples for the routine list of parameters, as well as included biological monitoring.

The On-Site Study Area (which includes the on-site monitoring stations), the response and routine monitoring, response verification monitoring, and the flow conditions, are described in **Section 4.1**.

The assessment of on-site historical surface water quality is presented in **Section 4.3**.

3.2.2 Off-Site Surface Water Quality Field Studies/Monitoring

A temporary off-site surface water quality monitoring program was established in 2022. The program consisted of monitoring surface water quality within the roadside ditch of the northbound lane to Lambton County Road 79 (Nauvoo Road), approximately 1 km north and 500 m south of the entrance to the TCEC. The off-site surface water quality monitoring program was considered as the Off-Site Study Area for the purpose of the Surface Water Quality portion of this EA effort. Surface water quality was assessed in consideration of potential PAH effects from ASR track-out.,

The off-site surface water monitoring program consisting of five (5) monitoring stations (refer to stations SW1, SW2, SW3, SW4, and SW5 on **Figure 2**) was established for a 12-month period from January to December 2022, whereby surface water samples were collected concurrently with those of the routine on-site compliance surface water quality monitoring program. Additionally, two (2) surface water monitoring stations were established upstream (north and south) of the Gilliand-Geerts Drain along the east side of the Nauvoo Road ROW to evaluate baseline surface water quality conditions interpreted to not be subjected to potential impacts from ASR track-out debris.

Off-site surface water monitoring stations SW1, SW2, SW3, SW4, and SW5, are depicted on **Figure 2**. Details pertaining to the temporary monitoring efforts completed within the Off-Site Study Area (which includes descriptions of the off-site surface water monitoring stations) and the response monitoring is detailed in **Section 4.2.**

The findings for this 12-month off-site surface water quality study on the potential impacts of ASR track-out debris within the Nauvoo Road ROW is detailed in **Section 4.5**.

3.3 Characterization of Existing Conditions

The Existing Conditions for surface water quality were characterized as follows:

1. Information collected from the sources identified in **Section 3.1** were reviewed;
2. Field studies described in **Section 3.2.1** were evaluated in the context of existing surface water quality conditions at the TCEC;
3. A 12-month Field Study was completed to assess for potential impacts to surface water quality as it relates to ASR track-out along the east side of the Nauvoo Road ROW (**Section 3.2.2**); and
4. Information from available sources was compiled by environmental criterion.

4 Description of Existing Conditions

The evaluation of surface water quality Existing Conditions considers the following;

- Overview of the surface water flow regime and setting, both on-site and off-site, as it relates to the established surface water monitoring stations.
- Evaluation of historical surface water chemical analytical data based on the following:
  - Historical concentration ranges (i.e., maximums & minimums).
  - Historical geometric concentration and value means; and
  - Chemical analytical trends.

Surface water quality data collected from the TCEC was evaluated to document the Existing Conditions as it pertains to its quality prior to off-site discharge in consideration of the On-Site Study Area (Existing Landfill and Expansion Landfill) The On-Site Study Area consists of the TCEC. Surface water at the TCEC is managed through on-site drainage features such as ditches and swales, as well as four (4) sedimentation ponds. Surface water that is managed by the Sedimentation Ponds typically consists of runoff that originates from the footprint of the waste fill areas of the TCEC. An Off-Site Study Area was established to assess Existing Conditions within the drainage ditch of the northbound lane to Lambton County Road 79 (Nauvoo Road) extending approximately 1 km north and 500 m south from the entrance to the TCEC. Field monitoring to assess surface water Existing Conditions were completed in 2022 to evaluate potential impacts to surface water quality associated with ASR track-outs along the road allowance. PAHs were identified as a contaminant of concern that had the potential to adversely affect off-site surface water quality nearby the TCEC.

4.1 On-Site Study Area

4.1.1 On-Site Study Area Surface Water Physical Setting

Surface water flow is precipitation dependent. Flowing conditions are ephemeral and are typically noted following snowmelt or prolonged periods of precipitation. Historically, adequate flowing conditions have generally been noted following precipitation measurements of 10 mm or more in a 24-hour period.

On occasion, where 10 mm or more of precipitation (in the form of rain) is received at the Site in a 24-hour period, the precipitation did not generate sufficient flowing conditions. These ‘no flow’ scenarios typically occur during drier periods from late spring to early fall when lacking precipitation results in drier ground surface conditions such that it will absorb most of the precipitation. These ‘no flow’ scenarios are even observed after measuring over 25 mm of precipitation in the five days leading up a 10 mm/24-hour precipitation event.

The on-site surface water flow regime is depicted on **Figure 3**. A significant portion of surface water runoff on-site at the TCEC is managed through Sedimentation Ponds 1, 2, 3, and 4. Sedimentation Ponds 1 through 4 are four (4) on-site sedimentation ponds constructed in 2009 to manage surface water runoff for the operating portion of the Site that is utilized for waste management disposal operations. Details on each Sedimentation Pond are discussed in **Section 4.1.2.1**.

Surface water runoff originating from areas south of the operating portion of the Site flows toward: 1) Kersey Drain (Brown Creek) to the east for the Existing Landfill; and 2) to the west toward the Van Kessel Drain for the Expansion Landfill. Specifically, surface water runoff south of the Expansion Site eventually enters a municipal drainage tile at a catch basin (surface water monitoring station SS1), which is situated 60 m east of the western Site boundary. The municipal drainage tile subsequently drains into the discharge ditch, which ultimately flows westward to the Gilliand-Geerts Drain 'A', beneath Lambton County Road 79.

The Brown Creek watershed drains the area east of the Site, including the northeast corner of the Existing Landfill. Brown Creek is a southwesterly flowing headwater of the Sydenham River, which it intersects about 1.3 kilometres (km) northeast of Alvinston, approximately 13 km south of the TCEC.

Construction of the Sedimentation Pond network in the Expansion Landfill began in 2008 and was completed by August 2009. The surface watercourse on the Expansion Landfill eventually discharges into a tributary of Bear Creek on the east side of Lambton County Road 79 (Nauvoo Road).

4.1.2 On-Site Study Area Surface Water Monitoring Stations

Since the development of the Expansion Landfill, beginning in 2008, overall Site improvements to protect the downstream watercourses have been implemented. These improvements include an extensive watercourse drainage network consisting of vegetated drainage ditches with rock-check dams, straw bale check dams, stormwater control berms, as wells as the four (4) stormwater management ponds. Surface water quality monitoring can be divided into three (3) main groupings: 1) compliance monitoring program; 2) the Poplar System monitoring program; and 3) the Poplar Plantation monitoring program.

There are two (2) types of surface water monitoring stations at the TCEC. The first type of station consists of an open ditch where surface water flows unimpeded and as such, the collection of water while flowing conditions exists is dependent on precipitation (collected within the open ditch). The second type of station consists of Sedimentation Ponds (i.e., 'SP' monitoring stations), where flowing conditions are managed (slowly released from the Site).

The surface water monitoring station designation and short descriptions for the existing Compliance, Poplar System, and Plantation Monitoring Programs are detailed in **Table 4-1** and are graphically represented on **Figure 3**.

Table 4-1. On-Site Study Area Surface Water Monitoring Station Summary

Task	Monitoring Station Designations	Monitoring Station Description
Surface Water Compliance Monitoring Program	SS1	Downstream of landfill on WM property, 60 m east of Lambton County Road 79 (Nauvoo Road) – Compliance Point
	SS10	Off-site flow into East Ditch of the Existing Landfill – Background Surface Water Quality
	SS16	Flow onto site from lands located to the south – Background Surface Water Quality
	SP1	Outlet Weir of Sedimentation Pond 1 – Internal assessment location
	SP2	Outlet Weir of Sedimentation Pond 2 – Compliance Point
	SP3	Outlet Weir of Sedimentation Pond 3 – Compliance Point
	SP4	Outlet Weir of Sedimentation Pond 4 – Compliance Point
Surface Water Poplar System Monitoring Program	SS14A	On-site flow within East Ditch of the Existing Landfill, upstream of Poplar System – Internal assessment location
	SS14B	On-site flow within West Ditch of the Existing Landfill, downstream of Poplar System as of June 2011 – Internal assessment location
	SS15A	South Ditch of the Existing Landfill and inlet point to Sedimentation Pond 1. Downstream of Poplar System – Internal assessment location
Surface Water Poplar Plantation Monitoring Program	SS17A	On-site flow from western portion of Poplar Plantation, northwest corner - Compliance Point when plantation is active
	SS17B	On-site flow from western portion of Poplar Plantation, southwest corner - Compliance Point when plantation is active
	SS18A	On-site flow from eastern portion of Poplar Plantation, north end of stormwater control berm plantation - Compliance Point when plantation is active
	SS18B	On-site flow from eastern portion of Poplar Plantation, south end of stormwater control berm plantation - Compliance Point when plantation is active

Sedimentation Ponds 1 through 4 were fully constructed by 2009 but were not necessarily connected to the drainage network at the same time, as detailed within **Table 3-2**.

4.1.2.1 On-Site Study Area Compliance Surface Water Monitoring Stations

The surface water compliance monitoring program consists of three (3) sampling points that are located within conveyance ditches, namely stations SS1, SS10, and SS16, while there are four (4) sampling points located within sedimentation ponds, namely stations SP1 (Sedimentation Pond 1), SP2 (Sedimentation Pond 2), SP3 (Sedimentation Pond 3), and SP4 (Sedimentation Pond 4).

The compliance surface water monitoring program monitoring stations presented in **Table 4-1**, are further described below, and are depicted on **Figure 3**.

Surface water monitoring station SS1 is located within a westerly flowing drainage conveyance, nearby a catch basin that is approximately 60 m upstream of the TCEC's western property boundary. This monitoring station is located within the public access trail portion of the TCEC. SS1 is downstream of Sedimentation Pond 1.

Surface water monitoring station SS10 is considered a background station, where surface water runoff enters the TCEC. This monitoring station is located approximately 90 m south of the East Access Road along the eastern TCEC property boundary.

SS10 is located within a short and narrow cut (about 0.3 m deep) that runs east-west directly from the neighbouring farm field onto the TCEC property (at the fenceline) where it connects with and flows into the TCEC's Existing Landfill perimeter ditch that runs north-south as shown on **Figure 4**. It is noted that this portion of the perimeter ditch is approximately 1.5 m deep. If any leachate seepage from the Existing Landfill were occurring in this area, it would potentially impact surface water quality within the TCECs Existing Landfill perimeter ditch that runs north-south and would be directed to Sedimentation Pond 1 and flow past, but not into SS10. There are no influences from the TCEC on surface water monitoring station SS10.

Like monitoring station SS10, surface water monitoring station SS16 is also identified as a background/upstream point where surface water runoff enters the TCEC. Monitoring station SS16 is located along the TCEC's south-eastern property boundary approximately 500 m east of Nauvoo Road and is adjacent to the Old Warwick Landfill property.

Similar to SS10, at background monitoring station SS16 there are no influences from the TCEC on surface water located along the TCEC's south-eastern property boundary adjacent to the Old Warwick Landfill property. The surface water drainage network ditches around the Excess Soil Stockpile, the LFG Flare Facility, and the leachate Equalization Tank, direct surface water either toward Sedimentation Pond 1, monitoring station SS1, or the neighbouring field south-west of the TCEC as shown on **Figure 4**. None of these flow paths influence the water quality as observed at SS16.

Each Sedimentation Pond consists of the following areas/zones: 1) a permanent pool area, including sediment capture/storage, between the pond bottom and the invert of the lowest orifice of the outlet structures; 2) a settlement zone located between the crest of the rectangular weir and the invert of the lowest orifice of the outlet structure; 3) an attenuation zone, which is above the rectangular weir; and 4) a riprap lined emergency spillway.

Under normal operating conditions, WM maintains the pond sluice gates in an open position, allowing water to discharge from the TCEC when the water level is within or above the settlement zone. During the dry season, typically through the summer, WM may close the pond sluice gates to maintain the water level within the settlement zone, which would allow WM to access sufficient water volume for frequent water taking for road watering (dust control). This requirement is most prevalent during the drier seasons and/or during earthworks construction (cell excavation and/or landfill capping) when there is the greatest need for dust control during the year.

Sedimentation Pond 1 receives stormwater flow from most of the east half and the southern approximate one-quarter of the western half of the Existing Landfill. Sedimentation Pond 1 discharges water through twin culverts to an open drainage ditch on-site, which flows westward until it enters a municipal drain (surface water monitoring station SS1) near the western site boundary. This municipal drainage tile discharges into one of the headwater branches of the Gilliand-Geerts Drain on the east side of Lambton County Road 79 (Nauvoo Road). Monitoring station SP1 is located within the Sedimentation Pond 1 near the outlet structure.

Sedimentation Pond 2 receives flow from the central western portion of the Existing Landfill, as well as the southern two-thirds of the Expansion Landfill. Discharge from Sedimentation Pond 2 is through twin culverts to an open drainage ditch that flows to the western site boundary and into one of the headwater branches of the Gilliand-Geerts Drain on the east side of Lambton County Road 79 (Nauvoo Road). Monitoring station SP2 is located within the Sedimentation Pond 2 near the outlet structure.

Sedimentation Pond 3 receives stormwater flow from the northern approximate one-third of the Expansion Landfill, as well as a large area of the undeveloped northwestern portion of the TCEC, and discharges through three culverts that flow to the eastern roadside ditch of Nauvoo Road, which in-turn directs the stormwater flow to two additional headwater branches of the Gilliand-Geerts Drain all to the west of Nauvoo Road. Monitoring station SP3 is located within the Sedimentation Pond 3 near the outlet structure.

Sedimentation Pond 4 receives stormwater flow from approximately one-quarter of the northeastern portion of the Existing Landfill. Stormwater that discharges from Sedimentation Pond 4 flows through a culvert then into an open drainage ditch that flows westward until it enters a series of culverts that direct water under a screening berm and then under Zion Line to flow into one of the headwater branches of the Gilliand-Geerts Drain. Monitoring station SP4 is located within the Sedimentation Pond 4 near the outlet structure.

Quality monitoring results at monitoring stations SP2, SP3, and SP4 can be interpreted to represent the quality of surface water flowing off-site at the respective locations. As the discharge surface water from Sedimentation Pond 1 (monitored at SP1) flows to the area with monitoring station SS1, prior to flowing off-site, the quality monitoring results at SS1 can be interpreted to represent the surface water quality flowing off-site at that location.

If surface water was to be influenced by landfill leachate, it would flow to one of the four (4) sedimentation ponds since all perimeter waste mound ditches flow to one of the four (4) ponds. Once the surface water reaches the ponds, any chemical constituents from leachate would attenuate for a longer period of time compared to an open ditch location. Where required, surface water within a sedimentation pond can be held within the pond by closing the sluice gates. This water then can be re-evaluated and/or managed until it is verified to be of acceptable quality for off-site discharge, in accordance with the EMP and the Sewage ECA. Further discussion is provided in **Section 4.3**.

A summary of the surface water monitoring station designation and description is presented above in **Table 4-1**.

4.1.2.2 On-Site Study Area Poplar System Surface Water Monitoring Stations

The Poplar System surface water monitoring station designations and locations are depicted on **Figure 3**.

The Poplar System was initially operated as a pilot study from 2003 through 2007. By 2008, the Poplar System was MECP-approved to operate as a leachate phytoremediation system. In 2011, the Poplar System was approved to expand to its current 9.3 ha size. Part of the expansion approval included some modifications to the tree monitoring aspect of the system, as well as a surface water monitoring station relocation effort to account for a larger Poplar System footprint. The approved leachate application area, including its perimeter surface water motoring stations SS14A, SS14B, and SS15, are shown in **Figure 3**. SS14A and SS15A are upstream of Sedimentation Pond 1. SS14B is upstream of Sedimentation Pond 2.

The Poplar System Surface Water Monitoring Program focuses on evaluating surface water quality within the Existing Landfill's perimeter ditch, which is situated downslope of the Poplar System. The quality of surface water is assessed for impacts related to irrigation liquid effects.

The irrigation liquid consists of leachate that is applied to the irrigation field during the growing season, which is typically May to October, weather conditions permitting. Irrigation liquid monitoring in consideration of application quality to the Poplar System (specifically the operational loading to the poplar trees) is completed monthly during the growing season. Samples of the irrigation liquid are collected from the irrigation liquid holding tanks.

With the commissioning of the Poplar System Expansion in 2017, the locations of some monitoring stations were adjusted in consideration of the larger irrigation area footprint of the expanded Poplar System so that surface water quality could be assessed upstream and downstream of the irrigation area. Surface water monitoring station SS14 was renamed SS14A and relocated further north from its original location within the eastern perimeter ditch and is upstream of the Poplar System. Surface water monitoring station SS15 was renamed SS14B and relocated from the southwestern corner of the perimeter ditch to further northward along the west side of the Poplar System and in line with Zone 3 of the irrigation field. Surface water monitoring station SS15A is a new monitoring station that was established in September 2009 to monitor surface water quality that is downstream of the Poplar System irrigation field within the Existing Landfill footprint's perimeter ditch, prior to it discharging into Sedimentation Pond 1. The surface water monitoring station locations for the Poplar System are shown in **Figure 3**.

A summary of the surface water monitoring station designation and description is presented above in **Table 4-1**.

4.1.2.3 On-Site Study Area Poplar Plantation Surface Water Monitoring Stations

The Poplar Plantation consists of a plot of trees planted on native soil that is situated south of the excess soil stockpile at the TCEC. The constructed area is approximately 28 ha. The surface water quality monitoring program of the Poplar Plantation was established under the same pretense as that of the Poplar System's surface water monitoring program, whereby there are established monitoring points both upstream and downstream of the Poplar Planation irrigation area.

Though not currently monitored, the surface water quality monitoring program for the Poplar Plantation was active from October 2009 to December 2012. Only monitoring stations SS17A and SS17B could be sampled during that time as eastern surface water stations SS18A and SS18B did not generate sufficient flowing conditions to collect samples.

Approval to discontinue monitoring the Poplar Plantation was received from the MECP on February 20, 2013, and as such, the surface water monitoring program for monitoring stations SS17A/B and SS18A/B has since been suspended.

Per Condition 8.7. (r) of the Waste ECA, monitoring and reporting for the Poplar Plantation would commence 2 months prior to the application of treated leachate effluent and continue 2 years following the cessation of treated leachate effluent application to the poplar field.

4.1.3 On-Site Study Area Surface Water Field Monitoring

The surface water monitoring program adheres to the relevant Waste and Sewage ECAs, as amended. The surface water monitoring program instills a quarterly routine frequency for sampling, and, when necessary, a verification monitoring component to verify initial routine sampling findings.

4.1.3.1 Routine Field Monitoring

In general, the current triggering mechanism for response monitoring is the measurement of 10 mm or more of precipitation in a 24-hour period from 08:00 to 08:00 hours. Flowing conditions permitting, the surface water stations listed in **Table** 4-1, except for those of the Poplar Plantation, are sampled within a 24-hour window following confirmation of the receipt of 10 mm or more of precipitation at the TCEC. Surface water is sampled once per calendar quarter as part of the required routine monitoring for the TCEC. If a compliance and/or Poplar System monitoring station does not produce sufficient runoff to conduct sampling (or is dry), then the next precipitation event of 10 mm or more in a 24-hour period will trigger the re-assessment of that station(s). This response monitoring will continue throughout that quarterly monitoring period until the relevant station(s) has been sampled, or the quarter ends, at which time monitoring of all the compliance stations will reset again for the next quarterly monitoring period.

4.1.3.2 Biological Routine Monitoring

As part of the routine surface water monitoring program, flow conditions permitting, surface water is collected at surface water monitoring stations SS1, SS10, SS16, SP1, SP2, SP3, and SP4, annually in the spring for biological assessment as per the Landfill EMP. Surface water samples are laboratory tested for their toxicity to *daphnia magna* and rainbow trout. A greater than 50% mortality rate in a 48-hour period for *daphnia magna* and 96-hour period for rainbow trout demonstrates water quality that has the potential to adversely affect benthic communities downstream of the surface watercourse sampling location.

4.1.3.3 Verification Monitoring

To differentiate landfill leachate effects from natural water quality variability, a group of parameters indicative of landfill leachate were selected during the preparation of the Landfill EMP to form a Primary Leachate Indicator List (PLIL) based on:

- Elevated concentrations in leachate.
- Mobility and stability in surface water;
- Representative of larger chemical groupings (e.g., boron for metals); and
- Applicable Provincial Water Quality Objectives (PWQO) (MOEE, 1995).

The PLIL is explained in more detail in **Section 4.3.1.4**, and the PLIL is provided in **Table 4-5**.

When a PLIL parameter exceeds its trigger concentration at compliance surface water monitoring stations SS1, SP1, SP2, SP3, or SP4, a verification monitoring response is triggered for that monitoring station. The rationale for the mechanism to evaluate trigger concentrations for the PLIL parameters is detailed in **Section 4.3.1.5**.

For open channel monitoring stations (e.g., monitoring station SS1), verification monitoring can only occur after the receipt of 10 mm or more of precipitation in a 24-hour period where sufficient flowing conditions are generated to complete sampling. Response monitoring continues throughout the calendar quarter until a precipitation event generates sufficient flowing conditions to complete sampling. If insufficient flowing conditions continue at the ditch type station throughout a quarterly monitoring period, the verification event is extended into the next quarterly monitoring period. Consequently, during this situation, the verification monitoring event will be combined with the routine quarterly monitoring. Verification monitoring has been extended into the subsequent calendar quarter for a few monitoring events in the past due to non-flowing conditions.

Similarly, for the Sedimentation Ponds, a verification monitoring event is triggered when the analytical results from the routine sampling event shows one or more PLIL parameter concentration that is above the triggering criteria. Per Condition 5.4 of the Sewage ECA, the verification monitoring for Sedimentation Ponds is completed within

one (1) week following the receipt of the routine surface water monitoring event's chemical analytical results, independent of precipitation).

4.1.3.4 Biological Verification Monitoring

Since 2014, surface water verification monitoring events have included biological monitoring for compliance surface water monitoring stations SS1, SP1, SP2, SP3, and SP4. This biological monitoring is completed as described in **Section 4.1.3.1**.

In accordance with the Waste and Sewage ECAs, per the EMP and the Request for Modification to Surface Water Monitoring/Assessment Process at Twin Creeks Landfill, Letter dated February 27, 2014, if the biological verification monitoring results are not acceptable, then an alternate source evaluation would be completed, of which includes closing the sluice gate(s) of the relevant pond prior to completing further evaluation.

4.2 Off-Site Study Area

4.2.1 Off-Site Study Area Surface Water Physical Setting

An off-site surface water monitoring field study was completed for a 12-month period from January 2022 to December 2022. The Off-Site Study Area, including the established surface water monitoring stations and drainage features, are depicted on **Figure 2**.

Stormwater from the northern portion of the TCEC, inclusive of discharge water from Sedimentation Pond 4 and a component of discharge flow from Sedimentation Pond 3, flows northerly from the TCEC along the eastern roadside ditch of Nauvoo Road toward Highway 402. Along this ditch are: 1) two drainage features that form part of the Auld-Redmond Drain Branch; and 2) one drainage feature that forms part of the Morris Drain. Stormwater from the on-site area just west of the transfer area flows westerly through a culvert and beneath perimeter screening berm C (Berm C) into the off-site eastern roadside ditch adjacent to Nauvoo Road, where it then flows southerly into the Gilliand-Geerts Drain. Stormwater from the Nauvoo Road eastern roadside ditch that is south of the Gilliand-Geerts Drain flows northerly and into the Gilliand-Geerts Drain.

4.2.2 Off-Site Study Area Surface Water Monitoring Stations

The locations and descriptions of the off-site monitoring stations are detailed in **Table 4-2** and are presented on **Figure 2**.

Table 4-2. Off-Site Surface Water Monitoring Station Designations and Descriptions

Task	Off-site Monitoring Station Designations	Monitoring Station Description
12-month Surface Water Environmental Monitoring Program	SW1	Downstream of the landfill at the intersection of Zion Line and Nauvoo Road, at the culvert heading northbound under Zion Line.
	SW2	Downstream to the north of the landfill at the first culvert facing westward under Nauvoo Road that forms part of the Auld-Redmond Drain Branch.
	SW3	Downstream and further north from SW2 along the east roadside ditch of Nauvoo Road at the culvert facing westward under Nauvoo Road that forms part of the Morris Drain (closer to Hwy 402).
	SW4	Downstream and south of the landfill, within the off-Site eastern roadside ditch adjacent to Nauvoo Road, near the northern confluence point where surface water flows into the Gilliand-Geerts Drain from the north.
	SW5	Downstream and further south of the landfill within the off-Site eastern roadside ditch adjacent to Nauvoo Road, near the southern confluence point where surface water flows into the Gilliand-Geerts Drain from the south.

4.2.3 Off-Site Study Area Routine Monitoring

The mechanism for initiating the off-site surface water monitoring is that of the routine compliance surface water monitoring program as described in **Section 4.1.3**. Surface water quality was assessed for chemical indicators PAHs inferred to be inherent to ASR material.

4.2.4 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. Though a portion of the TCEC is identified to be 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. 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. **Figure 5** 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 Environmental Quality Evaluations

Surface water quality data collected from the TCEC since 2003 for the established existing environmental monitoring program serves as a comprehensive baseline assessment of surface water conditions at the TCEC both pre- and post- landfill expansion development. The evaluation of this historical database will be used to predict potential effects from the landfill optimization project on surface water quality.

An assessment of the primary and secondary leachate indicator list (PLIL and SLIL) parameters that were established pre-landfill 2008 expansion as part of the 2007 EMP were examined for their current and future relevance based on surface water and leachate quality data that has been collected from the site since 2009/2010.

4.3.1 Leachate Quality Trends

An evaluation of leachate chemical quality characteristics is necessary to determine potential landfill leachate influences on surface water quality. Once the chemical characteristics from the leachate and surface water are understood, an evaluation can be made of whether a chemical constituent can be identified as an indicator of potential leachate effects on surface water based on its prevalence. For the purposes of this Surface Water Quality component of the EA, historical leachate quality data is evaluated for each individual landfilling area at the TCEC, namely the Expansion Landfill and the Existing Landfill. A comparison of leachate quality is 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 Surface Water Quality at the TCEC.

4.3.1.1 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 Cells Cell 1 and Cell 2 were added. Starting in 2017, leachate within the Equalization Tank included that of the 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.

Leachate quality from the pumping stations is 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.

Leachate quality for the purposes of evaluating the Expansion Landfill was assessed from samples collected at individual pumping stations, including PS1, PS3, and PS5. It is noted that leachate with 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 4-3**.

Table 4-3. 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
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
TDS	F	F	F
Phenols	F	F	F

Parameter	Pumping Station PS1	Pumping Station PS3	Pumping Station PS5
Arsenic	F	F	C
COD	F	F	D
Chromium	I	D/C	D
Copper	F	F	C
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 in **Table 4-3**, 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. The variability in constituent concentration trends between each of the waste fill areas of the Expansion Landfill is interpreted to be associated with the variability of waste deposited in each cell and its decomposition condition (i.e., older waste compared to newer waste). For leachate quality at monitoring station PS5, there are only three (3) datasets and the trends noted are very short-term but could be indicators toward the long-term as constituent concentrations show similar initial trends within PS5 as with the older waste cells at PS1 and PS3.

4.3.1.2 Existing Landfill Leachate Quality

Leachate quality within the Equalization Tank is representative of the leachate quality from the Existing Landfill and Expansion Landfill. As such, leachate quality for the purposes of evaluating the Existing Landfill was assessed from samples collected as part of the on-going compliance monitoring program per the 2007 EMP at the Site. Therefore, the Existing Landfill leachate quality evaluation 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 4-4**, which was derived from the historical leachate chemical data contained in **Appendix A**.

Table 4-4. 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 4-4**, most constituent concentrations at the SUMP and the CFA-COMP monitoring locations continue to show a decreasing and fluctuating trend through 2022 whereas others have 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.

4.3.1.3 Overall Leachate Quality Evaluation

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.

When considering the predicted peak leachate values tabulated within Table 6-9 of the 2008 Design & Operations Report for the Expansion Landfill Report (2008 D&O Report) (Henderson Paddon, 2008), the Expansion Landfill historical geometric mean and the arithmetic mean constituent concentrations (> 75% of the constituents tested) remain below their respective predicted values. **Table A-1, Appendix A**, 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 A-1, Appendix A**, 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 (i.e., size/volume of waste) from other jurisdictions (i.e., the U.S.).
- Waste streams and material compositions that are now landfilled slightly shifted over the years, due to various factors, some of which include 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 based on the current lifecycle of the waste mound.

As the Expansion Landfill leachate constituent concentrations generally remain below the predicted peak leachate values tabulated within Table 6-9 of the 2008 D&O Report, the selected Leachate Indicator List parameters for evaluating potential leachate effects on surface water quality outlined in the 2007 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. For example, BTEX are deemed indicators for the presence of VOCs. They have not typically been detected within the surface water at the TCEC. Notwithstanding, BTEX is present within the leachate at sufficient concentrations to warrant analysis within the surface water at the TCEC. **Table A-2, Appendix A**, 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 parameters that could be utilized in the assessment of landfill leachate impacts to surface water. In general, the PLIL and SLIL parameters currently established to monitor for landfill leachate effects to surface water continue to be effective as these parameters are noted to be elevated within the leachate when compared to the surface water.

Though elevated in leachate, some chemical parameters may not necessarily indicate a leachate impact to surface water, but rather an impact related to natural processes, such as erosional effects (elevated natural metals such as nickel, chromium, zinc, copper, and inorganics such as arsenic), stagnant water conditional effects (elevated BOD or COD), decaying terrestrial and aquatic plant life (elevated BOD, COD, phosphorous, and TSS), etc., or anthropological effects, such as 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 surface water quality and do typically 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 surface water are landfill leachate related or related to some other factor(s).

Poplar System Irrigation Liquid Evaluation

As noted in **Section 4.1.2.2**, irrigation liquid monitoring in consideration of application quality to the Poplar System (specifically the operational loading to the poplar trees) is completed monthly during the growing season. The analytical results for the irrigation liquid samples are presented in **Tables A-3** to **A-5**, **Appendix A.**

The historical analytical results for the irrigation liquid are compared to the target leachate concentrations for irrigation loading to the poplar trees. The parameter concentrations within the irrigation liquid satisfied the 100% leachate target concentrations with some exceptions as noted in **Tables A-3** to **A-5**, **Appendix A** and as discussed herein.

For comparative purposes, the irrigation liquid analytical results were also compared to guidelines for metals and general parameters in irrigation water from the Canadian Council of Ministers of the Environment (CCME, 2004) (CCME Guideline). In addition, the results were also assessed against values for chloride irrigation of salt tolerant poplar trees (Shanon et al., 1998). The CCME Guideline criteria are presented in **Tables A-3** to **A-5**, **Appendix A**. It is noted that the CCME Guideline criteria are for vegetable crops and do not represent upper toxicity limits for the poplar trees, however, they can be utilized as a guide for assessing chemical loading to the poplar trees. The analytical results which were found to be greater than their respective CCME Guideline criterion are highlighted in **Tables A-3** to **A-5**, **Appendix A.** In general, the irrigation liquid's quality satisfied the CCME Irrigation Water Guidelines with some regularly observed exceptions.

It is noted that the boron concentration for the August 11, 2021 sample was unusually elevated for irrigation liquid. This is a result of the time of sample collection, where the sample was collected prior to full dilution of the source leachate with clean water/weaker strength leachate, and as such is not a full representation of the liquid that would have been applied to the Poplar System at that time. Notwithstanding, the source leachate in this situation was from MH18 of the South Cell. As this strength of boron cannot be easily diluted, even with clean water, strong strength leachate was decided to no longer be sourced from MH18 for irrigation purposes. From August 2021, leachate from MH18 was decided to be sent to the Equalization Tank for off-site disposal, or dilution to reasonable quality strength leachate for dilution purposes for irrigation liquid.

Generally, the boron concentrations were noted to be around the CCME Guideline criteria but typically lower than the 100% leachate target concentration. Also, there was not any evidence of significant tree stress, such as but not limited to, deformed growth or leaf discolouration, that indicated the boron concentrations detrimentally affected tree health.

For the organic parameters tested, there is only a 100% leachate target concentration for the total BTEX compounds (benzene, toluene, ethylbenzene, and xylenes). The concentrations of total BTEX historically are less than the respective 100% leachate target concentration, with a couple exceptions (August and September 2021). There

was not any evidence of tree stress, such as but not limited to, deformed growth or leaf discolouration, that indicated the BTEX concentrations detrimentally affected tree health. The organic analytical results are presented in **Tables A-4** and **A-5**, **Appendix A.**

4.3.1.4 Establishment of Surface Water Leachate Indicator Lists

The establishment of leachate indicator parameters was completed during the preparation of the Landfill EMP. This section summarizes the steps that were taken toward the establishment of site-specific leachate indicator lists (LILs) for the TCEC and how the list applies toward the evaluation of surface water quality.

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

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

A landfill leachate effect on surface water quality is defined as leachate mixing with surface water and migrating in the direction of water movement beyond the TCEC boundary. To differentiate the TCEC landfill leachate effects from natural water quality variability, a group of parameters indicative of landfill leachate, referred to as the Primary Leachate Indicator List (PLIL), was selected based on the following:

- Elevated concentrations in leachate;
- Mobility and stability in surface water;
- Representative of larger chemical groupings (e.g., boron for metals); and
- Applicable PWQO.

The PLIL for surface water quality evaluations at the TCEC is summarized in **Table 4-5.**

Table 4-5. Primary Leachate Indicator List Compounds for Surface Water

Primary Leachate Indicator List (PLIL)
Chloride Ammonia (unionized) Phenols Boron Nickel Chromium (total) Zinc

A supplemental group of parameters, termed the Secondary Leachate Indicator List (SLIL), was 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 4-6**.

Table 4-6. Secondary Leachate Indicator List Compounds for Surface Water

Secondary Leachate Indicator List (SLIL)	
Alkalinity Sulphate Calcium Magnesium Potassium Sodium Iron	Nitrate TKN Phosphorus (total) TDS pH Conductivity Turbidity Dissolved Oxygen

Per the EMP, similar to the PLIL, the SLIL were also selected based on elevated concentrations within the leachate relative to surface water. 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 surface water triggering events.

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.

4.3.1.5 Trigger Mechanism Assessment

The trigger concentrations utilized to assess for potential landfill effects on surface water quality as an initial first step, are based on the 90th percentile of background surface water quality historical data from SS10 and SS16, or the PWQO, whichever is greatest. Water quality data from the previous calendar year is added to the historical database to calculate a triggering concentration value for the upcoming monitoring calendar year. The trigger concentration calculated values are updated on an annual

basis in consideration of fluctuating surface water quality conditions over time. These background stations reflect background surface water quality that would be expected if the landfill was not present. Where a PLIL constituent concentration is noted to be above its trigger value verification monitoring is required.

Verification monitoring, where completed, also includes biological testing (for both ditches and ponds), such that if biological testing results are acceptable, regardless of any chemical parameter concentration, the surface water quality is deemed of acceptable quality.

Based on the evaluation of surface water quality existing conditions, as well as the leachate quality from both the Existing and Expansion Landfills, the assessment process to establish triggering criteria still apply and the above trigger concentration mechanism remains suitable for discerning potential landfill leachate impacts to surface water quality.

4.3.2 Surface Water Monitoring Program Exceptions

Since the implementation of the EMP when the Expansion Landfill construction began in late 2008, surface water quality has typically satisfied the trigger criteria year-over-year with some exceptions that were typically not related to a landfill leachate effect.

As noted in **Section 4.1.2.3**, surface water monitoring was discontinued for the Poplar Plantation in 2011/2013, per MECP approval.

PLIL constituent concentration for boron within the surface water of Sedimentation Pond 1 were frequently elevated above its respective triggering criterion but was not related to landfill leachate or operational effects. As such, MECP approval to adjust the PLIL parameter boron trigger criterion was received in 2012. Its trigger concentration changed from 0.20 mg/L to 0.39 mg/L.

The mechanism for verification monitoring was also adjusted in 2014 following MECP approval, whereby verification samples would also include biological toxicity analysis. The MECP also approved the use of both background surface water station analytical data to calculate the 90th percentile values for each PLIL to establish the trigger mechanism by which surface water quality is evaluated.

Table B-4, Appendix B, lists the surface water monitoring locations that have been modified from its original assessment mechanism(s) per MECP approval.

4.3.3 Compliance Monitoring Surface Water Quality Trends

Existing surface water quality trends with flow around the TCEC were evaluated to understand Existing Conditions. The available surface water quality for the established PLIL parameters listed in **Table 4-5** was assessed for chemical trends such as seasonal patterns. PLIL parameters were determined as part of the 2007 EMP as being the most representative of a landfill leachate effect when identified in elevated concentrations in surface water. In addition, more than one PLIL parameter at elevated concentrations compared to background concentrations within the surface

water at compliance monitoring locations is interpreted as a potential landfill leachate effect to surface water.

To evaluate potential Expansion Landfill effects (i.e., operational and/or leachate) to surface water quality, consideration was also given to the timing of when the constructed exterior sideslopes first began extending above ground surface elevations. The interpretation is that, as the waste mound increases in height above the surrounding ground surface, the potential for a landfill effect to surface water (e.g., from leachate seeps) increases.

A summary of the timing for the exterior sideslope advancement attaining ground surface elevation for each individual waste cell of the Expansion Landfill to near 240 mASL is presented in **Table 4-7**.

Table 4-7. Approximate Dates that Waste Elevation for each Cell reached Ground Surface or approximately 240 mASL

Cell	Date	Waste Footprint Exterior Sideslopes with Direct Flow to Drainage Network
Cell 1A	Q1 2012	W, S
Cell 1B	Q2 2013	E, S
Cell 2A	Q2 2014	W
Cell 2B	Q1 2015	N/A
Cell 2C	Q1 2016	N/A
Cell 2D	Q4 2016	N/A
Cell 2E	Q4 2017	E
Cell 4A	Q1 2020	W
Cell 4B	Q1 2021	N/A
Cell 4C	Q1 2022	E
Cell 6A	Still below surrounding grade	W, N

Note: N/A denotes not applicable as the sideslopes were not sloping directly toward the TCECs surface drainage network.

4.3.3.1 General Chemical Trends

As discussed, data trends of the surface water PLIL parameters were evaluated using chemical analytical data collected at the Site since 2003 at the compliance monitoring locations. Data were analyzed for long-term trends, which considered the historical data that are presented in **Tables B-1** to **B-3**, and graphically represented for compliance station PLIL parameters chloride, boron, unionized ammonia and zinc in **Figures B-1** to **B-8**, as well as the same parameters for Poplar System stations on **Figures B-9** to **B-12**. A minimum of three (3) to five (5) data points are required to determine a chemical trend with time. Findings are discussed below.

General Statistical Data Assessment

Statistical data, including constituent concentration ranges and historical geometric means, for the surface water monitoring stations for both the Compliance and Poplar System Monitoring Programs, is provided in **Table B-1** and **Table B-3** of **Appendix B**, respectively.

During the assessment period, the TCEC was, and continues to be, undergoing significant alterations related to landfill growth since 2008. For example, during 2022, the development of Cell 6A occurred, which impacted surface water flow paths within the northwestern portion of the TCEC whereby a more significant portion of runoff will be managed through Sedimentation Pond 3.

Relatively consistent chemical concentration trends within the surface water were observed at the Site, with slight changes over time that correlate with Site development activities that are either in response to on-going (e.g., increase vehicular traffic to the Site) or intermittent (e.g., construction of roads, berms, waste cells, etc.) operational effects. These slight concentration changes for a few constituents, mainly PLIL heavy metal parameters nickel and zinc, within the surface water coincided with landfill operational milestones and are not associated with a landfill leachate effect. The surface water quality routinely satisfies the instilled regulatory criteria for acceptable off-site discharge. A summary of the PLIL parameter trigger concentration evaluation for surface water at the TCEC for 2022 is provided in **Table 4-8**.

Table 4-8. Surface Water Quality Trigger Concentration Comparison – 2022 Calendar Year

Quarter Sampled	Event Type	Date	Chloride	Ammonia (Unionized)	Phenols	Boron	Nickel	Chromium	Zinc	Biological
		PLIL Trigger:	**210**	**0.020**	**0.004**	**0.20 0.39 ***	**0.028**	**0.025**	**0.06**	**<50% Survival**
SS1 (Compliance)										
Q1	Routine	17-Feb-22	19	0.0089	0.0010	0.08	**0.039**	**0.026**	**0.07**	NR
Q1	Verification	4-May-22	29	<0.0047	<0.0010	**0.36**	0.009	<0.005	0.01	PASS
Q2	Routine	4-May-22	29	<0.0047	<0.0010	**0.36**	0.009	<0.005	0.01	PASS
Q2	Verification	16-May-22	30	0.0028	<0.0010	0.19	**0.032**	0.019	0.05	PASS
Q3	Routine	4-Aug-22	18	<0.0074	<0.0010	0.11	0.006	<0.005	0.01	NR
Q4	Routine	18-Oct-22	23	0.017	<0.0010	0.13	**0.092**	**0.062**	**0.17**	NR
Q4	Verification	28-Nov-22	29	<0.00051	<0.0010	0.08	0.005	<0.005	<0.01	PASS
SP1 (Internal Assessment Point)										
Q1	Routine	17-Feb-22	17	0.0076	0.0012	0.08	0.019	0.013	0.04	NR
Q2	Routine	4-May-22	29	<0.0015	<0.0010	0.37	0.007	<0.005	<0.01	PASS
Q3	Routine	20-Jul-22	28	*<0.082*	<0.0010	**0.43**	0.003	<0.005	<0.01	NR
Q3	Verification	2-Aug-22	26	*<0.075*	<0.0010	0.35	0.003	<0.005	<0.01	PASS
Q4	Routine	18-Oct-22	24	<0.0067	<0.0010	0.33	0.002	<0.005	<0.01	NR
SP2 (Compliance)										
Q1	Routine	17-Feb-22	34	0.0058	0.0011	0.09	0.021	0.013	0.04	NR
Q2	Routine	4-May-22	84	<0.0078	<0.0010	**0.39**	0.005	<0.005	<0.01	PASS
Q2	Verification	16-May-22	70	<0.0076	<0.0010	**0.50**	0.005	<0.005	<0.01	PASS
Q3	Routine	20-Jul-22	71	<0.013	<0.0010	**0.40**	0.003	<0.005	<0.01	NR
Q3	Verification	2-Aug-22	70	*<0.085*	<0.0010	**0.39**	0.003	<0.005	<0.01	PASS
Q4	Routine	18-Oct-22	34	**0.035**	<0.0010	0.18	0.025	0.016	0.04	NR
Q4	Verification	13-Jan-22	56	<0.0057	<0.0010	**0.28**	0.008	<0.005	0.01	PASS
SP3 (Compliance)										
Q1	Routine	17-Feb-22	71	0.003	<0.0010	0.06	0.012	0.007	0.03	NR

Quarter Sampled	Event Type	Date	Chloride	Ammonia (Unionized)	Phenols	Boron	Nickel	Chromium	Zinc	Biological
		PLIL Trigger:	**210**	**0.020**	**0.004**	**0.20 0.39 ***	**0.028**	**0.025**	**0.06**	**<50% Survival**
Q2	Routine	4-May-22	37	*<0.033*	<0.0010	0.11	0.002	<0.005	<0.01	PASS
Q3	Routine	2-Aug-22	60	*<0.045*	<0.0010	0.18	0.002	<0.005	<0.01	NR
Q4	Routine	18-Oct-22	33	*<0.06*	<0.0010	0.15	0.001	<0.005	<0.01	NR
SP4 (Compliance)										
Q1	Routine	17-Feb-22	34	0.0019	0.0011	0.09	0.020	0.012	0.03	NR
Q2	Routine	4-May-22	37	<0.0054	<0.0010	0.07	0.006	<0.005	<0.01	PASS
Q4	Routine	18-Oct-22	29	<0.0034	<0.0010	0.07	0.004	<0.005	<0.01	NR

Notes:
1) Trigger Concentrations are Post 2019 Criteria per the Sewage ECA.
2) Bold and Shaded denotes parameter exceeds Primary Leachate Indicator List trigger concentration at a compliance monitoring station
3) Italics denotes parameter concentration's RDL is greater than the trigger value
4) All units are in mg/L unless otherwise noted
5) NR (Pass) denotes biological not required but was completed as input to the assessment process.
6) NR denotes not required.
7) * it is noted that the boron trigger concentration for SP1 is 0.39 mg/L, as per the MOE letter dated May 18, 2012

On-going Operational Effects

An example of a change in surface water quality as a result of on-going operational effects, chloride concentrations within the surface water at compliance monitoring stations have shown a slightly increasing trend since 2018. The slightly increasing trend is attributable to road salting influences associated with increased vehicular traffic to the Site, which expectedly aligns with the increased annual tonnage rate that was approved in late 2017. The increased vehicular traffic did not necessarily increase on-site road snow management maintenance, but rather introduced additional road salt tracked onto the Site by trucks/trailers. This same effect is not observed for chloride within the surface water of the Poplar System surface water monitoring program, which has monitoring stations removed from the noted vehicular traffic on the internal road network.

Intermittent Operational Effects

An example of a change in surface water quality as a result of intermittent operational effects relate to the identification of elevated surface water boron concentrations noted since 2021 at monitoring stations SS1 and SP2 (refer to **Table 4-8** for 2022 boron values). Elevated boron concentrations are interpreted to be a result of short-term effects from the temporary storage of crushed glass (used as an aggregate bedding for landfill gas piping) near the southeast corner of Sedimentation Pond 2 and therefore, not related to a landfill leachate effect. During precipitation events, boron is inferred to have leached from the micro-shards (or dust) of glass into the surface water runoff at this location.

Similarly elevated boron was noted at SS1 as a result of this storage practice and the ditch regrading near the southeast corner of Sedimentation Pond 2 related to the Street C reconstruction activities.

Elevated boron concentrations within the surface water at the TCEC has not been observed at any other monitoring location. As such, the commonality between surface water monitoring stations SS1 and SP2 is runoff generated from the area where crushed glass was stored. Crushed glass was first placed in 2020 at the TCEC on a materials lay-down pad at a location between Sedimentation Pond 2 and the woodlot area to the south that drains toward monitoring station SS1. Elevated boron concentrations within the surface water at monitoring stations SS1 and SP2 were first attributed to this effect in the fall of 2020. The stockpiles of crushed glass were subsequently moved onto the Expansion Landfill footprint. The effects observed at monitoring stations SS1 and SP2 are attributed to this historical crushed glass storage practices.

A desktop review of the origin of boron in glass shows several studies that reference borosilicate glass originating from the manufacturing of glassware, ovenware, and glass used in laboratories. Borosilicate glass has been used since the 1900's. Some manufacturers use up to 15% boron oxide within the glass content, such as Pyrex® glass, which can translate up to 1,500 ppm. Though the boron oxide additive has many benefits for glassware, such as thermal resistivity and overall durability, boron has been shown to leach off glass surfaces under certain conditions.

Boron in surface water at monitoring stations SS1 and SP2 is an emerging existing condition, which continues to be monitored and is being considered for further studies to evaluate the leachability of boron from crushed glass.

In consideration of the above, glass used for bedding is now temporarily stored on the landfill mound where runoff from the glass is managed as leachate.

Another example of intermittent operation effects to surface water quality is in response to sedimentation pond sediment cleanup efforts. During this activity, select PLIL parameters can be temporarily elevated due to sediment release and residual loose soils following excavation activities. Disturbance of sediment during pond cleanup activities followed by the onset of inclement rainfall events can affect the overall quality of surface water that is discharging from the pond and shows chemical quality that is the same as seen from soil erosion effects. **Section 4.4** provides further details related to erosional effects to surface water quality at the TCEC.

Surface Water Analytical Constituent Trends

Concentrations of chloride, boron, unionized ammonia, and zinc in surface water within the Sedimentation Ponds and at compliance monitoring station SS1 were typically similar to each other. Some recent exceptions where elevated and fluctuating concentrations of boron have generally been noted were at SS1, SP1, and SP2, as explained above.

Long-term concentration trends indicate both constant and fluctuating concentrations with time. Fluctuating concentrations generally showed a seasonal pattern for PLIL parameters boron and chloride at stations SS1 and SP1. Chloride concentrations at SP2 and SP4 appear to have a fluctuating pattern in the long-term. Additionally, in the long-term, unionized ammonia concentrations continued a constant trend of being below the respective laboratory RDL and/or less than the respective PWQO (0.02 mg/L), with occasional historical concentrations above the PWQO at monitoring stations SS1, SP1, and SP2.

Organic compounds are intermittently and rarely detected within the surface water at the Site. When detected the concentrations are typically less than the relevant PWQO criterion. There is no discernible trend pattern for organic constituents. The assessed organic compounds are valuable to be evaluated in surface water as they are elevated within the landfill leachate. Refer to **Table B-2**, **Appendix B**, for the organic compound chemical results.

4.3.3.2 Biomonitoring Considerations

Samples collected to assess biological conditions have been assessed for surface water quality toxicity to *daphnia magna* and rainbow trout since 2003. The biological testing results showed that there was no potential for detrimental effects to aquatic life within discharging surface water at the TCEC either prior to, or during the presence of, the Expansion Landfill. This is also true for verification surface water sampling events since 2014. Prior to 2014, verification surface water monitoring under the landfill EMP did not consider biological monitoring toward its quality

evaluation. The historical biological testing results (2014 through 2022) are provided in **Table 4-9** below.

Table 4-9. Surface Water Historical Biological Testing Results (2014 – 2022)

Monitoring Station ID	Type of Event	SS1	SP2	SP3	SP4	SS10	SS16	SP1
				Mortality (%)				
28-Jan-14	Verification		0					
08-Apr-14	Routine	0	0	0	0	0	0	0
30-Apr-14	Verification	0	0	0	0	0	0	0
05-May-14	Verification		0					
07-Jul-14	Routine						**0**	
24-Jul-14	Verification		0					
06-Sep-14	Verification	0					0	
15-Oct-14	Routine						**0**	
04-Nov-14	Verification			0				
15-Dec-14	Verification		0		0			0
10-Apr-15	Routine	10 (RBT)	0	0	0	0	0	10 (RBT)
30-Apr-15	Verification		0					0
1-Jun-15	Verification	0					0	
7-Apr-16	Routine	0	0	0	0	0	0	0
27-Dec-16	Verification	0						
24-Jan-17	Verification							0
8-Feb-17	Verification	0						
6-Apr-17	Routine	0	0	0	0	0	0	0
19-Nov-17	Routine	0						
4-Apr-18	Routine	0	0	0	0	0	0	0
26-Sep-18	Verification	0						
17-Apr-19	Routine	0	0	0		0	0	
19-Apr-19	Routine				0			0
27-Oct-19	Verification	0						
3-Dec-19	Verification			0				
29-Mar-20	Verification	0						
18-May-20	Routine	0	0	0		0		0
4-Jun-20	Verification		0					
26-Nov-20	Verification	0	0					
9-Apr-21	Verification	0	0					
3-Jun-21	Routine	0		0	0			

Monitoring Station ID	Type of Event	SS1	SP2	SP3	SP4	SS10	SS16	SP1
26-Jun-21	Routine		0					
9-Jul-21	Routine/Verification		0					
30-Jul-21	Verification	0						
15-Oct-21	Verification	0	0	0				
4-May-22	Routine	0	0	0	0	0	0	0
16-May-22	Verification	0	0					
2-Aug-22	Verification		0					0
4-Aug-22	Routine		0					
28-Nov-22	Verification	0						

Notes: Values presented above are mortality percentages (%). RBT denotes rainbow trout.

The historical biological testing results (2014 through 2022) showed mortality results of 0% with the exception of the occurrences noted below.

- SS1 and SP1: 10% mortality – rainbow trout – April 10, 2015.

The historical biological testing results, when greater than 0%, were well still below the trigger of ≤50% mortality.

Biological monitoring continues to be an effective tool to evaluate surface water quality as it relates to aquatic conditions within the surface water at the TCEC.

4.3.4 Poplar System Monitoring Surface Water Quality Evaluation

The current surface water monitoring station locations for the Poplar System are shown on **Figure 2**. It is noted that the Poplar System surface water stations are not subject to the compliance assessment monitoring at the Site. Notwithstanding, these stations provide an understanding of surface water quality within the perimeter ditches around the Existing Landfill upstream of compliance monitoring points SP1, SS1, and SP2. The Poplar System surface water quality monitoring program evaluates for potential effects of the Poplar System's operation to surface water quality within the perimeter ditch of the Existing Landfill.

Quarterly precipitation event (10 mm or more in 24 hours) monitoring is completed for the TCEC's Poplar System with storm precipitation events (25 mm or more in 24 hours) completed twice during the permitted irrigation season, pending flowing conditions are observed and sufficient to complete sampling.

Currently established PLIL parameters chloride, boron, nitrate, and total ammonia are deemed as useful leachate effect indicators and typically occur at detectable concentrations within the surface water.

Generally, concentrations of PLIL parameters have shown to be generally fluctuating with no trend of note (e.g. increasing or decreasing) at SS14B and SS15A, and generally near historical lows at SS14A.

Most recently, in 2022, it was noted that concentrations of chloride, boron, and nitrate appear to be present at near historically elevated concentrations in the surface water at the relevant locations in part, due to temporary effects of Cell 6 construction and excavation/hauling activities that occurred throughout the year (e.g., effects of erosion from the roadways within the catchment areas of the relevant ditches). This is evidenced by the fact that elevated turbidity values were noted primarily at SS14B and partly at SS15A in comparison to turbidity values within the surface water at monitoring station SS14A. In this case, the elevated parameter concentrations are not directly attributed to the operation of the Poplar System, but rather to localized erosional effects from earthworks construction activities.

Organic compounds are typically not detected at the Poplar System surface water monitoring stations and were evaluated to be undetected as recent as 2022. As noted in **Section 2** organic compounds are noted at elevated concentrations within the leachate and on occasion are detected within the irrigation liquid utilized to irrigate the poplar trees, and as such, their analytical testing within the surface water is warranted.

During storm event monitoring efforts (initiated post 25 mm or more within 24 hours), surface water quality at the Poplar System monitoring stations are generally similar to that of routine quarterly monitoring events (initiated post 10 mm or more within 24 hours).

Some exceptions where select parameters are slightly more elevated following a storm event relate to heavy metals such as iron, aluminum, cobalt, copper, lead, vanadium, zinc, and nickel. Though elevated within the leachate, these heavy metals concentrations can be correlated with erosional effects as these metals are naturally occurring within clayey soils in the region. Further discussion as it relates to erosional effects to surface water quality is provided in **Section 4.4**.

In comparison to the PLIL parameter concentrations of the irrigation liquid historical data shown in **Tables A-3** to **A-5**, **Appendix A**, the surface water quality observed at SS14B and SS15A, is significantly lower in concentration. For example, based on geometric mean concentrations, chloride is commonly detected approximately 27 times lower, while boron is commonly detected approximately 1,312 time less in the surface water at downstream assessment monitoring stations relative to the irrigation liquid. In consideration of this evaluation and the evaluations discussed above, runoff from the Poplar System has not negatively affected downstream water quality. Ongoing monitoring will continue to evaluate this observation or emerging trends of concern that would require corrective action.

It is noted that the Poplar System surface water stations are not compliance stations and, as such, are not required to be assessed against the relevant surface water trigger concentrations derived from the Landfill Environmental Monitoring Program, as prepared by Jagger Hims Limited and dated December 2007.

4.4 Consideration of Erosional Effects

The surface water quality for the PLIL parameters was evaluated for chemical concentration trends in consideration of clayey soil erosional effects. Clayey soils are naturally comprised with more common (i.e., iron, aluminum) and trace (i.e., copper, cobalt, chromium, lead, nickel, molybdenum, and zinc) metals within their mineralogical composition. During erosional processes, the clayey soil particles can remain in suspension within the surface water column for an extended period. This allows for collection during sampling. Surface water samples, per industry standards, are not filtered to remove suspended particulate, as surface water is evaluated based on total constituent concentrations. Therefore, the reported chemical concentrations represent both dissolved and suspended chemicals in the surface column that is sampled.

Although there is no PWQO for TSS, evaluating TSS concentrations is important because when surface water has elevated TSS, there is typically a corresponding increase in metals constituent concentrations within the surface water.

It is noted that although influences other than soil erosion, such as waterfowl, fish, water-habitat mammals, and algae can cause TSS loading to surface water, these collective influences are visually interpreted to be inconsequential in comparison to that of soil erosional effects to surface water quality at the Site. Expectedly, erosional effects to surface watercourses increases the visual turbidity and consequently, the TSS concentrations.

TSS provides a very good indicator of erosional effects within the surface watercourse, as has historically been observed at the Site, and other watercourses established within a clayey soil hydrogeologic setting. As such, an evaluation of surface water TSS concentrations and its relationship to heavy metal concentrations within the watercourse was undertaken as part of the Existing Conditions for surface water at the Site.

4.4.1 Heavy Metals and TSS Relationship

When evaluating the TSS concentrations to those of select PLIL and SLIL metal parameters, a direct correlation is observed between elevated TSS and elevated heavy metal constituent concentrations within the surface water. Expectedly, concentrations of PLIL metal parameters chromium, nickel, zinc, as well as SLIL metal parameters iron, magnesium, and potassium, are typically elevated when TSS concentrations are elevated. This correlation is seen across the monitoring stations at the Site.

Moreover, TSS concentrations typically increase within the surface watercourse following intense precipitation events. However, TSS concentrations can vary regardless of precipitation intensity and can be influenced by other factors that may also contribute to TSS within the surface water during sampling such as, but not necessarily limited to, the following:

- Size of area with exposed clayey soil at the time of sampling;
- Vegetation growth;
- Condition of rock and straw bale check dams; and
- Climatic conditions leading up to the precipitation event, etc.

In general, when TSS concentrations are noted to be below 150 mg/L, surface water quality has historically been of acceptable quality for PLIL metal constituents and other metals such as, but not limited to, iron, magnesium, and potassium. In almost all instances where TSS concentrations were 120 mg/L or less, surface water quality has historically shown acceptable constituent concentrations for the metal related PLIL and SLIL parameters, with iron typically the exception.

4.4.2 TSS Evaluation

A summary of the historical TSS analytical testing results for surface water samples collected from the monitoring stations listed in **Table 4-1**, is provided in **Table B-1** of **Appendix B.**

4.4.2.1 Year-Over-Year TSS Evaluation

TSS is analyzed in surface water at the internal and downstream compliance monitoring stations for each sample collected throughout the year. For background (upstream) monitoring stations, TSS is evaluated once annually in the spring.

Thus, to assess the historical TSS data for comparison between surface water stations, an annual geometric mean is calculated for each station to complete a year-over-year comparison. This comparison is graphically presented in Figure **B-13** and **B-14**, of **Appendix B**.

As shown in the aforementioned graphs, TSS annual geometric mean concentrations were greatest immediately following construction and approximately 2019/2020 at both the background and the internal and downstream compliance monitoring stations. At the beginning of Expansion Landfill construction, the Sedimentation Ponds required sampling even during their individual construction development and as such, the ponds were not fully effective as they were not fully constructed. During 2019/2020, TSS concentrations were assessed to be elevated but could not be remediated until 2021 due to staffing availability as a result of the COVID-19 pandemic. It is recognized that TSS reduction is important to minimize erosional effects from metal-related parameters.

4.4.2.2 Per-Event TSS Evaluation

In addition to the year-over-year TSS evaluation discussed above, the TSS concentrations were also evaluated on a per-event basis to track the number of times TSS concentrations were greater than 120 mg/L. This evaluation was completed to understand the number of times there was a metal-related PLIL concentration above its established trigger value. This is important as the purpose of the surface water

monitoring program is to assess for landfill leachate-related effects more than soil erosion effects.

The below **Table 4-10** shows a statistical analysis of the historical TSS concentrations in surface water at the TCEC.

Table 4-10. Surface Water Historical TSS Statistical Analysis (2008 – 2022)

Monitoring Station ID	SS1	SP2	SP3	SP4	SS10	SS16	SP1
Statistical Analysis							
Minimum	6	4	2	2	13	21	4
Maximum	32,000	5,300	720	360	980	2,100	530
Geometric Mean	121	40	19	42	81	82	52
Count (Total)	79	70	61	48	15	15	58
Count (<120 mg/L)	46	54	54	40	8	10	41
% Below 120 mg/L	58%	77%	89%	83%	53%	67%	71%

Notes: mg/L denotes milligrams per litre. Values presented above are concentrations in mg/L unless otherwise indicated.

As shown above, 76% of the time, TSS concentrations are less than 120 mg/L at compliance surface water monitoring stations. Of these compliance monitoring stations, SS1 had the greatest percentage of events with TSS concentrations above 120 mg/L relative to SP2, SP3, and SP4. Also of note, background monitoring stations also showed TSS concentrations less than 120 mg/L 63% of the time historically. Therefore, on a percentage basis, TSS concentrations are more frequently less than 120 mg/L leaving the Site than flowing onto the Site.

When looking at the TSS concentrations in **Table B-1**, of **Appendix B**, each of the internal and compliance monitoring stations periodically show concentrations much greater than 120 mg/L. Of these occurrences, downstream monitoring stations SS1 and SP2 show the greatest magnitude TSS concentrations greater than 120 mg/L. Correspondingly, these stations required the greatest percentage of verification monitoring events, which are attributable to metal related PLIL concentrations above their established trigger values.

Therefore, when TSS concentrations are less than 120 mg/L surface water quality is typically acceptable when comparing got the PLIL trigger values.

4.4.3 Sediment Loading Reduction Actions

WM has implemented several controls to help mitigate sediment loading to the surface drainage network at the TCEC during and post cell construction activities, which continue to be maintained or replaced. These controls are outlined below.

4.4.3.1 Drainage Ditch Sediment Barriers

Straw bale check dams are routinely installed and maintained or replaced within freshly exposed clayey soil ditches, or in ditches that are appearing to begin to have sediment build up within them. Regular maintenance of the straw bale check dams includes conducting routine monthly inspections and intermittent inspections following inclement weather.

4.4.3.2 Evaluation of Sedimentation Pond Sediment Buildup

On an annual basis, the four sedimentation ponds at the TCEC (Pond 1, Pond 2, Pond 3, and Pond 4) are inspected for sediment build up within the forebay(s) and main portions of each pond from the water that flows through the ponds.

Sediment Buildup

The sedimentation pond's sediment management functionality is based on the design of maintaining a minimum water column above the sediment build-up. Per discussions with the design engineer for the sedimentation ponds, for the ponds to effectively operate as designed to remove particles > 13 micrometres (µm), the minimum water column within the main portion of the pond should not decrease more than 75% of the total design water column.

For example, if a pond's design water column is 0.6 metres (m), then the suggested build-up target of sediment within the design water column depth of 0.6 m would be 0.15 m (25% of 0.6 m), leaving the remainder 75% of the water column (0.45 m) occupied by water.

For the pond's forebays, the suggested target allowable build-up of sediment to maintain a given pond's functionality to manage sediment would be equal to the difference in elevation between the bottom of the primary forebay and the bottom of the main portion of the pond.

In addition to the targets presented above, as the secondary forebay in each Sedimentation Pond 1 and 2 were constructed with a base elevation equal to the main portion of the pond, their functionality to capture sediment is simply to limit the sediment loading to the main portion of the pond. Therefore, as a conservative approach to limit sediment loading to the main portion of each respective pond from the secondary forebay, a target build-up thickness of twice that of the target build-up thickness for the main portion of the respective pond is utilized.

The approximate maximum sediment build-up targets and the average sediment build-up measurements for Sedimentation Ponds 1 to 4 are presented in **Table 4-11**.

Table 4-11. Approximate Sediment Build-Up Targets and the Average Sediment Build-Up Measurements for Ponds 1 to 4

Sediment Build-Up Assessment						
	Sedimentation Pond 1			Sedimentation Pond 2		
Year	Primary Forebay	Secondary Forebay	Main Portion	Primary Forebay	Secondary Forebay	Main Portion
Sediment Build up Removal Target	0.60 m	0.30 m	0.15 m	0.50 m	0.40 m	0.20 m
2019	**0.99 m**	**0.61 m**	0.11 m	**0.88 m**	**1.00 m**	**0.38 m**
2020	**1.06 m**	**0.63 m**	*0.16 m*	**0.89 m**	**0.60 m**	0.18 m
2021	**1.42 m**	**1.01 m**	**0.41 m**	**0.82 m**	**0.74 m**	0.15 m
2022	0.01 m	0.24 m	0.00 m	**0.64 m**	**0.89 m**	**0.38 m**

	Sedimentation Pond 3			Sedimentation Pond 4		
Year	Primary Forebay	Secondary Forebay	Main Portion	Primary Forebay	Secondary Forebay	Main Portion
Sediment Build up Removal Target	0.40 m	N/A	0.15 m	0.70 m	N/A	0.15 m
2019	**0.66 m**	N/A	*0.20 m*	*0.77 m*	N/A	*0.19 m*
2020	**0.61 m**	N/A	0.07 m	*0.71 m*	N/A	0.10 m
2021	**0.68 m**	N/A	*0.16 m*	**0.91 m**	N/A	0.01 m
2022	0.32 m	N/A	*0.19 m*	0.29 m	N/A	0.07 m

Notes:

'Bold' denotes recommended for removal.

'Italics' denotes suggested to be re-evaluated the following year for additional sediment build-up of significance that would require removal. As noted in the above summaries, the forebays of each pond have effectively worked as designed and have had sediment accumulation. Each forebay notably limited the amount of sediment that entered the remainder of the pond.

Sedimentation Pond 1: It was assessed that the primary forebay (in 2019, 2020, and 2021), the secondary forebay (in 2019, 2020, and 2021), and the main portion (in 2020 and 2021) had sufficient sediment buildup partially limiting the forebay's ability to settle sediment.

Sedimentation Pond 2: It was assessed that the primary forebay (in 2019, 2020, 2021, and 2022), the secondary forebay (in 2019, 2020, 2021, and 2022), and the main portion (in 2019, 2020, and 2022) had sufficient sediment buildup partially limiting the forebay's ability to settle sediment.

Sedimentation Pond 3: It was assessed that the forebay (in 2019, 2020, and 2021) and the main portion (in 2019, 2021, and 2022) had sufficient sediment buildup partially limiting the forebay's ability to settle sediment.

Sedimentation Pond 4: It was assessed that the forebay (in 2019, 2020, and 2021) and the main portion (in 2019) had sufficient sediment buildup partially limiting the forebay's ability to settle sediment.

Below is **Table 4-12** with the approximate dates of sediment removal from the four (4) sedimentation ponds.

Table 4-12. Dates of Sediment Removal from Sedimentation Ponds 1 to 4

Removal of Sediment Build-Up						
	Sedimentation Pond 1			Sedimentation Pond 2		
Year	**Primary Forebay**	**Secondary Forebay**	**Main Portion**	**Primary Forebay**	**Secondary Forebay**	**Main Portion**
Sediment Build up Removal Target	0.60 m	0.30 m	0.15 m	0.50 m	0.40 m	0.20 m
2019	Winter	Winter	Winter	Winter	Winter	Winter
2020	Winter	Winter	NR	NR	Winter	NR
2021	Winter	Winter	Winter	Winter	Winter	NR
2022	Winter	Winter	Winter	Fall	Fall	Fall

	Sedimentation Pond 3			Sedimentation Pond 4		
Year	**Primary Forebay**	**Secondary Forebay**	**Main Portion**	**Primary Forebay**	**Secondary Forebay**	**Main Portion**
Sediment Build up Removal Target	0.40 m	N/A	0.15 m	0.70 m	N/A	0.15 m
2019	Winter	N/A	NR	NR	N/A	NR
2020	Winter	N/A	NR	NR	N/A	NR
2021	Winter	N/A	NR	Winter	N/A	NR
2022	NR	N/A	NR	NR	N/A	NR

Note: "NR" denotes Not Required as removal of sediment was not impeding the functionality of the relevant SWM Pond.

On-going sediment build-up inspections of the ponds is completed annually. Assessment focus is typically on the forebays of the ponds.

4.5 Off-Site Study Area Surface Water Quality Evaluation

A supplemental surface water monitoring program was completed in 2022 in concert with the current surface water quality monitoring program to evaluate off-site Existing Conditions.

This temporary monitoring program was implemented to evaluate effects, if any, from ASR track out on surface water quality off-site within the roadside ditch of the northbound lane of Nauvoo Road from the TCEC to Hwy 402.

The temporary supplemental surface water study was completed as described in **Section 4.2.1**.

Of note, ASR may be used at the TCEC as daily cover in accordance with Condition 6.51 of the Waste ECA. ASR samples, when this material is utilized, are collected on a semi-annual basis during the spring and fall and submitted for analysis of Ontario

Regulation 347 (O.Reg. 347) Schedule IV criteria in accordance with Condition 6.52 of the Waste ECA. Historical analytical data related to the semi-annual (spring and fall) ASR assessments that are completed per Condition 6.52 of the Waste ECA, is presented in the Quarterly and Annual Compliance Monitoring Reports for the TCEC.

The track out of ASR for 2022 does not represent the normal operational conditions of using ASR as daily cover at the Site during the timeframe from 2008 through 2022. As such, the evaluation of potential effects of ASR track out collectively considers both the duration of time where ASR track out challenges occurred and did not occur. Notwithstanding, ASR operational changes were implemented by WM to prevent track out and buildup of track out. This is completed through on- and off-Site ongoing inspection and cleaning program of where historically track-out occurred.

For years leading up to November 2021, ASR was utilized at the TCEC on a routine basis. In November of 2021, WM temporarily discontinued the use of ASR to manage the track out of ASR. WM re-instated the use of ASR after sourcing new streams of ASR material in February 2022, of which has since continued to be utilized at the TCEC.

In addition, operational activities that were implemented by WM in 2022 are listed below.

- After temporary discontinuance of the use of ASR as daily cover in November 2021, in February 2022 WM resumed utilizing ASR as daily cover at the TCEC. It is noted that in February 2022, the use of ASR as daily cover was from a new supplier that had milled the size of ASR material smaller to minimize track out of ASR caught between the dual tires of haul trucks and trailers.
- In September 2022, WM implemented a longer on-Site exit truck route for waste hauling trucks to allow a greater distance of travel on-Site for residual ASR material that may have gotten stuck within the treads of the truck wheels to fall out prior to exiting the TCEC.
- In October 2022, WM removed the existing build-up of ASR material within the ditches and road shoulders along Nauvoo Road using Hydrovac trucks.
- Since October 2022, WM has implemented a more rigorous routine inspection and where warranted, cleanup of track out ASR. On-site and off-site cleanup efforts are completed as needed and consist of sweeping, scraping with light equipment, hand raking/picking, along the roadways, road shoulders, and within the ditches. It is noted that the vegetative growth within Nauvoo Road's roadside ditches is cut as part of cleanup activities such that ASR does not remain entangled in tall vegetation in ditches.

In summary, WM works to contain the use of ASR within the workface to areas away from where the waste hauling trucks drive. This reduces the likelihood of ASR getting stuck between the truck tires as the trucks leave the workface. Aside from occurrences on occasion, ASR is contained within the workface. Following the identification of occurrences of ASR trackout, WM promptly cleans up the ASR that is observed outside the site entrance.

4.5.1 Off-Site Surface Water Quality Findings

To evaluate off-site Existing Conditions as it pertains to potential ASR effects to surface water quality, surface water samples were collected for laboratory analysis of PAHs. PAHs were identified as potential indicators of impacts from ASR to surface water quality. It should be noted that there are other potential contributors to PAHs in surface water along a highway setting, such as, but not limited to, tire wear from vehicular traffic (rubber residue on roadways washing into roadside ditches), atmospheric deposition from combustible engines of vehicles (incomplete combustion of hydrocarbons such as gasoline, diesel, and oil).

As discussed, the temporary supplemental off-site surface water monitoring program included collecting surface water samples at five (5) monitoring stations on a quarterly basis throughout 2022.

A summary of the laboratory PAH analytical testing results for surface water samples collected from temporary monitoring stations SW1, SW2, and SW3, as well as SW4, and SW5, is provided in **Table B-5** of **Appendix B**.

Of note, parameters anthracene, benzo(a)anthracene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and fluoranthene were reported as non-detectable at laboratory RDLs that were above their respective interim PWQOs. The RDL is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from a method blank laboratory test result. For each of these PAH constituents, the laboratory verified that the PWQO criteria are interim and not yet adopted by the MECP.

Moreover, the low-level values set for these constituents are typically not achievable for certified environmental testing laboratories. The PWQO criteria concentrations are too low for environmental laboratories to confidently report test results to those detection limits.

4.5.1.1 Site Entrance Northward to Hwy 402

The tested PAH constituents from sampled surface water at the off-site monitoring stations SW1, SW2, and SW3, were commonly not detected at concentrations greater than their respective laboratory RDLs. The parameter phenanthrene was detected at monitoring station SW1 with a concentration of 0.044 µg/L, as well as at monitoring station SW2 with a concentration of 0.038 µg/L for the first quarter monitoring event of 2022. These concentrations were noted to be above the relevant laboratory RDL and the assigned interim PWQO of 0.030 µg/L. Interim PWQOs are not regulatory limits, as there is insufficient scientific data to support an objective (MECP, 2016). These values are suggested by the MECP to be utilized in the interim while an objective is being developed. Moreover, the interim PWQO can be modified based on scientific data once it becomes an objective and as such, surface water quality evaluations using interim PWQOs are interpreted with caution.

There were no other detectable concentrations of PAHs within the sampled surface water of the northbound roadside ditch along Nauvoo Road for the remainder of 2022.

Therefore, the noted detected phenanthrene concentration at SW1 and SW2 in February 2022, are interpreted to not be a concern, as the detection was not repeatable at other stations, nor was it persistently observed at such concentrations for follow-up sampling events. As such, surface water samples collected within the roadside ditch along the east side of Nauvoo Road, upstream of where surface water enters the Gilliand-Geerts Drain from the north and the south, was of acceptable quality. If future evaluations determine that a persistence of ASR trackout along the northbound shoulder of Nauvoo Road were occurring, then PAHs could be assessed in concurrence with the surface water quality assessment program detailed herein. The duration of monitoring would be determined based on the evaluation such that acceptable surface water quality with respect to PAHs related to ASR trackout was assessed.

4.5.1.2 Site Entrance Southward to Gilland-Geerts Drain

The tested PAH constituents from sampled surface water at the off-site monitoring stations SW4 and SW5, were not detected at concentrations greater than their respective laboratory RDLs. As such, surface water within the roadside ditch along the east side of Nauvoo Road, upstream of where surface water enters the Gilliand-Geerts Drain from the north and the south, was determined to be of acceptable quality and did not indicate vehicle traffic related PAH influences on surface water.

4.5.1.3 Off-Site Surface Water Quality Summary

Given the above evaluation, it is interpreted that the presence of ASR material track out within the roadside ditch of the northbound lane of Nauvoo Road from the Site entrance to Hwy 402 did not negatively impact surface water quality.

4.6 Summary of Existing Conditions

Surface water quality data collected from the TCEC was evaluated to document the Existing Conditions as it pertains to its quality prior to off-site discharge in consideration of the On-Site Study Area (Existing Landfill and Expansion Landfill). The On-Site Study Area consists of the TCEC. Surface water at the TCEC is managed through on-site drainage features such as ditches and swales, as well as four (4) sedimentation ponds. Surface water that is managed by the Sedimentation Ponds typically consists of runoff that originates from the footprint of the waste fill areas of the TCEC. An Off-Site Study Area was established to assess Existing Conditions within the drainage ditch of the northbound lane to Lambton County Road 79 (Nauvoo Road) extending approximately 1 km north and 500 m south from the entrance to the TCEC. Field monitoring to assess surface water Existing Conditions were completed in 2022 to evaluate potential impacts to surface water quality associated with ASR track-outs along the road allowance. PAHs were identified as a contaminant of concern that had the potential to adversely affect off-site surface water quality nearby the TCEC.

The TCEC comprises of two (2) surface water monitoring programs, with 1) compliance monitoring program for three (3) open ditch surface water monitoring stations and four (4) sedimentation ponds, and 2) an open ditch surface water monitoring program consisting of three (3) monitoring stations to assess for Poplar System irrigation liquid effects to surface water quality within the perimeter ditch of the southern half of Existing Landfill.

The following brief conclusions are provided as a summary of the findings from this Surface Water Quality Existing Conditions evaluation for the TCEC.

- Both the Compliance and Poplar System Surface Water Monitoring Programs are effective in evaluating potential landfill leachate effects to surface water quality based on surface water quality Existing Conditions.
    - The selected Leachate Indicator List parameters, for evaluating potential leachate effects on surface water quality as outlined in the 2007 EMP, remain relevant based on leachate constituent concentrations remaining below the predicted peak leachate values tabulated within Table 6-9 of the 2008 D&O Report and overall surface water quality Existing Conditions. As such, the established trigger concentration mechanism continues to be suitable for discerning potential landfill leachate impacts to surface water quality.
- PLIL parameter concentration trends within the surface water are observed to be relatively consistent at the TCEC. Minor deviations in surface water quality do occur over time that primarily relate to erosional effects from exposed soil surfaces during periods of construction activity (i.e., infrastructure construction, waste cell excavation, soil and material movement, etc.) since 2008.
- Ongoing quality monitoring data indicated that surface water quality is generally not negatively impacted by the TCEC. The PLIL parameter concentrations generally satisfy the triggering mechanisms that form part of the surface water quality evaluation procedures for the TCEC. As a result, the surface water quality routinely satisfies the triggering mechanisms for acceptable off-site discharge.
- TSS concentrations correspondingly and expectedly influence heavy metal concentrations within the surface watercourse.
- The off-site temporary supplemental surface water monitoring program completed in 2022 showed low level detections of one (1) PAH parameter for one (1) of four (4) monitoring events at two (2) of the five (5) off-Site surface water monitoring stations during the first quarter of 2022. No other PAH parameter was detected at the Off-Site surface water monitoring stations for the 1-year short-term monitoring period in 2022.

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Figures

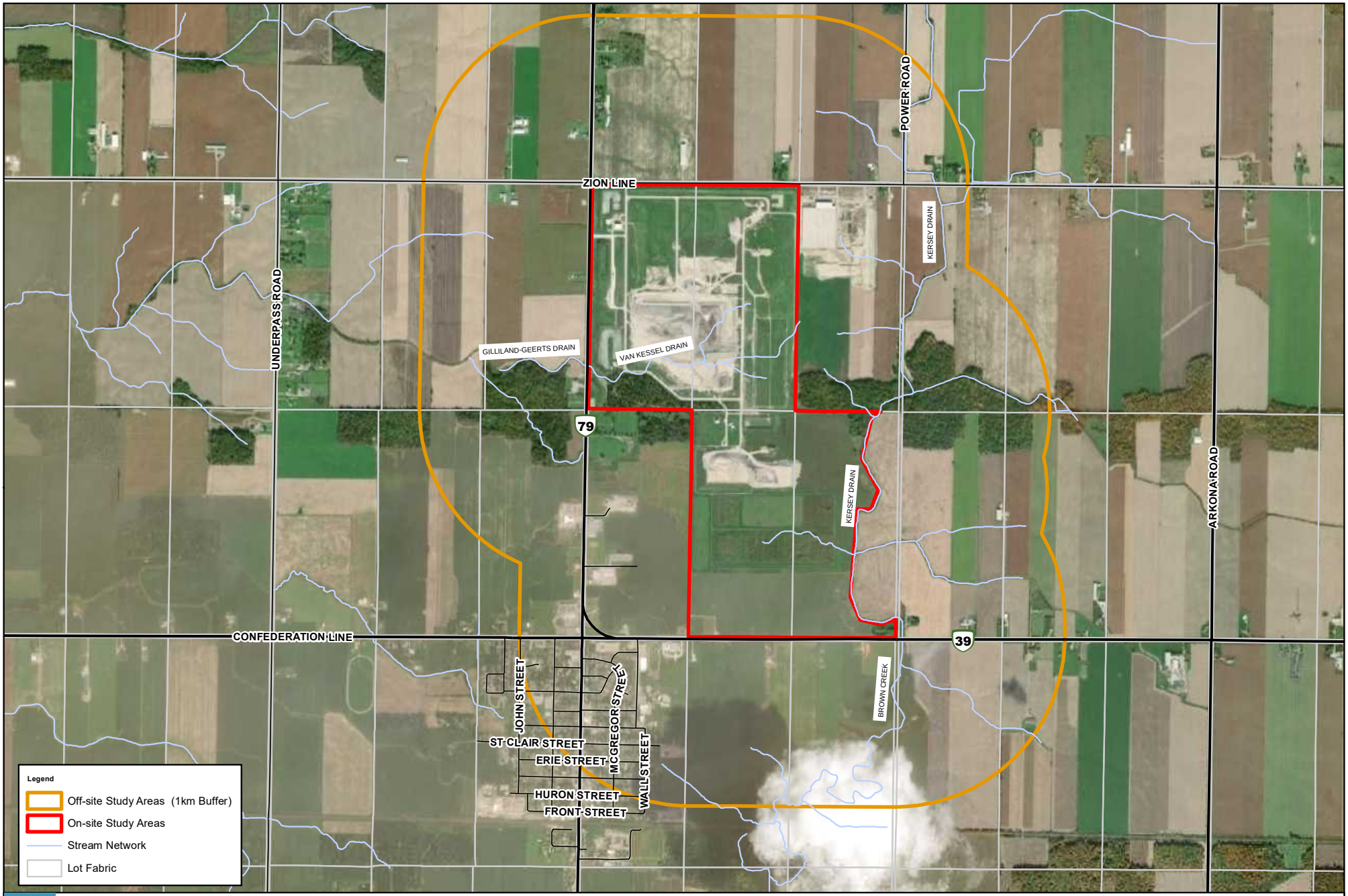
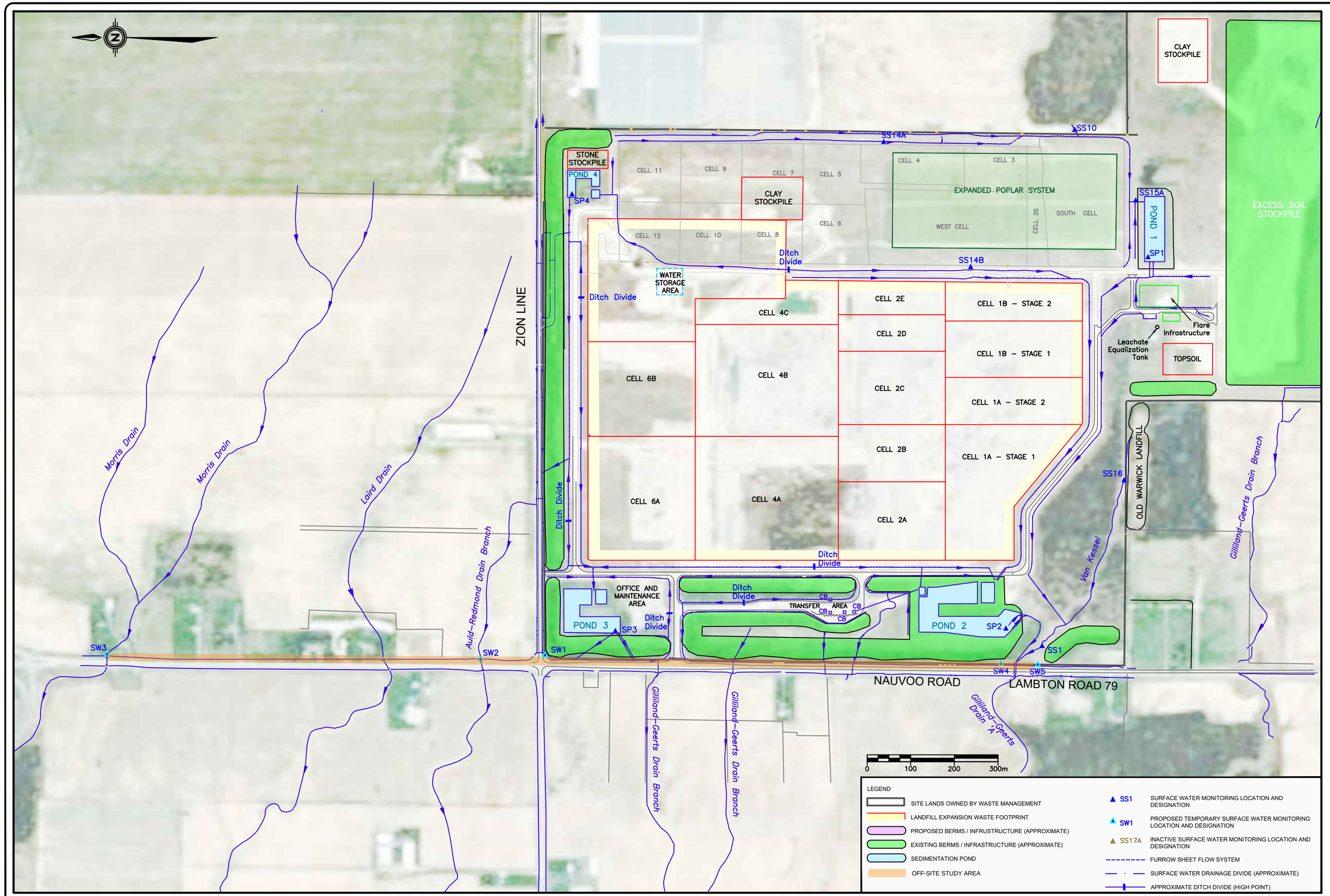


FIGURE 1

PROJECT STUDY AREA



MAP SOURCE:
AERIAL PHOTO PROVIDED BY ESRI (2020), ACCESSED ON NOVEMBER 2021.
FIGURE PROVIDED BY GENIVAR INC., FIGURE 3, FILE REF NO. 111-53111-00-F3-SP 12CM Q4, DATED JANUARY 2013.

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

RWDI

WASTE MANAGEMENT

SURFACE WATER SYSTEM
LANDFILL OPTIMIZATION ENVIRONMENTAL ASSESMENT

TWIN CREEKS ENVIRONMENTAL CENTRE
TOWNSHIP OF WARWICK, ONTARIO

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

WASTE MANAGEMENT OF CANADA CORP.

PROJECT FILE REF. NO. 2101750

FIGURE
2

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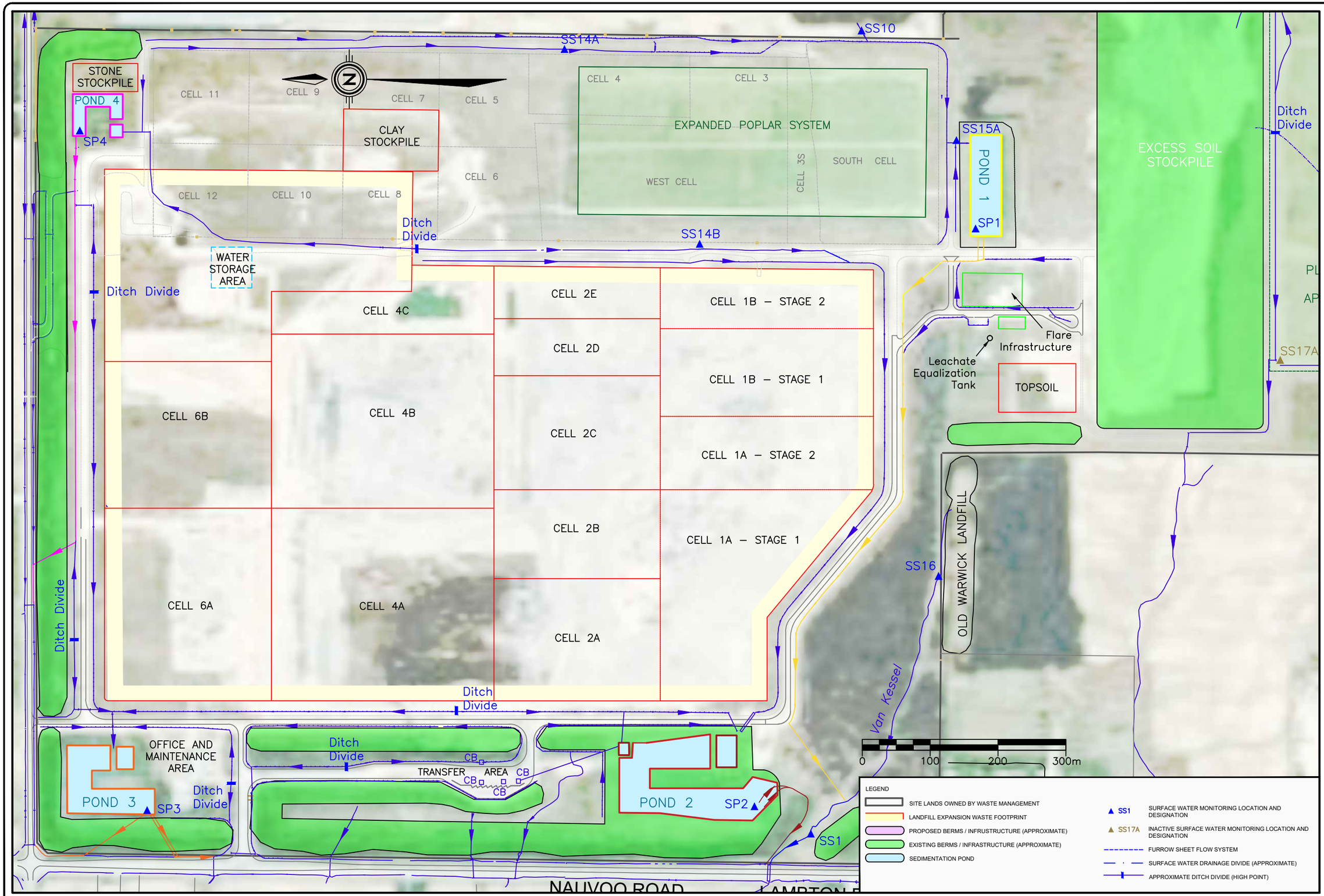


MAP SOURCE:
AERIAL PHOTO PROVIDED BY ESRI (2020), ACCESSED ON NOVEMBER 2021.
FIGURE PROVIDED BY GENIVAR INC., FIGURE 3, FILE REF NO. 111-53111-00-F3-SP 12CM Q4, DATED JANUARY 2013.

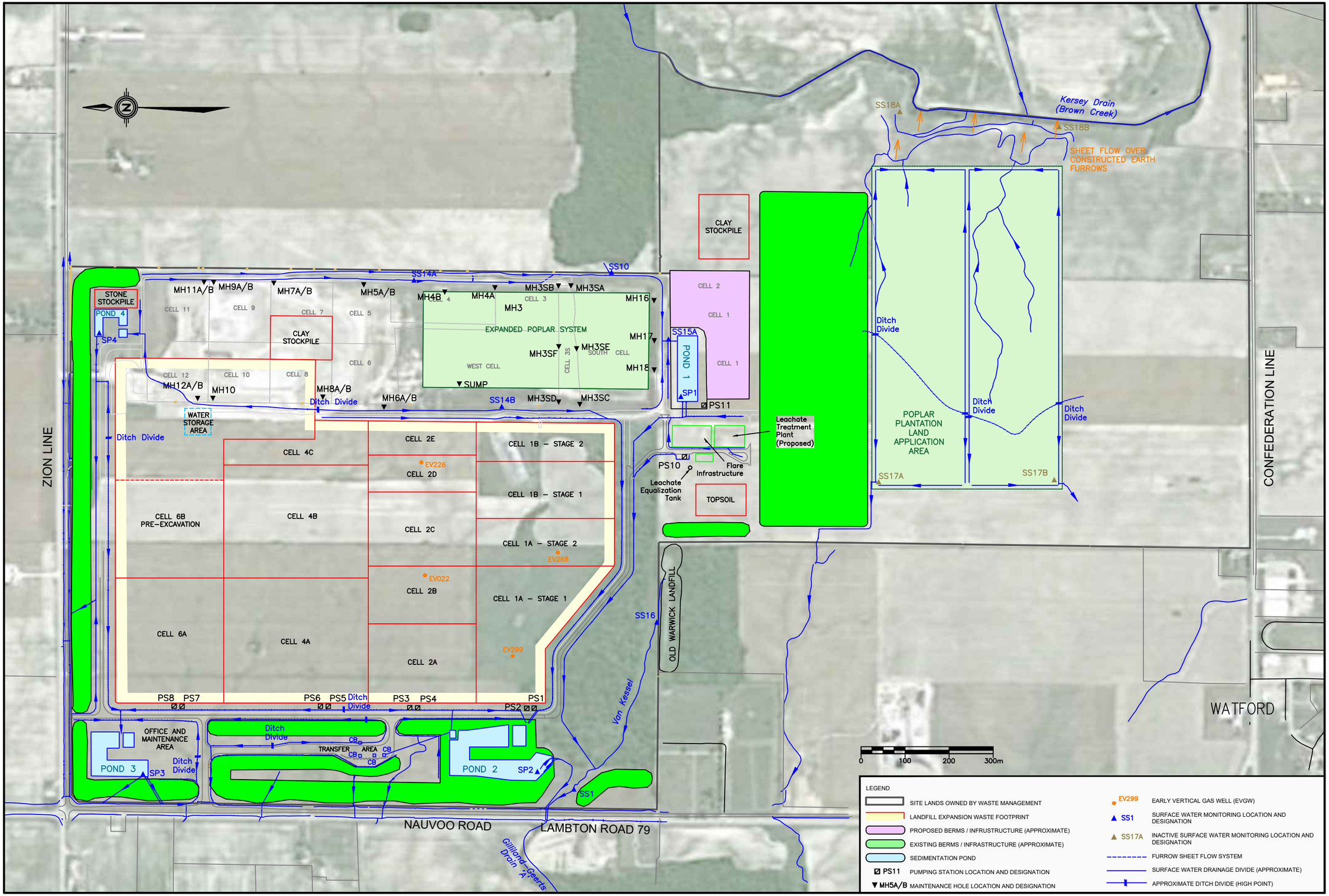
NOTE:
LOCATION OF CONSTRUCTION SEDIMENTATION PONDS, BERMS, POPLAR PLANTATION, TREATMENT PLANT, & EFFLUENT LAGOONS FROM NOVEMBER 2010 SURVEY PLAN.

SURFACE WATER SYSTEM
LANDFILL OPTIMIZATION ENVIRONMENTAL ASSESMENT

TWIN CREEKS ENVIRONMENTAL CENTRE
TOWNSHIP OF WARWICK, ONTARIO

DWN BY: EW
CHK BY: JCL
DATE: NOVEMBER 2021
SCALE: 1:5,000
WASTE MANAGEMENT OF CANADA CORP.
PROJECT FILE REF. NO. 2101750

FIGURE
3



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-F3-SP 12CM Q4, DATED JANUARY 2013.

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

WASTE MANAGEMENT

SURFACE WATER SYSTEM

LANDFILL OPTIMIZATION ENVIRONMENTAL ASSESSMENT

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 4

LEGEND:

- Approximate Property Boundary
- Significant Groundwater Recharge Area

Note:

1. Locations are approximate and provided for illustrative purposes only.
2. Base map obtained from Source Protection Plan & Assessment Report (Thames-Sydenham Source Protection).

0 400 800m

St. Clair Region Source Water Protection
Surface Water Quality Existing Conditions Report, 5768 Nauvoo Road, Watford, ON

Waste Management

True North

Project #2101750

Drawn by:	EW	Figure:	5
Approx. Scale:	1:20,320		
Date Revised:	Jun. 11, 2024		

\\rwdgroup.net\rwdfs\AM_Jobs\2021\2101750\6. Deliverables\Hydrogeology and Surface Water\2023 Existing Conditions Reports\Surface Water Quality\02Figures\Working Files\Figure 5\20240611 RWDI 2101750 FIGS Source Water Protection.dwg

A

Leachate and Irrigation Liquid Chemical Results

Table A-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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

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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	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.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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.
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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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.
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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-1
Leachate - General Analytical Results - Compliance Monitoring
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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.
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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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					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).
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mg/L denotes milligrams per litre.
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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					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).
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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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mg/L denotes milligrams per litre.
4) Maxxam denotes Maxxam Analytics Inc.
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Twin Creeks Environmental Centre

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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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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.
4) Maxxam denotes Maxxam Analytics Inc.
5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.
6) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table A-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 Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

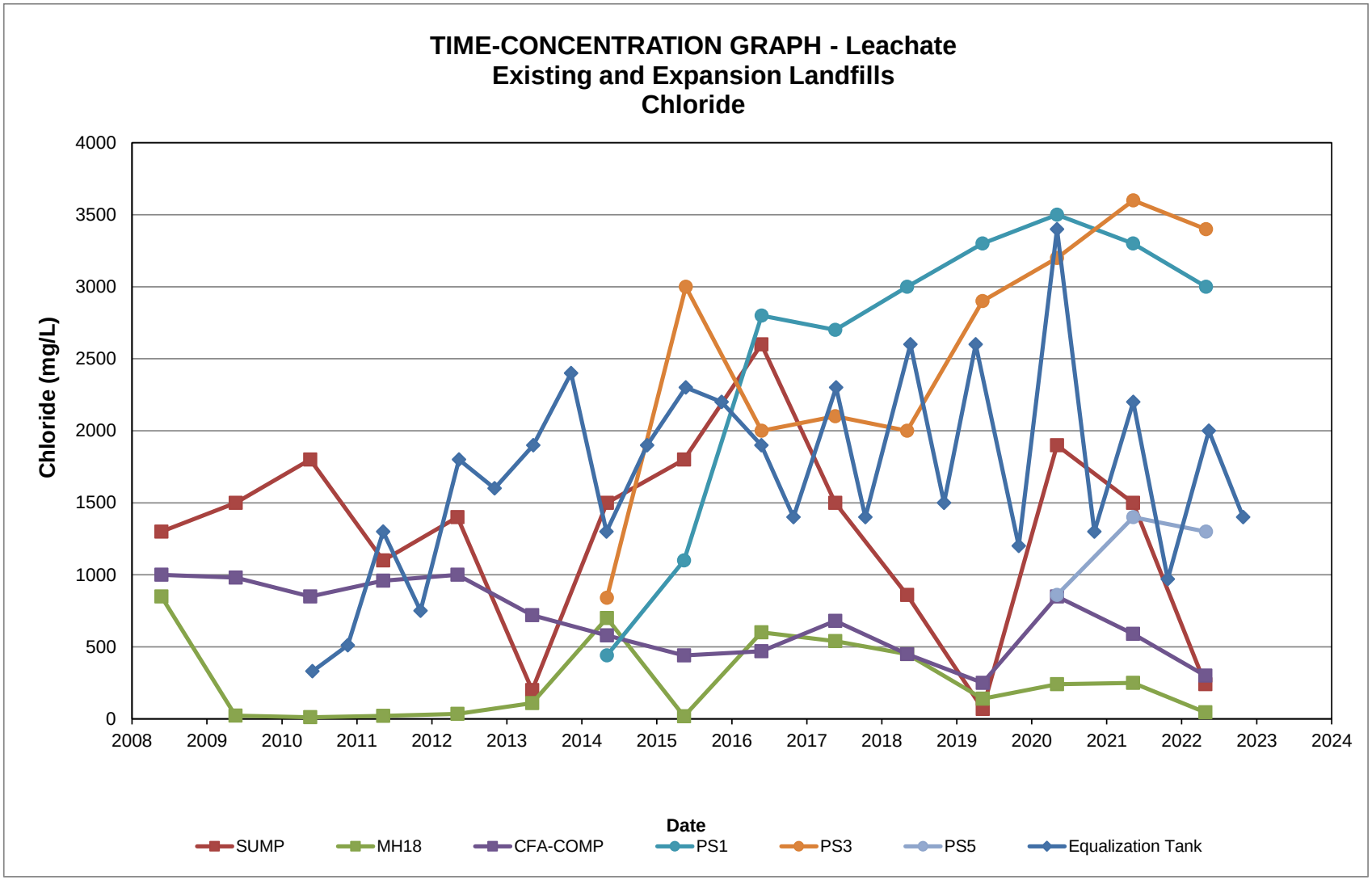
TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Chloride
Chloride (mg/L)
4000
3500
3000
2500
2000
1500
1000
500
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE A-1

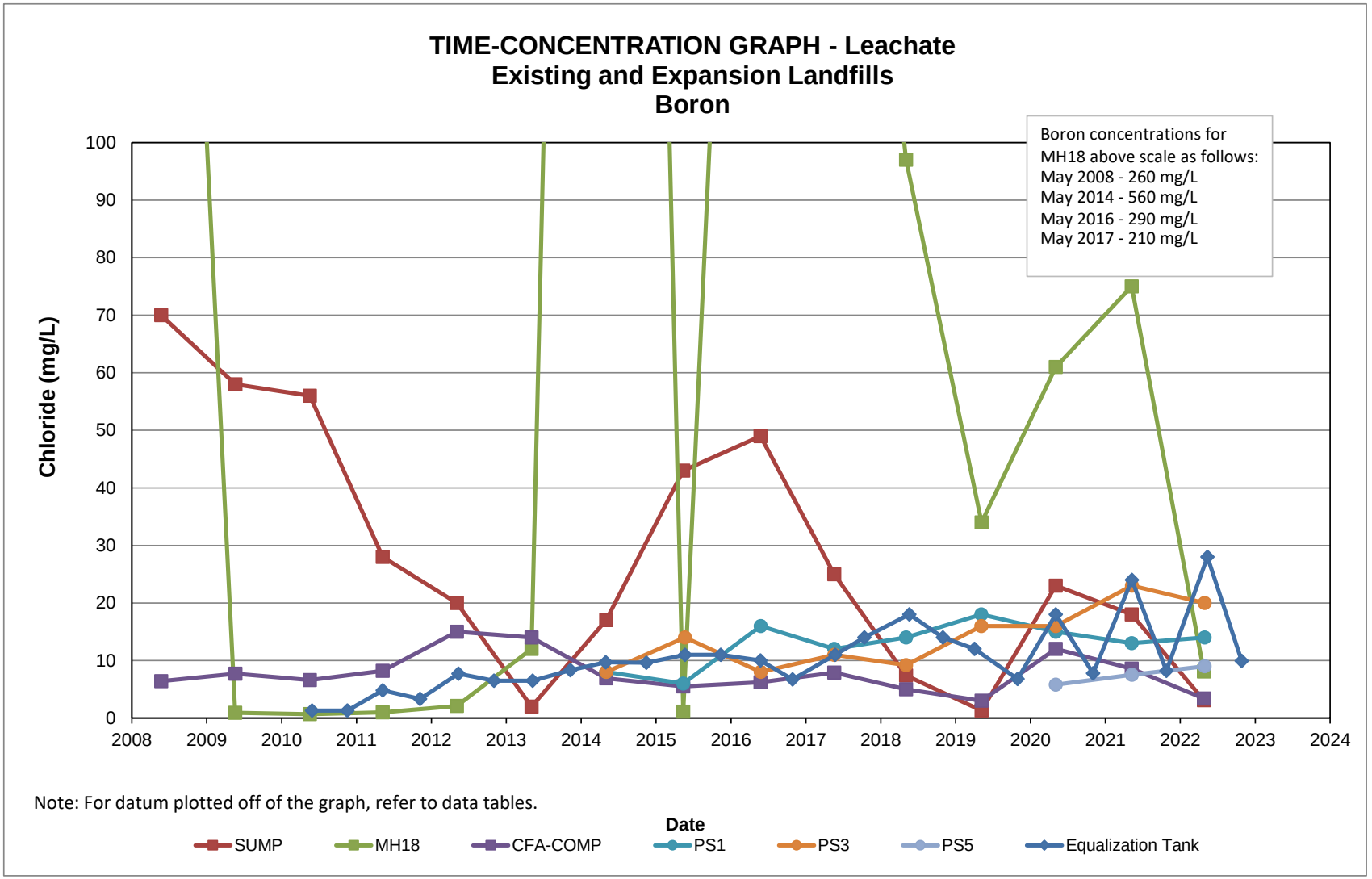
TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Boron
Boron concentrations for
MH18 above scale as follows:
May 2008 - 260 mg/L
May 2014 - 560 mg/L
May 2016 - 290 mg/L
May 2017 - 210 mg/L
Chloride (mg/L)
100
90
80
70
60
50
40
30
20
10
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
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 A-2

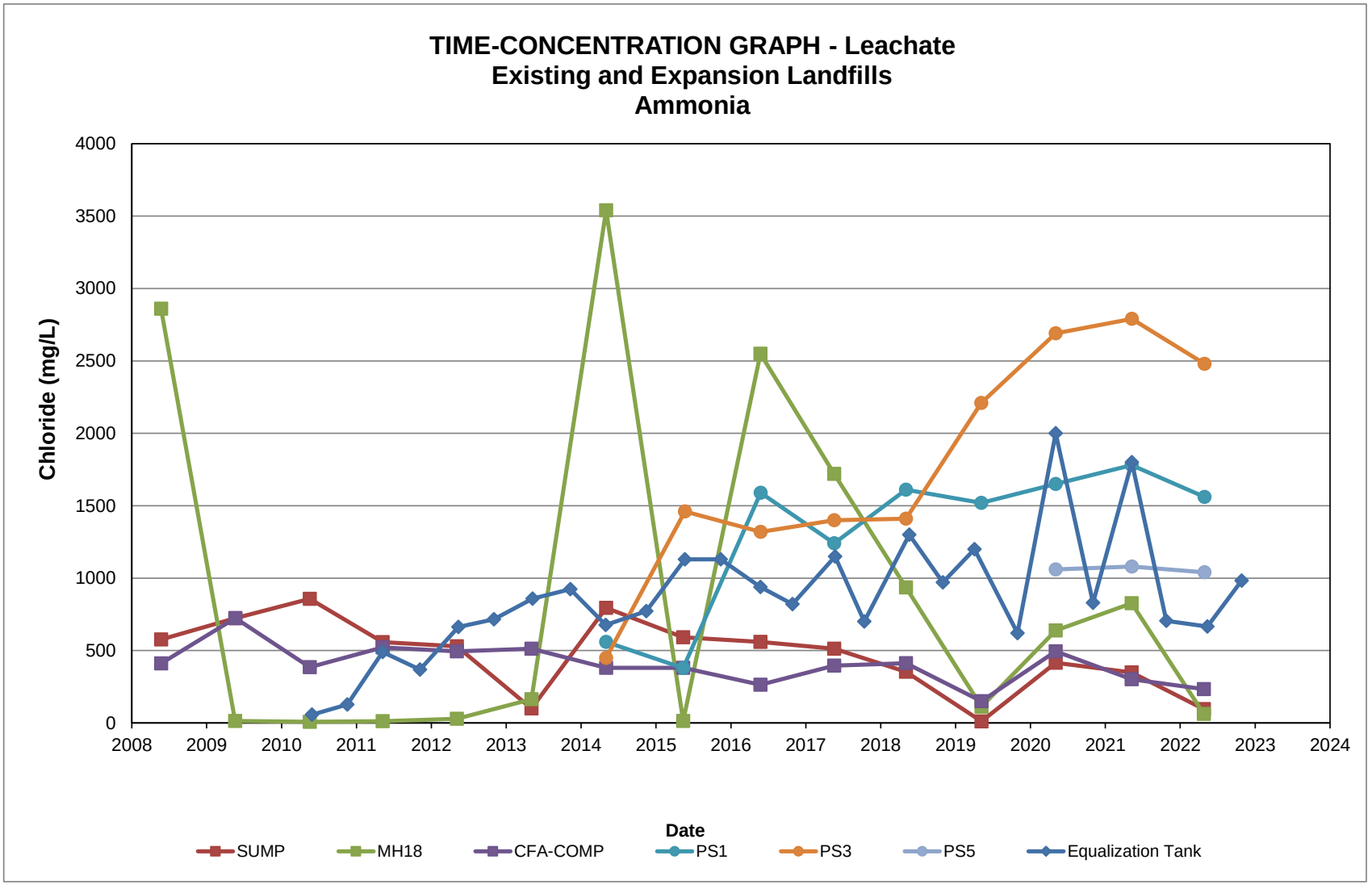
TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Ammonia
Chloride (mg/L)
4000
3500
3000
2500
2000
1500
1000
500
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE A-3

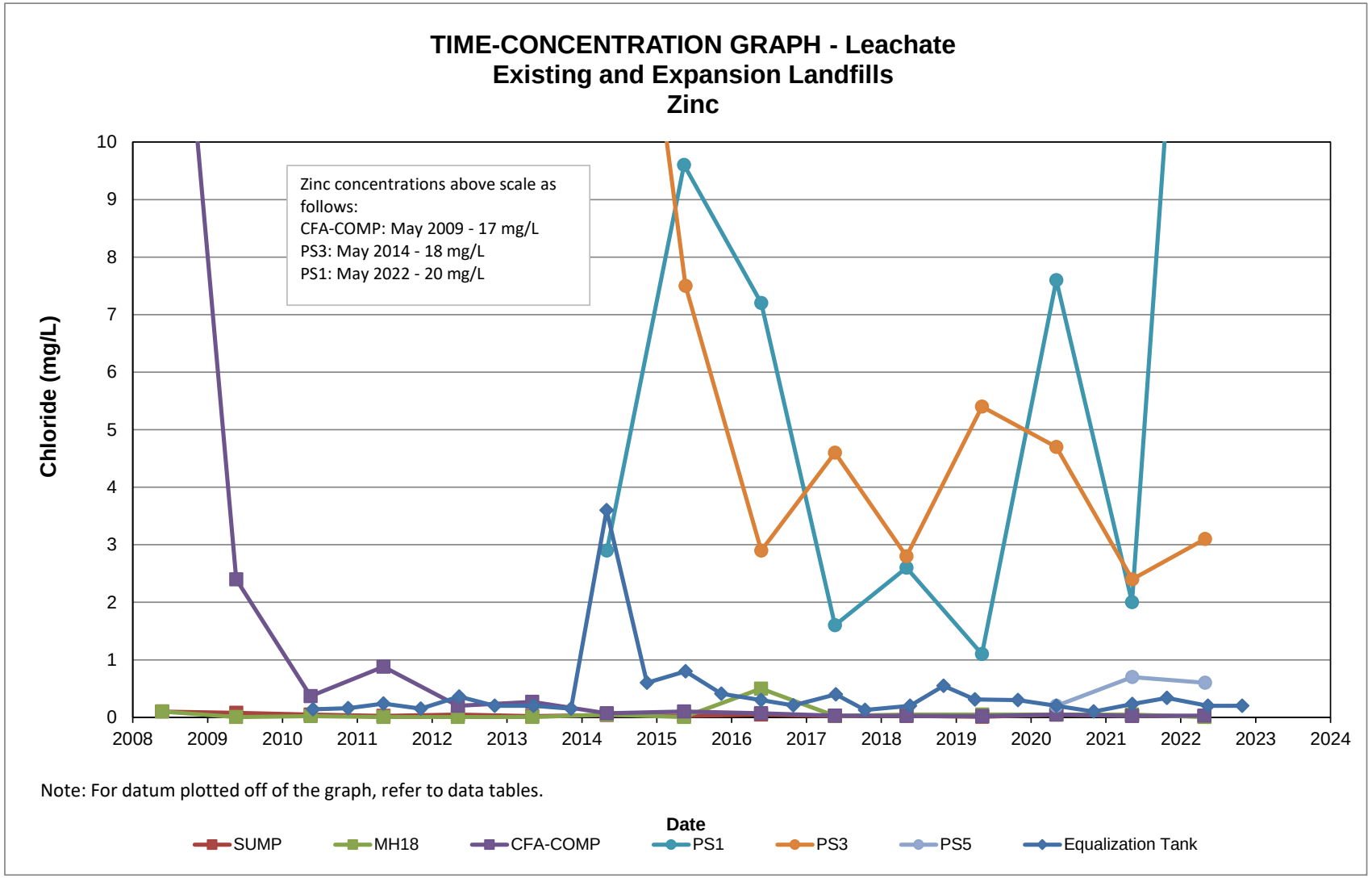
TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Zinc
Zinc concentrations above scale as follows:
CFA-COMP: May 2009 - 17 mg/L
PS3: May 2014 - 18 mg/L
PS1: May 2022 - 20 mg/L
Chloride (mg/L)
0
1
2
3
4
5
6
7
8
9
10
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
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 A-4

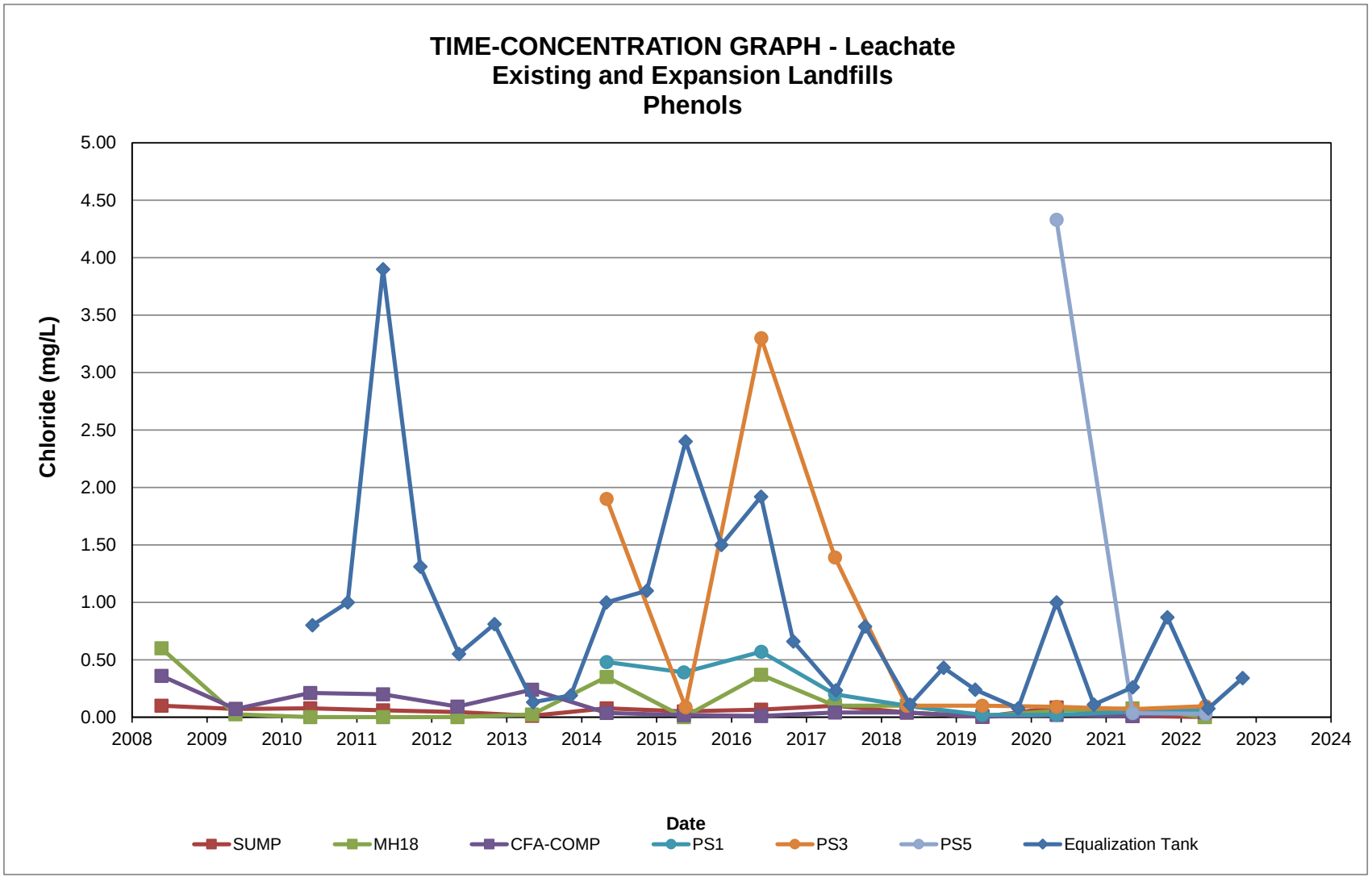
TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Phenols
Chloride (mg/L)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE A-5

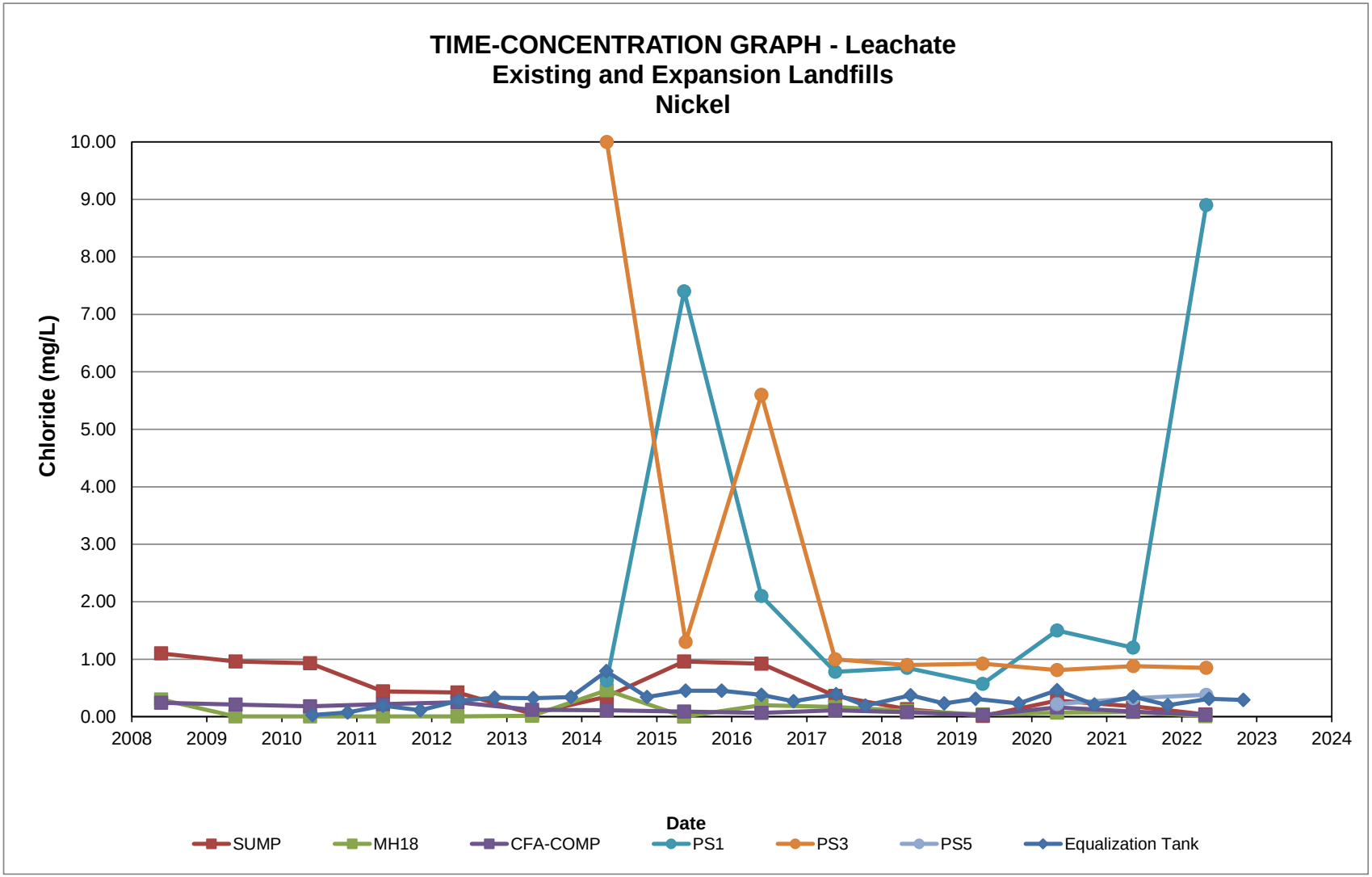
TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Nickel
Chloride (mg/L)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE A-6

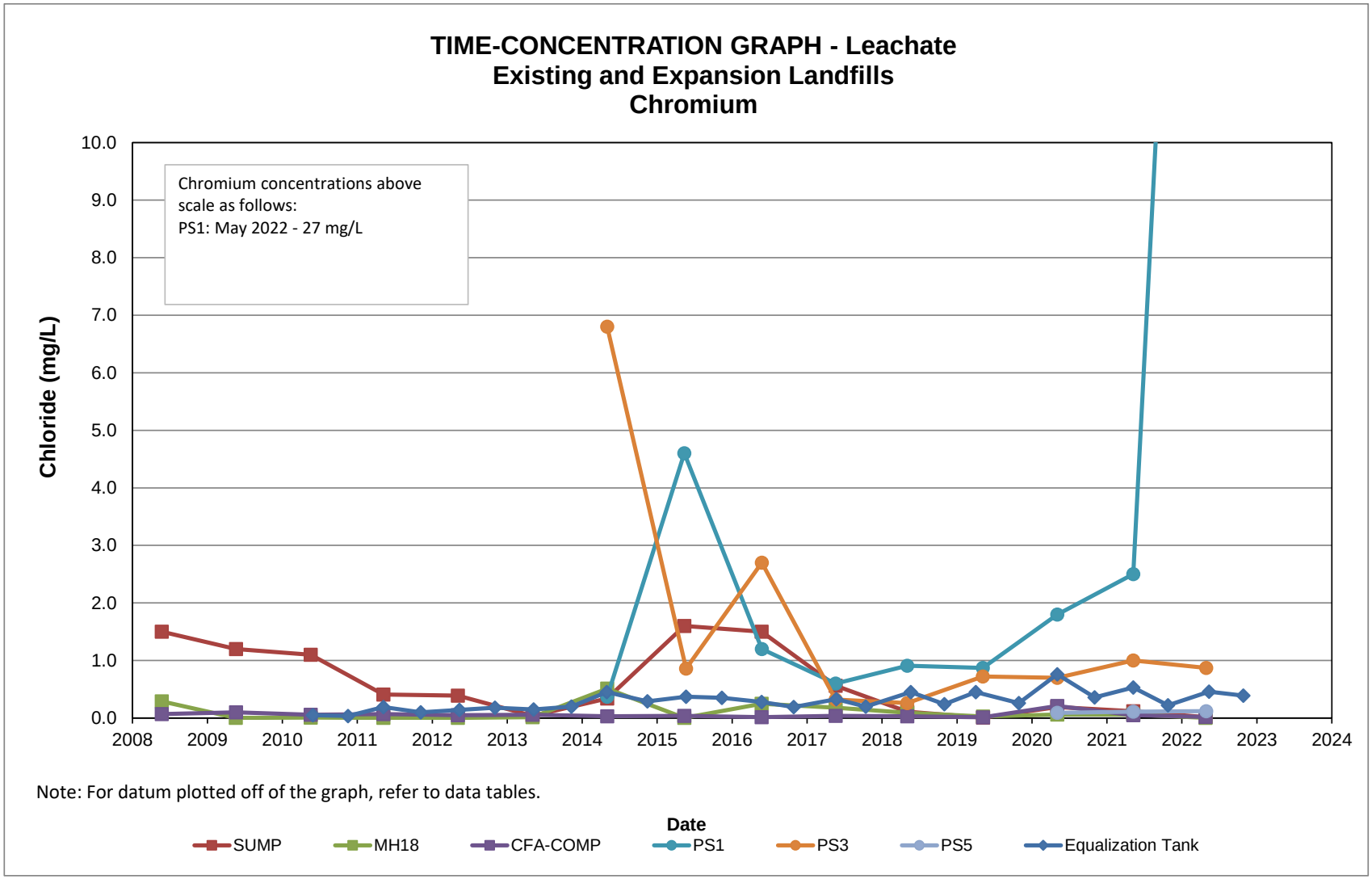
TIME-CONCENTRATION GRAPH - Leachate
Existing and Expansion Landfills
Chromium
Chromium concentrations above scale as follows:
PS1: May 2022 - 27 mg/L
Chloride (mg/L)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Note: For datum plotted off of the graph, refer to data tables.
Date
SUMP
MH18
CFA-COMP
PS1
PS3
PS5
Equalization Tank

FIGURE A-7

Table A-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 A-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 A-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 A-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 A-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 A-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 A-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 A-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.

Table A-3
General Chemical Results - Irrigation Liquid
Twin Creeks Environmental Centre - Poplar System

Parameter	Units	D&O Anticipated Raw Leachate Quality		Target Concentration 100% Leachate	CCME Guideline	Min	Max	Arithmetic Mean	Geomean	PS Holding Tank									
		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality							28-Sep-17	28-May-18	11-Jun-18	17-Jul-18	22-Aug-18	27-Sep-18	24-May-19	26-Jun-19	5-Jul-19	7-Aug-19
										Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity as $CaCO_3$	mg/L		4500	9,150	-	990	9700	3253	2902	5000	1800	4800	2700	990	4600	1700	3700	1800	3700
Chloride	mg/L	8625	2500	1,241	700 to 14,000*	240	1400	673	614	1400	370	1200	760	240	730	310	720	500	1200
Conductivity	uS/cm			10,616	-	980	11310	6790	6219	9100	3600	8200	5500	3300	980	4700	9200	4600	10000
N-NH_3 (Ammonia)	mg/L	2944	800	554	-	17	1310	428	317	988	155	682	17	153	533	161	478	207	607
N-NO_2 (Nitrite)	mg/L				-	0.005	0.155	0.052	0.036	<0.20	0.13	<0.20	0.033	0.01	<0.10	<0.050	<0.10	<0.010	<0.10
N-NO_3 (Nitrate)	mg/L				-	0.05	1	0.34	0.22	<2.0	<1.0	<2.0	<0.10	<0.10	<1.0	<0.50	<1.0	<0.10	<1.0
pH	pH units		7.2		6.0-8.5	6.73	8.1	7.3	7.3	8.0	6.9	7.2	7.8	7.9	7.2	6.9	7.1	7.1	7.6
Sulphate	mg/L	483	200		-	10	560	269	201	<20	370	99	90	140	210	330	77	560	300
Total Kjeldahl Nitrogen	mg/L	3450	960	2,948	-	150	1300	477	400	890	150	670	360	150	570	160	500	220	700
Total Phosphorus	mg/L	18.61	3	2.37	-	0.45	5.7	1.88	1.49	5.70	0.45	3.70	2.20	0.77	3.60	0.66	1.90	0.90	3.50
Calcium	mg/L	3795	200		-	45	840	177	149	67	260	160	45	51	840	180	150	190	140
Magnesium	mg/L	1380	350	347	-	53	330	165	154	170	140	230	88	53	330	130	200	200	170
Potassium	mg/L	2852	300	238	-	36	380	183	154	380	74	380	190	78	270	79	230	110	290
Sodium	mg/L	6578	500	921	-	220	1400	690	619	1300	300	1200	560	240	820	370	770	550	940
Aluminum	mg/L	4.09	4.09		20.0	0.1	56.0	2.5	0.4	0.4	0.3	0.3	1.2	0.2	**56.0**	0.2	0.1	0.5	1.3
Arsenic	mg/L	<0.11	<0.11		2.0	0.0	0.1	0.021	0.013	0.050	0.004	0.039	0.030	0.013	0.078	<0.005	0.009	0.004	0.050
Barium	mg/L	0.966	0.966		-	0.058	1.4	0.22	0.18	0.25	0.13	0.36	0.14	0.058	1.4	0.14	0.28	0.12	0.21
Beryllium	mg/L	<0.007	<0.007		0.1	0.0003	0.015	0.0018	0.0010	<0.006	<0.0006	<0.003	<0.003	<0.0006	<0.003	<0.003	<0.003	<0.0006	<0.006
Bismuth	mg/L				-	0.0005	0.025	0.0030	0.0016	<0.01	<0.001	<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.001	<0.01
Boron	mg/L	7.13	50	25.3	6.0	1.8	110.0	13.3	8.7	**21.0**	3.9	**18.0**	**7.0**	3.8	**19.0**	**7.9**	**15.0**	4.1	**7.3**
Cadmium	mg/L	0.12	0.12		0.01	0.00005	0.0025	0.0003	0.0002	<0.001	<0.0001	<0.0005	<0.0005	<0.0001	0.0016	<0.0005	<0.0005	<0.0001	<0.001
Chromium	mg/L	0.92	0.5	0.12	0.1	0.012	0.24	0.08	0.06	**0.22**	0.01	**0.17**	**0.11**	0.04	**0.24**	<0.03	0.04	0.02	**0.18**
Cobalt	mg/L	<0.115	<0.115		5.0	0.0	0.1	0.014	0.010	0.024	0.007	0.022	0.011	0.0045	0.099	0.004	0.011	0.0057	0.017
Copper	mg/L	0.064	0.1	0.43	5	0.001	0.32	0.021	0.006	<0.02	0.005	<0.01	<0.01	0.003	0.32	<0.01	<0.01	0.002	<0.02
Iron	mg/L	1150	8	25	20.0	0.6	210.0	10.7	3.4	3.0	3.7	2.3	1.7	0.6	**210.0**	2.7	1.0	3.5	5.0
Lead	mg/L	1.38	1.38	0.33	2.0	0.0	0.2	0.0075	0.0019	<0.005	0.0008	<0.003	<0.003	0.0006	0.15	<0.003	<0.003	0.0025	<0.005
Molybdenum	mg/L	<0.06	<0.06	1.82	0.05	0.003	0.05	0.019	0.013	<0.02	0.003	<0.01	0.02	0.019	0.05	<0.01	<0.01	0.017	0.05
Nickel	mg/L	1.84	0.5	29.3	2.0	0.0	0.4	0.101	0.080	0.23	0.044	0.19	0.094	0.036	0.37	0.027	0.093	0.046	0.16
Selenium	mg/L	<0.100	<0.100		0.05	0.0025	0.15	0.017	0.009	<0.05	<0.005	<0.03	<0.03	<0.005	<0.03	<0.03	<0.03	<0.005	<0.05
Silver	mg/L				-	0.0002	0.01	0.0012	0.0007	<0.004	<0.0004	<0.002	<0.002	<0.0004	<0.002	<0.002	<0.002	<0.0004	<0.004
Strontium	mg/L				-	0.51	3.5	1.5	1.4	0.88	1.4	1.6	0.6	0.51	3.5	1.3	1.7	1.7	1.3
Tin	mg/L				-	0.001	0.05	0.010	0.007	0.02	0.003	0.02	0.02	0.006	0.04	<0.01	<0.01	0.004	<0.02
Titanium	mg/L	0.29	0.29		-	0.015	0.77	0.090	0.054	0.15	0.016	0.11	0.09	0.031	0.77	<0.03	0.06	0.022	0.18
Vanadium	mg/L	0.115	0.115		1.0	0.0	0.1	0.017	0.012	0.030	0.004	0.026	0.018	0.006	0.120	0.005	0.015	0.005	0.030
Zinc	mg/L	11.27	0.3	0.043	5.0	0.0	1.8	0.104	0.032	*<0.1*	0.020	0.080	0.070	0.030	1.800	*<0.05*	*<0.05*	0.030	0.100

NOTES: 1) Blank denotes data not available.

2) Target Concentrations derived from LMP and "Expansion of Poplar Cap Irrigation System for Existing Waste Disposal Area" report by Genivar Consultants LP dated January 2010.

3) CCME Guidelines denotes maximum concentration for negative effects to vegetation for irrigation water as per Canadian Water Quality Guidelines (2004).

4) '*' denotes concentration estimated based on poplar tree tolerance and vegetable crops of > 710 mg/L (CCME, 2004), and salty water irrgation for poplars at 400 to 14,000 mg/L (Shanon et al, 1998).

5) '-' denotes no CCME Guideline.

6) µs/cm denotes microsiemens per centimeter.

7) mg/L denotes milligrams per litre.

8) "**" denotes parameter not analysed due to log in error at laboratory.

9) Shading indicates exceedances of the target concentrations.

10) Bolding indicates exceedances of CCME guideline.

11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant target concentrations.

Table A-3
General Chemical Results - Irrigation Liquid
Twin Creeks Environmental Centre - Poplar System

Parameter	Units	D&O Anticipated Raw Leachate Quality		Target Concentration 100% Leachate	CCME Guideline	Min	Max	Arithmetic Mean	Geomean	PS Holding Tank									
		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality							11-Sep-19 Bureau Veritas	07-Oct-19 Bureau Veritas	20-May-20 Bureau Veritas	09-Jun-20 Bureau Veritas	21-Jul-20 Bureau Veritas	31-Aug-20 Bureau Veritas	15-Sep-20 Bureau Veritas	19-May-21 Bureau Veritas	23-Jun-21 Bureau Veritas	14-Jul-21 Bureau Veritas
Alkalinity as $CaCO_3$	mg/L		4500	9,150	-	990	9700	3253	2902	3800	2800	1600	2400	3400	4800	1800	2500	3400	2700
Chloride	mg/L	8625	2500	1,241	700 to 14,000*	240	1400	673	614	670	700	510	540	950	1100	520	420	660	560
Conductivity	uS/cm			10,616	-	980	11310	6790	6219	7900	8200	4830	5690	6110	9770	5910	6000	6060	7080
N-NH_3 (Ammonia)	mg/L	2944	800	554	-	17	1310	428	317	464	473	201	292	604	719	221	299	455	334
N-NO_2 (Nitrite)	mg/L				-	0.005	0.155	0.052	0.036	0.145	<0.10	0.057	<0.050	<0.10	<0.10	0.068	0.155	<0.010	<0.050
N-NO_3 (Nitrate)	mg/L				-	0.05	1	0.34	0.22	<0.10	<1.0	0.36	<0.50	<1.0	<1.0	<0.10	<0.50	<0.10	<0.50
pH	pH units		7.2		6.0-8.5	6.73	8.1	7.3	7.3	7.4	7.4	7.3	7.0	8.0	7.6	7.0	7.0	6.9	6.7
Sulphate	mg/L	483	200		-	10	560	269	201	250	380	420	270	<50	480	290	440	300	250
Total Kjeldahl Nitrogen	mg/L	3450	960	2,948	-	150	1300	477	400	440	420	190	280	590	900	220	280	420	340
Total Phosphorus	mg/L	18.61	3	2.37	-	0.45	5.7	1.88	1.49	1.80	2.10	0.59	1.10	3.00	3.30	0.68	0.94	1.6	1.3
Calcium	mg/L	3795	200		-	45	840	177	149	170	200	200	160	59	180	200	190	150	150
Magnesium	mg/L	1380	350	347	-	53	330	165	154	190	180	110	140	100	180	130	150	160	160
Potassium	mg/L	2852	300	238	-	36	380	183	154	180	190	78	120	300	330	120	90	150	140
Sodium	mg/L	6578	500	921	-	220	1400	690	619	650	740	350	530	850	1200	520	600	670	580
Aluminum	mg/L	4.09	4.09		20.0	0.1	56.0	2.5	0.4	0.3	0.7	0.15	0.09	0.55	0.4	2.6	<0.2	0.8	0.56
Arsenic	mg/L	<0.11	<0.11		2.0	0.0	0.1	0.021	0.013	0.008	0.021	0.005	0.007	0.049	0.05	0.012	<0.01	<0.01	0.005
Barium	mg/L	0.966	0.966		-	0.058	1.4	0.22	0.18	0.22	0.18	0.12	0.18	0.15	0.22	0.18	0.11	0.17	0.16
Beryllium	mg/L	<0.007	<0.007		0.1	0.0003	0.015	0.0018	0.0010	<0.0006	<0.0006	<0.0006	<0.0006	<0.003	<0.006	<0.0006	<0.006	<0.006	<0.003
Bismuth	mg/L				-	0.0005	0.025	0.0030	0.0016	<0.001	<0.001	<0.001	<0.001	<0.005	<0.01	<0.001	<0.01	<0.01	<0.005
Boron	mg/L	7.13	50	25.3	6.0	1.8	110.0	13.3	8.7	4.4	**7.9**	3.1	4.4	**6.7**	**20.0**	5.0	**20**	**17**	**6.2**
Cadmium	mg/L	0.12	0.12		0.01	0.00005	0.0025	0.0003	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.001	<0.0001	<0.001	<0.001	<0.0005
Chromium	mg/L	0.92	0.5	0.12	0.1	0.012	0.24	0.08	0.06	0.05	0.10	0.03	0.032	**0.24**	**0.23**	0.06	<0.05	0.05	0.03
Cobalt	mg/L	<0.115	<0.115		5.0	0.0	0.1	0.014	0.010	0.0089	0.011	0.0057	0.0069	0.019	0.019	0.0092	0.006	0.009	0.008
Copper	mg/L	0.064	0.1	0.43	5	0.001	0.32	0.021	0.006	<0.002	0.004	0.002	<0.002	<0.01	<0.02	0.007	<0.02	<0.02	<0.01
Iron	mg/L	1150	8	25	20.0	0.6	210.0	10.7	3.4	2.0	4.5	4.1	2.7	1.9	5.0	7.0	4	5	3.3
Lead	mg/L	1.38	1.38	0.33	2.0	0.0	0.2	0.0075	0.0019	0.0015	0.0021	0.0008	0.0007	<0.003	<0.005	0.004	<0.005	<0.005	<0.003
Molybdenum	mg/L	<0.06	<0.06	1.82	0.05	0.003	0.05	0.019	0.013	0.008	0.018	0.02	0.013	0.05	0.05	0.013	0.03	<0.02	0.01
Nickel	mg/L	1.84	0.5	29.3	2.0	0.0	0.4	0.101	0.080	0.082	0.1	0.044	0.062	0.16	0.17	0.081	0.05	0.08	0.06
Selenium	mg/L	<0.100	<0.100		0.05	0.0025	0.15	0.017	0.009	<0.005	<0.005	<0.005	<0.005	<0.03	<0.05	<0.005	<0.05	<0.05	<0.03
Silver	mg/L				-	0.0002	0.01	0.0012	0.0007	<0.0004	<0.0004	<0.0004	<0.0004	<0.002	<0.004	<0.0004	<0.004	<0.004	<0.002
Strontium	mg/L				-	0.51	3.5	1.5	1.4	1.6	1.9	1.6	1.6	0.58	1.7	1.6	1.5	1.6	1.5
Tin	mg/L				-	0.001	0.05	0.010	0.007	0.005	0.008	<0.002	0.003	0.02	<0.02	0.003	<0.02	<0.02	<0.01
Titanium	mg/L	0.29	0.29		-	0.015	0.77	0.090	0.054	0.05	0.07	0.026	0.036	0.14	0.16	0.069	<0.05	<0.05	0.05
Vanadium	mg/L	0.115	0.115		1.0	0.0	0.1	0.017	0.012	0.011	0.016	0.006	0.009	0.027	0.03	0.014	<0.01	<0.01	0.01
Zinc	mg/L	11.27	0.3	0.043	5.0	0.0	1.8	0.104	0.032	0.020	0.040	<0.01	<0.01	0.050	*<0.1*	0.03	*<0.1*	*<0.1*	*<0.05*

NOTES: 1) Blank denotes data not available.

2) Target Concentrations derived from LMP and "Expansion of Poplar Cap Irrigation System for Existing Waste Disposal Area" report by Genivar Consultants LP dated Ja

3) CCME Guidelines denotes maximum concentration for negative effects to vegetation for irrigation water as per Canadian Water Quality Guidelines (2004).

4) '*' denotes concentration estimated based on poplar tree tolerance and vegetable crops of > 710 mg/L (CCME, 2004), and salty water irrgation for poplars at 400 to 1

5) '-' denotes no CCME Guideline.

6) µs/cm denotes microsiemens per centimeter.

7) mg/L denotes milligrams per litre.

8) "**" denotes parameter not analysed due to log in error at laboratory.

9) Shading indicates exceedances of the target concentrations.

10) Bolding indicates exceedances of CCME guideline.

11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant target concentrations.

Table A-3
General Chemical Results - Irrigation Liquid
Twin Creeks Environmental Centre - Poplar System

Parameter	Units	D&O Anticipated Raw Leachate Quality		Target Concentration 100% Leachate	CCME Guideline	Min	Max	Arithmetic Mean	Geomean	PS Holding Tank									
		Warwick Landfill Peak Value Including Recirculation	Warwick Landfill Anticipated Phase 1 Raw Leachate Design Quality							11-Aug-21 Bureau Veritas	16-Sep-21 Bureau Veritas	24-May-22 Bureau Veritas	7-Jun-22 Bureau Veritas	7-Jul-22 Bureau Veritas	9-Aug-22 Bureau Veritas	1-Sep-22 Bureau Veritas	4-Oct-22 Bureau Veritas		
Alkalinity as $CaCO_3$	mg/L		4500	9,150	-	990	9700	3253	2902	9700	4900	1400	3700	3300	3300	1900	2900		
Chloride	mg/L	8625	2500	1,241	700 to 14,000*	240	1400	673	614	610	880	400	810	660	680	500	250		
Conductivity	uS/cm			10,616	-	980	11310	6790	6219	9940	11310	4460	9570	8020	8300	5100	6680		
N-NH_3 (Ammonia)	mg/L	2944	800	554	-	17	1310	428	317	1310	639	166	638	366	575	194	39		
N-NO_2 (Nitrite)	mg/L				-	0.005	0.155	0.052	0.036	<0.10	<0.10	<0.010	0.022	<0.10	<0.10	<0.010	<0.10		
N-NO_3 (Nitrate)	mg/L				-	0.05	1	0.34	0.22	<1.0	<1.0	<0.10	<0.10	0.19	<1.0	<0.10	<1.0		
pH	pH units		7.2		6.0-8.5	6.73	8.1	7.3	7.3	7.4	7.9	7.3	7.4	7.1	7.5	6.9	8.1		
Sulphate	mg/L	483	200		-	10	560	269	201	83	160	530	66	230	310	430	420		
Total Kjeldahl Nitrogen	mg/L	3450	960	2,948	-	150	1300	477	400	1300	650	160	650	550	550	210	830		
Total Phosphorus	mg/L	18.61	3	2.37	-	0.45	5.7	1.88	1.49	3.4	2.3	0.5	2.4	1.4	1.5	0.8	0.66		
Calcium	mg/L	3795	200		-	45	840	177	149	77	150	220	140	140	150	220	110		
Magnesium	mg/L	1380	350	347	-	53	330	165	154	170	280	150	210	150	210	170	64		
Potassium	mg/L	2852	300	238	-	36	380	183	154	270	280	51	230	180	200	94	36		
Sodium	mg/L	6578	500	921	-	220	1400	690	619	1400	1000	320	770	610	790	470	220		
Aluminum	mg/L	4.09	4.09		20.0	0.1	56.0	2.5	0.4	<0.8	0.44	0.08	0.14	0.13	0.32	0.14	0.33		
Arsenic	mg/L	<0.11	<0.11		2.0	0.0	0.1	0.021	0.013	<0.05	0.01	0.008	0.009	0.01	0.012	0.004	0.063		
Barium	mg/L	0.966	0.966		-	0.058	1.4	0.22	0.18	<0.3	0.26	0.08	0.25	0.22	0.2	0.17	0.083		
Beryllium	mg/L	<0.007	<0.007		0.1	0.0003	0.015	0.0018	0.0010	<0.03	<0.003	<0.003	<0.003	<0.0006	<0.003	<0.0006	<0.0006		
Bismuth	mg/L				-	0.0005	0.025	0.0030	0.0016	<0.05	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001		
Boron	mg/L	7.13	50	25.3	6.0	1.8	110.0	13.3	8.7	**110**	**20**	**7.5**	**10**	**7.4**	**6.8**	**7.5**	1.8		
Cadmium	mg/L	0.12	0.12		0.01	0.00005	0.0025	0.0003	0.0002	<0.005	<0.0005	<0.0005	<0.0005	<0.0001	<0.0005	<0.0001	<0.0001		
Chromium	mg/L	0.92	0.5	0.12	0.1	0.012	0.24	0.08	0.06	*<0.3*	0.07	<0.03	0.05	0.047	0.05	0.023	0.026		
Cobalt	mg/L	<0.115	<0.115		5.0	0.0	0.1	0.014	0.010	<0.03	0.015	<0.003	0.012	0.01	0.012	0.0045	0.0028		
Copper	mg/L	0.064	0.1	0.43	5	0.001	0.32	0.021	0.006	<0.1	<0.01	<0.01	<0.01	0.003	0.1	0.007	<0.002		
Iron	mg/L	1150	8	25	20.0	0.6	210.0	10.7	3.4	<5	2.6	5.9	1.8	2.6	4.2	4.1	1.8		
Lead	mg/L	1.38	1.38	0.33	2.0	0.0	0.2	0.0075	0.0019	<0.03	0.003	<0.003	<0.003	0.0008	<0.003	0.0008	0.0006		
Molybdenum	mg/L	<0.06	<0.06	1.82	0.05	0.003	0.05	0.019	0.013	<0.1	<0.01	<0.01	<0.01	0.018	<0.01	0.008	0.017		
Nickel	mg/L	1.84	0.5	29.3	2.0	0.0	0.4	0.101	0.080	0.12	0.13	0.023	0.099	0.088	0.11	0.047	0.023		
Selenium	mg/L	<0.100	<0.100		0.05	0.0025	0.15	0.017	0.009	<0.3	<0.03	<0.03	<0.03	<0.005	<0.03	<0.005	<0.005		
Silver	mg/L				-	0.0002	0.01	0.0012	0.0007	<0.02	<0.002	<0.002	<0.002	<0.0004	<0.002	<0.0004	<0.0004		
Strontium	mg/L				-	0.51	3.5	1.5	1.4	1.0	1.6	2.2	1.6	1.8	1.7	2.2	0.96		
Tin	mg/L				-	0.001	0.05	0.010	0.007	<0.1	<0.01	<0.01	<0.01	0.004	<0.01	<0.002	0.008		
Titanium	mg/L	0.29	0.29		-	0.015	0.77	0.090	0.054	<0.3	0.06	<0.03	0.05	0.049	0.05	0.023	0.031		
Vanadium	mg/L	0.115	0.115		1.0	0.0	0.1	0.017	0.012	<0.05	0.013	<0.005	0.012	0.014	0.013	0.006	0.007		
Zinc	mg/L	11.27	0.3	0.043	5.0	0.0	1.8	0.104	0.032	*<0.5*	*<0.05*	*<0.05*	<0.05	0.01	*<0.05*	<0.01	<0.01		

NOTES: 1) Blank denotes data not available.
2) Target Concentrations derived from LMP and "Expansion of Poplar Cap Irrigation System for Existing Waste Disposal Area" report by Genivar Consultants LP dated Ja
3) CCME Guidelines denotes maximum concentration for negative effects to vegetation for irrigation water as per Canadian Water Quality Guidelines (2004).
4) '*' denotes concentration estimated based on poplar tree tolerance and vegetable crops of > 710 mg/L (CCME, 2004), and salty water irrgation for poplars at 400 to 1
5) '-' denotes no CCME Guideline.
6) µs/cm denotes microsiemens per centimeter.
7) mg/L denotes milligrams per litre.
8) "**" denotes parameter not analysed due to log in error at laboratory.
9) Shading indicates exceedances of the target concentrations.
10) Bolding indicates exceedances of CCME guideline.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant target concentrations.

Table A-4
Organic VOC Chemical Results - Irrigation Liquid
Twin Creeks Environmental Centre - Poplar System

Parameter	Units	Target Concentration 100% Leachate	PS Holding Tank																		
			28-Sep-17	28-May-18	11-Jun-18	17-Jul-18	22-Aug-18	27-Sep-18	24-May-19	26-Jun-19	5-Jul-19	7-Aug-19	11-Sep-19	7-Oct-19	20-May-20	9-Jun-20	21-Jul-20	31-Aug-20	15-Sep-20	19-May-21	23-Jun-21	14-Jul-21
BTEX (Total)	µg/L	127*	36.0	17.3	91.8	25.4	11.9	50.2	8.3	79.9	57.3	61.0	55.0	59.3	42.9	30.3	31.9	74.8	42.0	44.0	25.9	9.9
Acetone (2-Propanone)	ug/L		710.0	20.0	490.0	410.0	75.0	44.0	<100	23.0	<200	330.0	<500	45.0	39	38	800	640	100	<500	<100	<100
Benzene	ug/L		<5.0	1.6	4.8	0.9	0.4	3.1	<2.0	6.7	5.0	4.2	10.0	2.3	1.7	3	<2.0	3	3.6	<10	3.6	<2.0
Bromodichloromethane	ug/L		<5.0	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<25	<5.0	<5.0
Bromoform	ug/L		<10	<1.0	<10	<1.0	<1.0	<1.0	<10	<1.0	<20	<1.0	<50	<1.0	<1.0	<1.0	<10	<10	<1.0	<50	<10	<10
Bromomethane	ug/L		<25	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<25	<5.0	<5.0
Carbon Tetrachloride	ug/L		<5.0	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	<0.20	<10	<0.20	<0.19	<0.19	<1.9	<1.9	<0.19	<9.5	<1.9	<1.9
Chlorobenzene	ug/L		<5.0	2.6	5.4	<0.20	<0.20	3.1	<2.0	3.4	<4.0	1.0	<10	2.8	<0.20	3.2	<2.0	<2.0	1.3	<10	4	<2.0
Chloroethane	ug/L		<10	1.5	<10	<1.0	<1.0	2.4	<10	2.0	<20	<1.0	<50	<1.0	1.7	<1.0	<10	<10	1.2	<50	<10	<10
Chloroform	ug/L		7.8	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	0.9	<10	<0.20	<0.20	<0.20	18.0	<2.0	<0.20	<10	<2.0	<2.0
Chloromethane	ug/L		<25	<5.0	<50	<5.0	<5.0	<5.0	<50	<5.0	<100	<5.0	<250	<5.0	<5.0	<5.0	<50	<50	<5.0	<250	<50	<50
Dibromochloromethane	ug/L		<10	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<25	<5.0	<5.0
1,2-Dichlorobenzene	ug/L		<10	<0.50	<5.0	<2.0	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.40	<0.40	<4.0	<4.0	<0.40	<20	<4.0	<4.0
1,3-Dichlorobenzene	ug/L		<10	<0.50	<5.0	<2.0	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.40	<0.40	<4.0	<4.0	<0.40	<20	<4.0	<4.0
1,4-Dichlorobenzene	ug/L		<10	2.0	<5.0	<2.0	<0.50	2.5	<5.0	3.2	<10	1.1	<25	1.9	0.65	1.2	<4.0	<4.0	2.6	<20	<4.0	<4.0
1,1-Dichloroethane	ug/L		<5.0	0.7	<2.0	<0.20	<0.20	1.5	2.1	2.1	<4.0	0.5	<10	0.5	0.88	0.26	<2.0	<2.0	0.88	<10	<2.0	<2.0
1,2-Dichloroethane	ug/L		<10	<0.50	<5.0	1.1	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.40	<0.49	<4.9	<4.9	<0.49	<25	<4.9	<4.9
1,1-Dichloroethylene	ug/L		<5.0	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	<0.20	<10	<0.20	<0.20	<0.20	<2.0	<2.0	<0.20	<10	<2.0	<2.0
cis-1,2-Dichloroethylene	ug/L		<5.0	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<25	<5.0	<5.0
trans-1,2-Dichloroethylene	ug/L		<5.0	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<25	<5.0	<5.0
1,2-Dichloropropane	ug/L		<5.0	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	<0.20	<10	<0.20	<0.20	<0.20	<2.0	<2.0	<0.20	<10	<2.0	<2.0
cis-1,3-Dichloropropene	ug/L		<10	<0.30	<3.0	<0.30	<0.30	<0.30	<3.0	<0.30	<6.0	<0.30	<15	<0.30	<0.30	<0.30	<3.0	<3.0	<0.30	<15	<3.0	<3.0
trans-1,3-Dichloropropene	ug/L		<10	<0.40	<4.0	<0.40	<0.40	<0.40	<4.0	<0.40	<8.0	<0.40	<20	<0.40	<0.40	<0.40	<4.0	<4.0	<0.40	<20	<4.0	<4.0
Ethylbenzene	ug/L		<5.0	<0.20	16.0	2.3	1.2	5.9	<2.0	26.0	13.0	6.8	14.0	11.0	1.2	5.3	2.9	7.8	6.4	<10	<2.0	<2.0
Ethylene Dibromide	ug/L		<10	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	<0.20	<10	<0.20	<0.19	<0.19	<1.9	<1.9	<0.19	<9.5	<1.9	<1.9
Methylene Chloride(Dichloromethane)	ug/L		<25	<2.0	<20	<2.0	<2.0	<2.0	<20	<2.0	<40	<2.0	<100	<2.0	<2.0	<2.0	<20	<20	<2.0	<100	<20	<20
Methyl Ethyl Ketone (2-Butanone)	ug/L		1000.0	<10	600.0	730.0	150.0	27.0	<100	<10	<200	100.0	<500	25.0	<10	12	1000	840	110	<500	<100	<100
Methyl Isobutyl Ketone	ug/L		<250	<5.0	<50	18.0	5.5	<5.0	<50	<5.0	<100	12.0	<250	6.8	<5.0	<5.0	<50	<50	<5.0	<250	<50	<50
Methyl t-butyl ether (MTBE)	ug/L		<10	1.1	<5.0	1.9	0.6	1.1	<5.0	1.1	<10	1.9	<25	1.1	<0.50	0.69	<5.0	<5.0	1.3	<25	<5.0	<5.0
Styrene	ug/L		<10	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.40	<0.40	<4.0	<4.0	<0.40	<20	<4.0	<4.0
1,1,1,2-Tetrachloroethane	ug/L		<10	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<25	<5.0	<5.0
1,1,2,2-Tetrachloroethane	ug/L		<10	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.40	<0.40	<4.0	<4.0	<0.40	<20	<4.0	<4.0
Tetrachloroethylene	ug/L		<5.0	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	<0.20	<10	<0.20	<0.20	<0.20	<2.0	<2.0	<0.20	<10	<2.0	<2.0
Toluene	ug/L		25.0	1.5	21.0	13.0	6.4	6.2	<2.0	4.2	4.3	21.0	10.0	11.0	4.0	3.0	17	35	6.0	24	7.3	<2.0
1,1,1-Trichloroethane	ug/L		<5.0	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	<0.20	<10	<0.20	<0.20	<0.20	<2.0	<2.0	<0.20	<10	<2.0	<2.0
1,1,2-Trichloroethane	ug/L		<10	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.40	<0.40	<4.0	<4.0	<0.40	<20	<4.0	<4.0
Trichloroethylene	ug/L		<5.0	<0.20	<2.0	<0.20	<0.20	<0.20	<2.0	<0.20	<4.0	<0.20	<10	<0.20	<0.20	<0.20	<2.0	<2.0	<0.20	<10	<2.0	<2.0
Trichlorofluoromethane (FREON 11)	ug/L		<10	<0.50	<5.0	<0.50	<0.50	<0.50	<5.0	<0.50	<10	<0.50	<25	<0.50	<0.50	<0.50	<5.0	<5.0	<0.50	<25	<5.0	<5.0
Vinyl Chloride	ug/L		<10	0.3	<2.0	0.3	0.2	0.3	<2.0	0.5	<4.0	0.5	<10	0.4	<0.20	0.23	<2.0	<2.0	0.28	<10	<2.0	<2.0
p+m-Xylene	ug/L		11.0	7.8	38.0	6.2	2.7	23.0	2.3	30.0	25.0	20.0	21.0	25.0	23	14	7.5	20	20	10	6.1	<2.0
o-Xylene	ug/L		<5.0	6.2	13.0	3.0	1.2	12.0	3.0	12.0	10.0	9.1	<10	11.0	14	5.4	3.7	9	6.6	<10	7.6	6.9
Total Xylenes	ug/L		11.0	14.0	50.0	9.2	3.9	35.0	5.3	43.0	35.0	29.0	21.0	35.0	36	19	11	29	26	10	14	6.9

NOTES: 1) Blank denotes data not available.

2) < - denotes parameter concentration is below the estimated quantitation limit or method reporting limit.

3) µg/L denotes microgram per litre.

4) VOCs for leachate holding tank not analysed in July 2007 due to an error at laboratory.

5) "*" denotes composite concentration of benzene, ethylbenzene, toluene, and xylene (BTEX); where a concentration was less than the Reported Detection Limit (RDL), the concentration was considered to be equal to one half of the RDL.

6) Shading denotes exceedances of the target concentration.

Table A-4
Organic VOC Chemical Results - Irrigation Liquid
Twin Creeks Environmental Centre - Poplar System

Parameter	Units	Target Concentration 100% Leachate	PS Holding Tank																			
			11-Aug-21	16-Sep-21	24-May-22	7-Jun-22	7-Jul-22	9-Aug-22	1-Sep-22	4-Oct-22												
BTEX (Total)	µg/L	127*	319	131	31	50	40	40	23	66												
Acetone (2-Propanone)	ug/L		<500	53	300	<100	110	110	35	4000												
Benzene	ug/L		<10	5.5	1.2	3.8	2.7	3.1	1.9	3.9												
Bromodichloromethane	ug/L		<25	<0.50	<0.50	<5.0	<2.5	<5.0	<0.50	<0.50												
Bromoform	ug/L		<50	<1.0	<1.0	<10	<5.0	<10	<1.0	<1.0												
Bromomethane	ug/L		<25	<0.50	<0.50	<5.0	<2.5	<5.0	<0.50	<0.50												
Carbon Tetrachloride	ug/L		<9.5	<0.19	<0.19	<1.9	<0.95	<1.9	<0.19	<0.19												
Chlorobenzene	ug/L		<10	4.8	0.34	4.3	2.4	2.5	2.6	0.4												
Chloroethane	ug/L		<50	1.6	<1.0	<10	<5.0	<10	<1.0	<1.0												
Chloroform	ug/L		<10	<0.20	<0.20	<2.0	<1.0	<2.0	<0.20	<0.20												
Chloromethane	ug/L		<250	<5.0	<5.0	<50	<25	<50	<5.0	<5.0												
Dibromochloromethane	ug/L		<25	<0.50	<0.50	<5.0	<2.5	<5.0	<0.50	<0.50												
1,2-Dichlorobenzene	ug/L		<20	<0.40	<0.40	<4.0	<2.0	<4.0	<0.40	<0.40												
1,3-Dichlorobenzene	ug/L		<20	<0.40	<0.40	<4.0	<2.0	<4.0	<0.40	<0.40												
1,4-Dichlorobenzene	ug/L		<20	2.9	0.98	4.2	<2.0	<4.0	1.5	1.7												
1,1-Dichloroethane	ug/L		<10	0.56	0.28	<2.0	<1.0	<2.0	0.29	<0.20												
1,2-Dichloroethane	ug/L		<25	<0.49	<0.49	<4.9	<2.5	<4.9	<0.49	3.7												
1,1-Dichloroethylene	ug/L		<10	<0.20	<0.20	<2.0	<1.0	<2.0	<0.20	<0.20												
cis-1,2-Dichloroethylene	ug/L		<25	0.9	1.1	<5.0	<2.5	<5.0	<0.50	2.9												
trans-1,2-Dichloroethylene	ug/L		<25	<0.50	<0.50	<5.0	<2.5	<5.0	<0.50	<0.50												
1,2-Dichloropropane	ug/L		<10	<0.20	<0.20	<2.0	<1.0	<2.0	<0.20	0.47												
cis-1,3-Dichloropropene	ug/L		<15	<0.30	<0.30	<3.0	<1.5	<3.0	<0.30	<0.30												
trans-1,3-Dichloropropene	ug/L		<20	<0.40	<0.40	<4.0	<2.0	<4.0	<0.40	<0.40												
Ethylbenzene	ug/L		24	28	3.0	4.6	11	5.7	3.0	6.8												
Ethylene Dibromide	ug/L		<9.5	<0.19	<0.19	<1.9	<0.95	<1.9	<0.19	<0.19												
Methylene Chloride(Dichloromethane)	ug/L		<100	<2.0	<2.0	<20	<10	<20	<2.0	<2.0												
Methyl Ethyl Ketone (2-Butanone)	ug/L		<500	23	300	<100	71	<100	31	4200												
Methyl Isobutyl Ketone	ug/L		<250	7.5	11	<50	<25	<50	<5.0	59												
Methyl t-butyl ether (MTBE)	ug/L		<25	0.97	<0.50	<5.0	<2.5	<5.0	0.82	0.82												
Styrene	ug/L		<20	<0.40	<0.40	<4.0	<2.0	<4.0	<0.40	<0.40												
1,1,1,2-Tetrachloroethane	ug/L		<25	<0.50	<0.50	<5.0	<2.5	<5.0	<0.50	<0.50												
1,1,2,2-Tetrachloroethane	ug/L		<20	<0.40	<0.40	<4.0	<2.0	<4.0	<0.40	<0.40												
Tetrachloroethylene	ug/L		<10	<0.20	<0.20	<2.0	<1.0	<2.0	<0.20	<0.20												
Toluene	ug/L		200	15	9.3	4.1	2.3	5.1	3.4	27												
1,1,1-Trichloroethane	ug/L		<10	<0.20	<0.20	<2.0	<1.0	<2.0	<0.20	<0.20												
1,1,2-Trichloroethane	ug/L		<20	<0.40	<0.40	<4.0	<2.0	<4.0	<0.40	<0.40												
Trichloroethylene	ug/L		<10	<0.20	<0.20	<2.0	<1.0	<2.0	<0.20	<0.20												
Trichlorofluoromethane (FREON 11)	ug/L		<25	<0.50	<0.50	<5.0	<2.5	<5.0	<0.50	<0.50												
Vinyl Chloride	ug/L		<10	0.4	0.32	<2.0	<1.0	<2.0	0.26	<0.20												
p+m-Xylene	ug/L		63	58	12	22	16	17	11	19												
o-Xylene	ug/L		27	24	5.2	15	7.3	8.8	3.5	9.2												
Total Xylenes	ug/L		90	82	17	37	24	26	15	28												

NOTES: 1) Blank denotes data not available.

2) < - denotes parameter concentration is below the estimated quantitation limit or method reporting limit.

3) µg/L denotes microgram per litre.

4) VOCs for leachate holding tank not analysed in July 2007 due to an error at laboratory.

5) "*" denotes composite concentration of benzene, ethylbenzene, toluene, and xylene (BTEX); where a concentration was less than the Reported Detection Limit (RDL), the concentration was considered to be equal to one half of the RDL.

6) Shading denotes exceedances of the target concentration.

Table A-5
Organic EPA 625 Chemical Results - Irrigation Liquid
Twin Creeks Environmental Centre - Poplar System

Parameter	Units	Target Concentration 100% Leachate	PS Holding Tank																		
			28-Sep-17	28-May-18	11-Jun-18	17-Jul-18	22-Aug-18	27-Sep-18	24-May-19	26-Jun-19	5-Jul-19	14-Aug-19	11-Sep-19	7-Oct-19	20-May-20	9-Jun-20	21-Jul-20	31-Aug-20	15-Sep-20	19-May-21	23-Jun-21	14-Jul-21
Acenaphthene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	0.81	<0.80	<0.20	0.27	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Acenaphthylene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Anthracene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Benzo(a)anthracene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Benzo(a)pyrene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Benzo(b/j)fluoranthene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Benzo(g,h,i)perylene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Benzo(k)fluoranthene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
1-Chloronaphthalene	ug/L		<20	<1.0	<4.0	<4.0	<4.0	<10	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<1.0	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
2-Chloronaphthalene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chrysene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Dibenz(a,h)anthracene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Fluoranthene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Fluorene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	0.25	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Indeno(1,2,3-cd)pyrene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
1-Methylnaphthalene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	0.26	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2-Methylnaphthalene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	0.93	<0.80	<1.0	1.1	<0.20	0.24	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Naphthalene	ug/L		<4.0	<0.20	3.8	1.7	<0.80	4.4	<0.20	5.0	7.7	1.0	4.8	4.0	<0.20	<0.61	<2.0	<2.5	3.0	<0.80	3.4	<0.80
Perylene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Phenanthrene	ug/L		<4.0	<0.20	<0.80	0.91	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	0.25	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Pyrene	ug/L		<4.0	<0.20	<0.80	<0.80	<0.80	<2.0	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.20	<0.20	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
1,2-Dichlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,3-Dichlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,4-Dichlorobenzene	ug/L		<10	1.1	<2.0	<2.0	<2.0	<5.0	1.0	<2.5	<2.0	<2.0	<2.0	<2.0	<0.50	0.74	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Hexachlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Pentachlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,3,5-Tetrachlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,4,5-Tetrachlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,3-Trichlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,4-Trichlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,3,5-Trichlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2-Chlorophenol	ug/L		<6.0	<0.30	<1.2	<1.2	<1.2	<3.0	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<0.30	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
4-Chloro-3-Methylphenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
m/p-Cresol	ug/L		45.0	<0.50	9.5	57.0	<2.0	<5.0	<0.50	8.5	16.0	7.2	<2.0	6.1	<0.50	<0.50	340	190	18	<2.0	4.5	<2.0
o-Cresol	ug/L		<10	<0.50	3.9	7.6	<2.0	<5.0	<0.50	<2.0	<2.0	2.7	2.4	2.5	<0.50	0.79	5.0	7.1	<2.0	<2.0	<2.0	<2.0
1,2,3,4-Tetrachlorobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,3-Dichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,4-Dichlorophenol	ug/L		<6.0	<0.30	<1.2	<1.2	<1.2	<3.0	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<0.30	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
2,5-Dichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,6-Dichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
3,4-Dichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
3,5-Dichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,4-Dimethylphenol	ug/L		<10	1.0	2.1	<3.0	<2.0	5.2	<0.50	5.5	2.6	<2.0	<2.0	<2.0	<0.80	<1.0 (1)	<2.0	3.5	<2.0	<2.0	<2.0	<2.0
2,4-Dinitrophenol	ug/L		<40	<6.3	<50	<25	<8.0	<25	<2.5	<8.0	<40	<8.0	<8.0	<8.0	<2.0	<2.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
4,6-Dinitro-2-methylphenol	ug/L		<40	<2.0	<50	<8.0	<8.0	<20	<2.0	<8.0	<20	<8.0	<8.0	<8.0	<2.0	<2.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
2-Nitrophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
4-Nitrophenol	ug/L		<28	<1.4	<5.6	<5.6	<5.6	<14	<1.4	<5.6	<5.6	<5.6	<5.6	<5.6	<1.4	<1.4	<5.6	<5.6	<5.6	<5.6	<5.6	<5.6
Pentachlorophenol	ug/L		<20	<1.0	<4.0	<4.0	<4.0	<10	<2.5	<4.0	<20	<4.0	<4.0	<4.0	<1.0	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Phenol	ug/L		22.0	<0.50	<2.0	2.3	<2.0	<5.0	<0.50	<2.0	8.6	56.0	<2.0	<2.0	<0.50	<0.50	32	16	2.6	<2.0	<2.0	<2.0
2,3,4,5-Tetrachlorophenol	ug/L		<8.0	<0.40	<1.6	<1.6	<1.6	<4.0	<0.40	<1.6	<1.6	<1.6	<1.6	<1.6	<0.40	<0.40	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
2,3,4,6-Tetrachlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,3,5,6-Tetrachlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,3,4-Trichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,3,5-Trichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,3,6-Trichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,4,5-Trichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
2,4,6-Trichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
3,4,5-Trichlorophenol	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Benzyl butyl phthalate	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Biphenyl	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bis(2-chloroethyl)ether	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bis(2-chloroethoxy)methane	ug/L		<10	<0.60	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bis(2-chloroisopropyl)ether	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bis(2-ethylhexyl)phthalate	ug/L		<40	<2.0	12.0	24.0	<8.0	22.0	<2.0	<8.0	<8.0	12.0	<8.0	<8.0	2.0	<2.0	14	17	<8.0	<8.0	<8.0	<8.0
4-Bromophenyl phenyl ether	ug/L		<6.0	<0.30	<1.2	<1.2	<1.2	<3.0	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<0.30	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
p-Chloroaniline	ug/L		<20	<1.0	<4.0	<4.0	<4.0	<10	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<1.0	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
4-Chlorophenyl phenyl ether	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Di-N-butyl phthalate	ug/L		<40	<2.0	<8.0	<8.0	<8.0	<20	<2.0	<8.0	<8.0	<8.0	<8.0	<8.0	<2.0	<2.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Di-N-octyl phthalate	ug/L		<16	<0.80	<3.2	<3.2	<3.2	<8.0	<0.80	<3.2	<3.2	<3.2	<3.2	<3.2	<0.80	<0.80	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
2,4-Dinitrotoluene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Diethyl phthalate	ug/L		<20	<1.0	<4.0	<4.0	<4.0	<10	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<1.0	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
3,3'-Dichlorobenzidine	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethyl phthalate	ug/L		<20	<1.0	<4.0	<4.0	<4.0	<10	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<1.0	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
2,6-Dinitrotoluene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Diphenyl Ether	ug/L		<6.0	<0.30	<1.2	<1.2	<1.2	<3.0	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<0.30	<0.30	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Hexachlorobutadiene	ug/L		<8.0	<0.40	<1.6	<1.6	<1.6	<4.0	<0.40	<1.6	<1.6	<1.6	<1.6	<1.6	<0.40	<0.40	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Hexachlorocyclopentadiene	ug/L		<40	<2.0	<8.0	<8.0	<8.0	<20	<2.0	<8.0	<8.0	<8.0	<8.0	<8.0	<2.0	<2.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Hexachloroethane	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Isophorone	ug/L		<10	<0.50	<2.0	<7.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<6.0	<2.0	<2.0	<2.0	<2.0
Nitrobenzene	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nitrosodiphenylamine/Diphenylamine	ug/L		<20	<1.0	<4.0	<4.0	<4.0	<10	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<1.0	<1.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
N-Nitroso-di-n-propylamine	ug/L		<10	<0.50	<2.0	<2.0	<2.0	<5.0	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

NOTES: 1) Blank denotes data not available.
2) < - denotes parameter concentration is below the estimated quantitation limit or method reporting limit.
3) µg/L denotes microgram per litre.

Table A-5
Organic EPA 625 Chemical Results - Irrigation Liquid
Twin Creeks Environmental Centre - Poplar System

Parameter	Units	Target Concentration 100% Leachate	PS Holding Tank							
			11-Aug-21	16-Sep-21	24-May-22	7-Jun-22	7-Jul-22	9-Aug-22	1-Sep-22	4-Oct-22
Acenaphthene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Acenaphthylene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Anthracene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Benzo(a)anthracene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Benzo(a)pyrene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Benzo(b/j)fluoranthene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Benzo(g,h,i)perylene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Benzo(k)fluoranthene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
1-Chloronaphthalene	ug/L		<4.0	<4.0	<4.0	<5.0	<10	<4.0	<4.0	<10
2-Chloronaphthalene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Chrysene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Dibenz(a,h)anthracene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Fluoranthene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Fluorene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Indeno(1,2,3-cd)pyrene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
1-Methylnaphthalene	ug/L		<0.80	1.1	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
2-Methylnaphthalene	ug/L		<0.80	1.3	<0.80	<1.0	<2.0	0.94	<0.80	<2.0
Naphthalene	ug/L		3.6	6.8	1.5	1.3	13	6.5	<0.80	8.0
Perylene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Phenanthrene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
Pyrene	ug/L		<0.80	<0.80	<0.80	<1.0	<2.0	<0.80	<0.80	<2.0
1,2-Dichlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
1,3-Dichlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
1,4-Dichlorobenzene	ug/L		<2.0	2.1	<2.0	2.8	<5.0	<2.0	<2.0	<5.0
Hexachlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Pentachlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
1,2,3,5-Tetrachlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
1,2,4,5-Tetrachlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
1,2,3-Trichlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
1,2,4-Trichlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
1,3,5-Trichlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2-Chlorophenol	ug/L		<1.2	<1.2	<1.2	<1.5	<3.0	<1.2	<1.2	<3.0
4-Chloro-3-Methylphenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
m/p-Cresol	ug/L		99	8.6	13	<2.5	26	8.5	<2.0	100
o-Cresol	ug/L		4.8	<2.0	2.6	<2.5	<5.0	2.1	<2.0	11
1,2,3,4-Tetrachlorobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,3-Dichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,4-Dichlorophenol	ug/L		<1.2	<1.2	<1.2	<1.5	<3.0	<1.2	<1.2	<3.0
2,5-Dichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,6-Dichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
3,4-Dichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
3,5-Dichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,4-Dimethylphenol	ug/L		15	5.2	2.4	<2.5	6.0	4.1	<2.0	<5.0
2,4-Dinitrophenol	ug/L		<8.0	<8.0	<8.0	<10	<20	<8.0	<8.0	<20
4,6-Dinitro-2-methylphenol	ug/L		<8.0	<8.0	<8.0	<10	<20	<8.0	<8.0	<20
2-Nitrophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
4-Nitrophenol	ug/L		<5.6	<5.6	<5.6	<7.0	<14	<5.6	<5.6	<14
Pentachlorophenol	ug/L		<4.0	<4.0	<4.0	<5.0	<10	<4.0	<4.0	<10
Phenol	ug/L		7.4	<2.0	2.5	<2.5	9.1	2.8	<2.0	100
2,3,4,5-Tetrachlorophenol	ug/L		<1.6	<1.6	<1.6	<2.0	<4.0	<1.6	<1.6	<4.0
2,3,4,6-Tetrachlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,3,5,6-Tetrachlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,3,4-Trichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,3,5-Trichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,3,6-Trichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,4,5-Trichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
2,4,6-Trichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
3,4,5-Trichlorophenol	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Benzyl butyl phthalate	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Biphenyl	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Bis(2-chloroethyl)ether	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Bis(2-chloroethoxy)methane	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Bis(2-chloroisopropyl)ether	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Bis(2-ethylhexyl)phthalate	ug/L		<8.0	<8.0	<8.0	<10	<20	<8.0	<8.0	<20
4-Bromophenyl phenyl ether	ug/L		<1.2	<1.2	<1.2	<1.5	<3.0	<1.2	<1.2	<3.0
p-Chloroaniline	ug/L		<4.0	<4.0	<4.0	<5.0	<10	<4.0	<4.0	<10
4-Chlorophenyl phenyl ether	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Di-N-butyl phthalate	ug/L		<8.0	<8.0	<8.0	<10	<20	<8.0	<8.0	<20
Di-N-octyl phthalate	ug/L		<3.2	<3.2	<3.2	<4.0	<8.0	<3.2	<3.2	<8.0
2,4-Dinitrotoluene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Diethyl phthalate	ug/L		4.2	<4.0	<4.0	<5.0	<10	<4.0	<4.0	<10
3,3'-Dichlorobenzidine	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Dimethyl phthalate	ug/L		<4.0	<4.0	<4.0	<5.0	<10	<4.0	<4.0	<10
2,6-Dinitrotoluene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Diphenyl Ether	ug/L		<1.2	<1.2	<1.2	<1.5	<3.0	<1.2	<1.2	<3.0
Hexachlorobutadiene	ug/L		<1.6	<1.6	<1.6	<2.0	<4.0	<1.6	<1.6	<4.0
Hexachlorocyclopentadiene	ug/L		<8.0	<8.0	<8.0	<10	<20	<8.0	<8.0	<20
Hexachloroethane	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Isophorone	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<4.0	<2.0	<5.0
Nitrobenzene	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0
Nitrosodiphenylamine/Diphenylamine	ug/L		<4.0	<4.0	<4.0	<5.0	<10	<4.0	<4.0	<10
N-Nitroso-di-n-propylamine	ug/L		<2.0	<2.0	<2.0	<2.5	<5.0	<2.0	<2.0	<5.0

NOTES: 1) Blank denotes data not available.
2) < - denotes parameter concentration is below the estimated quantitation limit or method reporting limit.
3) µg/L denotes microgram per litre.

B

Surface Water Chemical Results

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						04-Apr-03	13-Jun-03	15-Oct-03	03-Nov-03	30-Dec-03	03-May-04	31-Jul-04	01-Dec-04	02-Apr-05	09-Nov-05
Laboratory						Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Routine/Verification Event															
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	71	138	134	112	109	170	222	184	125	182
Conductivity	umho/cm		225	1500	492										
Dissolved Chloride (Cl)	mg/L		4	180	17	14	35	168	15	10	7	24	17	12	24
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001										
Dissolved Sulphate (SO_4)	mg/L		19	660	90	74	53	23	109	94	107	151	122	43	156
Nitrate (N)	mg/L		0.005	23.6	0.38	6.82	0.61	0.28	2.94	1.75	<0.10	23.60	2.02	<0.10	1.94
Nitrite (N)	mg/L		0.005	0.27	0.0127										
pH	(pH units)	6.5-8.5	6.8	8.3	7.9										
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Ammonia-N	mg/L		0.01	3.21	0.099	0.09	0.07	0.07	0.03	0.03	0.09	0.07	0.03	0.06	0.13
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025										
Total Barium (Ba)	mg/L		0.014	3	0.057										
Total BOD	mg/L		1.0	5.0	1.5										
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.08	0.12	0.03	0.16	0.18	0.19	**0.28**	0.12	0.11	**0.24**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007										
Total Calcium (Ca)	mg/L		30	2900	78	52	59	44	63	58	71	116	99	51	120
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23										
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	<0.005	<0.005	0.006	0.002	0.004	<0.005	<0.001	0.002	0.001	<0.001
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082										
Total Dissolved Solids	mg/L		84	715	320										
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**0.53**	**0.89**	**0.89**	**1.01**	**0.51**	**0.53**	**0.42**	0.24	**0.39**	0.22
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83										
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002										
Total Magnesium (Mg)	mg/L		8	650	23	13	15	8	17	16	19	30	23	13	25
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18										
Total Potassium (K)	mg/L		1.9	110	6.2	5	9	9	4	6	3	7	6	3	3.0
Total Sodium (Na)	mg/L		2.8	128	13	8	22	128	10	10	11	18	12	10	17.0
Total Suspended Solids	mg/L		4	32000	106										
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	<0.005	<0.005	**0.06**	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Ion Percentage	%		0.001	47.5	3.0	5.5	2.7	2.3	0.7	2.1	0.8	2.9	3.0	2.7	4.1

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						18-Jan-06	09-Mar-06	05-Oct-06	17-Nov-06	02-Mar-07	09-Jan-08	19-Mar-08	11-Apr-08	12-May-08	14-Jun-08
Laboratory						Accutest	Accutest	Accutest	Accutest	Accutest	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	105	56	177	150	162		90	180	256	254
Conductivity	umho/cm		225	1500	492							298		661	700
Dissolved Chloride (Cl)	mg/L		4	180	17	18	15	35	25	18	26	13	22	18	22
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001							<0.0002	<0.0002	<0.0002	<0.0002
Dissolved Sulphate (SO_4)	mg/L		19	660	90	102	40	122	78	64	98	41	84	75	95
Nitrate (N)	mg/L		0.005	23.6	0.38	3.09	2.79	<0.10	1.31	1.76	6.70	1.50	<0.1	0.40	<0.1
Nitrite (N)	mg/L		0.005	0.27	0.0127							0.02	<0.01	<0.01	<0.01
pH	(pH units)	6.5-8.5	6.8	8.3	7.9							8.1		8.2	8.1
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.003**
Total Ammonia-N	mg/L		0.01	3.21	0.099	0.04	0.28	0.03	0.05	0.69		0.09	<0.05	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025							0.002	0.001	<0.001	0.003
Total Barium (Ba)	mg/L		0.014	3	0.057							0.052	0.037	0.042	0.037
Total BOD	mg/L		1.0	5.0	1.5							<2	<2	3	3
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.18	0.05	**0.21**	**0.26**	0.11	0.19	0.10	**0.23**	**0.23**	**0.36**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007							<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		30	2900	78	54	30	93	69	68	65	38	82	90	100
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23							26		41	45
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	0.002	0.002	0.002	0.001	0.001	**0.009**	**0.010**	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082							**0.006**	0.002	0.003	0.002
Total Dissolved Solids	mg/L		84	715	320							204	355	440	444
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**0.36**	**0.78**	0.23	**0.38**	**0.38**	**3.60**	**5.00**	**1.00**	**1.00**	**0.4**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83							1.1	0.8	2.0	<1
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002							0.004	0.0007	0.0007	<0.0005
Total Magnesium (Mg)	mg/L		8	650	23	15	8	22	19	18	17	10	21	25	24
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	0.008	0.002	0.003	0.003
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18							**0.13**	**0.08**		**0.14**
Total Potassium (K)	mg/L		1.9	110	6.2	3.0	5.0	7.0	5.0	5.0	4.3	3.3	4.1	8.6	4.3
Total Sodium (Na)	mg/L		2.8	128	13	12.0	9.0	19.0	17.0	15.0	16.0	7.7	17.0	17.0	19.0
Total Suspended Solids	mg/L		4	32000	106							67.0	14.0	34.0	4
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	<0.01	0.01	<0.01	<0.01	<0.01	0.02	**0.03**	<0.01	<0.01	<0.01
Ion Percentage	%		0.001	47.5	3.0	1.3	3.1	1.4	2.5	2.8	16.4	1.0	2.9	1.2	0.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						17-Jun-08	28-Jun-08	23-Jul-08	04-Nov-08	05-Dec-08	12-Feb-09	08-Mar-09	06-Apr-09	26-Apr-09	09-May-09
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118		242	196	68	170	88	83	75	168	97
Conductivity	umho/cm		225	1500	492		629	469	268	424	229	225	254	367	274
Dissolved Chloride (Cl)	mg/L		4	180	17	30	24	15	4	5	7	6	5	6	4
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001		<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Dissolved Sulphate (SO_4)	mg/L		19	660	90		72	30	50	44	27	27	45	27	44
Nitrate (N)	mg/L		0.005	23.6	0.38		<0.1	<0.1	1.7	0.3	0.7	0.8	0.7	0.3	0.9
Nitrite (N)	mg/L		0.005	0.27	0.0127		<0.01	<0.01	0.02	<0.01	0.01	0.02	0.01	0.02	0.03
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	8.0	8.2	8.2	8.0	8.0	7.7	7.1	7.5	8.0	6.8
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	**0.006**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Ammonia-N	mg/L		0.01	3.21	0.099		<0.15	<0.15	0.55	<0.15	0.16	<0.15	<0.15	<0.15	0.36
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025		0.003	0.002	**0.190**	0.001	0.007	0.004	0.018	0.009	0.002
Total Barium (Ba)	mg/L		0.014	3	0.057		0.030	0.026	2.400	0.051	0.095	0.057	0.240	0.110	0.630
Total BOD	mg/L		1.0	5.0	1.5		<2	2	<2	<2	<2	<2	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135		**0.28**	**0.2**	**0.4**	0.07	0.07	0.06	0.06	0.06	0.09
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007		<0.0001	<0.0001	**0.003**	<0.0001	0.0001	<0.0001	**0.0003**	**0.0001**	**0.0011**
Total Calcium (Ca)	mg/L		30	2900	78		82	59	970	61	45	34	120	76	380
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23		41	37	300	16	16	16	40	35	130
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058		<0.005	<0.005	**0.67**	0.008	**0.023**	**0.012**	**0.071**	**0.028**	**0.061**
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082		0.002	<0.002	**0.550**	0.003	**0.020**	**0.010**	**0.047**	**0.022**	**0.086**
Total Dissolved Solids	mg/L		84	715	320		415	310	180	280	142	150	165	230	180
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38		**0.9**	**0.9**	**690.0**	**4.0**	**23.0**	**13.0**	**70.0**	**27.0**	**140.0**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83		1.3	1.3	14.0	0.5	1.8	1.3	3.0	1.8	8.0
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002		0.001	<0.0005	**0.260**	0.002	**0.010**	0.004	**0.024**	**0.010**	**0.067**
Total Magnesium (Mg)	mg/L		8	650	23		22	19	280	16	14	9.2	35	21	83
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076		0.003	0.002	**0.90**	0.005	**0.030**	0.017	**0.091**	**0.037**	**0.130**
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18		**0.10**	**0.22**	**9.30**	<0.15	**0.31**	**0.22**	**0.79**	**0.48**	**3.2**
Total Potassium (K)	mg/L		1.9	110	6.2		3.4	3.8	84.0	4.2	5.7	4.3	9.7	6.4	13.0
Total Sodium (Na)	mg/L		2.8	128	13		17.0	13.0	10.0	5.5	5.4	4.4	2.8	5.2	4.9
Total Suspended Solids	mg/L		4	32000	106		19	19	13000	45	330	300	1400	630	8400
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004		<0.02	<0.02	**0.03**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016		<0.01	<0.01	**1.60**	0.01	**0.06**	**0.03**	**0.15**	**0.60**	**0.26**
Ion Percentage	%		0.001	47.5	3.0	50.0	1.2	1.1	48.3	1.5	10.8	3.8	29.5	9.9	40.9

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						09-Aug-09	10-Oct-09	25-Jan-10	06-Apr-10	16-Jul-10	14-Oct-10	06-Nov-10	28-Feb-11	20-Apr-11	9-Aug-11
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	86	139	94	104	141	109	104	114	132	144
Conductivity	umho/cm		225	1500	492	447	578	479	917	700	484	455	490	526	545
Dissolved Chloride (Cl)	mg/L		4	180	17	7	11	31	180	35	32	17	45	29	33
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Sulphate (SO_4)	mg/L		19	660	90	120	120	88	78	160	79	92	50	90	81
Nitrate (N)	mg/L		0.005	23.6	0.38	3.0	4.9	1.7	2.0	0.3	<0.1	<0.1	0.8	<0.1	<0.1
Nitrite (N)	mg/L		0.005	0.27	0.0127	0.10	0.01	0.03	0.02	0.04	<0.01	0.02	0.01	0.01	<0.01
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	7.8	7.8	7.9	7.9	7.9	7.9	8.0	7.9	8.1	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Total Ammonia-N	mg/L		0.01	3.21	0.099	<0.15	<0.15	0.17	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	0.002	<0.001	0.001	0.001	0.001	0.003	0.001	<0.001	0.001	0.002
Total Barium (Ba)	mg/L		0.014	3	0.057	0.045	0.033	0.045	0.050	0.044	0.083	0.028	0.044	0.033	0.038
Total BOD	mg/L		1.0	5.0	1.5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.07	0.07	0.13	0.07	0.19	0.07	0.09	0.06	0.19	0.090
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		30	2900	78	58	74	54	98	100	65	62	56	67	72
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	20	16	14	30	31	19	21	19	23	22
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	<0.005	<0.005	0.006	<0.005	<0.005	**0.013**	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	0.005	0.004	0.004	0.003	**0.006**	**0.006**	0.003	0.002	0.003	0.005
Total Dissolved Solids	mg/L		84	715	320	290	370	315	600	450	300	282	284	306	382
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**4.1**	**1.7**	**3.8**	**2.0**	**0.7**	**7.3**	**2.2**	**1.4**	**1.8**	**1.9**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	1.0	1.0	1.1	1.1	0.9	0.8	0.9	0.9	1.1	0.9
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	0.001	0.001	0.002	0.001	<0.0005	0.003	0.001	0.001	0.001	0.001
Total Magnesium (Mg)	mg/L		8	650	23	15	18	18	25	22	15	19	14	20	15
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.007	0.002	0.006	0.002	0.002	0.009	0.004	0.003	0.004	0.003
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.09**	**0.09**	**0.10**	**0.07**	**0.08**	**0.20**	**0.08**	**0.05**	**0.07**	**0.10**
Total Potassium (K)	mg/L		1.9	110	6.2	3.4	2.4	5.4	4.7	3.6	9.3	3.1	3.6	3.6	4.5
Total Sodium (Na)	mg/L		2.8	128	13	6.6	6.5	18.0	51.0	19.0	16.0	14.0	23.0	20.0	20
Total Suspended Solids	mg/L		4	32000	106	90	32	65	37	16	38	36	15	35	33
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	<0.01	<0.01	0.01	0.01	<0.01	0.02	0.02	<0.01	0.01	<0.01
Ion Percentage	%		0.001	47.5	3.0	0.4	0.4	2.7	1.5	2.0	3.6	4.6	2.4	2.8	1.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						20-Oct-11	23-Nov-11	6-Dec-11	13-Mar-12	22-Jun-12	30-Oct-12	21-Dec-12	13-Jan-13	30-Jan-13	10-Apr-13
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	149	116	121	120	150	110	140	93	95	94
Conductivity	umho/cm		225	1500	492	408	423	406	490	590	470	660	380	330	360
Dissolved Chloride (Cl)	mg/L		4	180	17	17	17	12	20	29	18	25	13	14	17
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	660	90	37	68	61	99	100	87	160	75	55	60
Nitrate (N)	mg/L		0.005	23.6	0.38	<0.1	0.7	0.3	0.5	<0.10	0.48	0.36	0.64	0.51	0.54
Nitrite (N)	mg/L		0.005	0.27	0.0127	<0.01	0.01	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	0.075	0.026
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	8.0	8.0	7.9	8.0	8.0	7.4	7.8	7.7	7.5	7.9
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	**0.002**	<0.001	**0.004**	**0.0013**	<0.0010	<0.0010	<0.0010	<0.0010	**0.004**	<0.0010
Total Ammonia-N	mg/L		0.01	3.21	0.099	<0.15	<0.15	<0.15	<0.15	<0.15	0.29	<0.15	<0.15	0.29	<0.15
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	0.002	0.003	0.004	0.002	0.002	0.026	0.002	0.003	0.003	0.004
Total Barium (Ba)	mg/L		0.014	3	0.057	0.032	0.057	0.110	0.053	0.041	0.320	0.047	0.059	0.048	0.058
Total BOD	mg/L		1.0	5.0	1.5	2	3	5	<2.0	<2.0	2.0	<2.0	<2.0	4	<2.0
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.040	0.160	**0.220**	0.190	0.170	0.170	0.180	0.140	0.120	0.080
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	**0.0004**	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		30	2900	78	53	60	55	63	75	310	90	56	57	58
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	28	32	25	27	39	90	22	28	22	34
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	<0.005	0.010	**0.025**	0.007	<0.005	**0.13**	0.005	**0.012**	**0.010**	**0.0130**
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	0.005	**0.009**	**0.008**	**0.007**	**0.006**	**0.091**	0.005	**0.009**	**0.011**	**0.013**
Total Dissolved Solids	mg/L		84	715	320	298	258	286	378	398	296	348	332	256	288
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**2.6**	**9.6**	**12**	**7.0**	**1.3**	**120.0**	**4.3**	**11.0**	**9.5**	**13.0**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	1.0	2.0	2.0	1.3	0.9	2.3	1.2	1.9	1.6	1.9
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	0.001	0.004	0.004	0.003	0.001	**0.047**	0.002	0.005	0.004	**0.006**
Total Magnesium (Mg)	mg/L		8	650	23	12	16	18	19	18	77	29	17	16	14
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.004	0.013	0.015	0.009	0.003	**0.18**	0.007	0.014	0.014	0.021
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.20**	**0.30**	**0.30**	**0.19**	**0.05**	**2.20**	**0.10**	**0.24**	**0.29**	**0.45**
Total Potassium (K)	mg/L		1.9	110	6.2	6.0	8.0	11.0	4.9	4.7	17.0	5.3	5.5	7.1	7.9
Total Sodium (Na)	mg/L		2.8	128	13	12	11	11	15	21	15	20	11	9.8	7.2
Total Suspended Solids	mg/L		4	32000	106	39	120	100	75	20	2200	65	170	180	1900
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	0.010	**0.030**	**0.030**	**0.030**	0.010	**0.300**	0.020	**0.040**	**0.040**	**0.050**
Ion Percentage	%		0.001	47.5	3.0	0.5	4.5	5.8	2.2	1.5	34.6	3.6	6.3	8.6	6.2

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						29-May-13	5-Jul-13	12-Sep-13	7-Oct-13	11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	6-Sep-14	25-Dec-14
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event										Routine	Routine	Verification	Routine	Verification	Routine
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	61	94	120	140	94	160	140	100	88	120
Conductivity	umho/cm		225	1500	492	330	300	470	480	250	460	460	580	400	470
Dissolved Chloride (Cl)	mg/L		4	180	17	10	24	20	18	8	18	13	20	15	15
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	660	90	81	40	81	77	19	48	76	170	81	91
Nitrate (N)	mg/L		0.005	23.6	0.38	0.18	<0.10	<0.10	<0.10	0.64	0.14	0.84	<0.10	0.79	1.35
Nitrite (N)	mg/L		0.005	0.27	0.0127	<0.010	<0.010	<0.010	<0.010	0.015	0.024	0.012	<0.010	0.038	0.017
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	7.9	8.2	8.0	8.0	8.1	8.2	8.1	7.7	7.8	7.9
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	**0.0032**	<0.0010	**0.0016**	<0.0010	<0.001
Total Ammonia-N	mg/L		0.01	3.21	0.099	<0.15	<0.15	<0.15	<0.15	0.26	<0.15	<0.15	<0.15	0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	0.002	0.004	0.003	0.002	<0.001	0.001	0.001	0.002	0.004	0.003
Total Barium (Ba)	mg/L		0.014	3	0.057	0.024	0.062	0.033	0.041	0.014	0.027	0.038	0.048	0.064	0.100
Total BOD	mg/L		1.0	5.0	1.5	<2.0	2.0	<2.0	3.0	3.0	<2.0	<2.0	<2.0	2.0	3.0
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.190	0.080	**0.330**	**0.270**	<0.02	0.070	0.180	0.110	0.190	0.13
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		30	2900	78	40	55	54	58	32	63	67	74	60	61
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	26	25	32	28	25	29	28	21	27	23
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	<0.005	**0.0140**	<0.005	<0.005	<0.005	<0.005	<0.005	0.0050	**0.0120**	**0.0190**
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	0.005	**0.020**	0.004	0.002	<0.002	0.003	**0.013**	**0.009**	**0.011**	**0.010**
Total Dissolved Solids	mg/L		84	715	320	206	312	286	282	84	326	324	392	294	354
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**2.50**	**14.0**	**1.70**	**1.40**	**0.38**	**2.00**	**3.40**	**5.20**	**12.0**	**11.0**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	0.8	1.6	2.0	1.2	1.1	1.5	1.2	1.2	1.3	1.20
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	0.001	**0.011**	0.001	0.001	<0.0005	0.001	0.002	0.002	0.004	0.004
Total Magnesium (Mg)	mg/L		8	650	23	16	13	21	18	9.5	16	18	16	19	20
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.005	0.022	0.005	0.004	<0.001	0.004	0.012	0.008	0.016	0.013
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.09**	**0.64**	**0.17**	**0.10**	**0.20**	**0.07**	**0.11**	**0.21**	**0.25**	**0.22**
Total Potassium (K)	mg/L		1.9	110	6.2	1.9	9.4	6.9	6.5	7.0	3.9	4.8	6.0	8.0	11.0
Total Sodium (Na)	mg/L		2.8	128	13	11.0	16.0	17.0	16.0	4.1	12.0	12.0	16.0	11.0	8.1
Total Suspended Solids	mg/L		4	32000	106	51	710	37	29	6	24	45	98	260	180
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	<0.02	<0.0092	<0.0053	<0.0019	0.0044	<0.0023	<0.003	<0.0051	0.0039	<0.0034
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	<0.01	**0.100**	<0.01	<0.01	<0.01	0.010	0.010	0.010	**0.040**	**0.030**
Ion Percentage	%		0.001	47.5	3.0	4.7	9.0	3.6	1.7	2.5	2.0	3.7	1.2	7.9	3.2

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						4-Jan-15	10-Apr-15	1-Jun-15	3-Aug-15	22-Dec-15	25-Feb-16	7-Apr-16	14-Jul-16	3-Nov-16	27-Dec-16
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Routine/ Verification	Verification	Routine	Routine	Routine	Routine	Routine	Routine	Verification
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	130	100	95	100	170	110	130	110	160	120
Conductivity	umho/cm		225	1500	492	460	310	480	510	840	450	400	600	560	440
Dissolved Chloride (Cl)	mg/L		4	180	17	12	9	12	21	36	9.6	6.1	13	12	11.0
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	*<0.00010*
Dissolved Sulphate (SO_4)	mg/L		19	660	90	86	45	120	130	220	95	69	170	100	83
Nitrate (N)	mg/L		0.005	23.6	0.38	0.84	1.02	<0.10	<0.10	1.33	1.20	0.59	0.018	0.34	0.87
Nitrite (N)	mg/L		0.005	0.27	0.0127	0.018	0.023	<0.010	<0.010	0.024	<0.010	<0.010	0.270	0.027	0.024
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	8.3	7.0	7.9	7.8	8.1	8.1	7.9	7.9	8.0	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	**0.0058**	**0.0012**	<0.0010	<0.0010	**0.0015**	<0.0010	<0.0010	<0.0040	<0.0040	*<0.004*
Total Ammonia-N	mg/L		0.01	3.21	0.099	0.16	<0.15	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	3.21	1.42
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	<0.001	0.007	0.001	0.002	<0.001	0.002	0.003	0.001	0.003	0.002
Total Barium (Ba)	mg/L		0.014	3	0.057	0.032	0.110	0.027	0.038	0.035	0.077	0.048	0.047	0.037	0.044
Total BOD	mg/L		1.0	5.0	1.5	3.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.06	0.11	0.10	0.07	0.05	0.13	0.10	0.10	**1.2**	**0.500**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		30	2900	78	61	54	60	69	100	60	63	79	60	44
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	21	24	22	13	25	22	34	22	31	26
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	<0.005	**0.0250**	<0.005	<0.005	<0.005	**0.0130**	**0.0090**	<0.005	0.0050	0.0070
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	0.003	**0.017**	0.005	**0.007**	0.004	**0.006**	**0.008**	**0.006**	**0.007**	0.005
Total Dissolved Solids	mg/L		84	715	320	292	240	342	360	510	262	272	418	404	296
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**0.95**	**24.0**	**1.40**	**3.00**	**0.90**	**7.30**	**7.80**	**2.40**	**4.80**	**4.10**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	0.83	1.30	0.86	0.34	0.68	0.48	0.49	<0.7	3.60	2.1
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	0.001	**0.010**	0.001	0.001	<0.0005	0.003	0.003	0.001	0.002	0.002
Total Magnesium (Mg)	mg/L		8	650	23	19	17	18	15	30	18	17	21	21	15
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.002	**0.032**	0.004	0.005	0.002	0.009	0.011	0.004	0.009	0.006
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.10**	**0.47**	**0.10**	**0.09**	**0.04**	**0.16**	**0.21**	**0.15**	**0.08**	**0.14**
Total Potassium (K)	mg/L		1.9	110	6.2	7.4	6.4	2.4	6.1	6.3	7.7	4.7	8.4	9.0	7.5
Total Sodium (Na)	mg/L		2.8	128	13	7.4	5.3	11.0	15.0	30.0	7.5	6.6	13.0	24.0	11.0
Total Suspended Solids	mg/L		4	32000	106	13	220	26	54	20	78	130	160	150	78
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	0.004	<0.0031	0.0049	<0.0053	<0.003	<0.0013	<0.0005	<0.0052	**0.082**	0.0053
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	<0.01	**0.060**	<0.01	<0.01	<0.01	0.020	0.020	<0.01	0.010	0.010
Ion Percentage	%		0.001	47.5	3.0	2.1	9.1	1.4	0.8	0.3	3.0	4.3	1.3	1.7	2.2

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						12-Jan-17	8-Feb-17	6-Apr-17	13-Jul-17	19-Nov-17	23-Jan-18	4-Apr-18	8-Aug-18	26-Sep-18	2-Oct-18
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Verification	Routine	Routine	Routine	Routine	Routine	Routine	Verification	Routine
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	110	120	140	110	100	120	130	93	88	270
Conductivity	umho/cm		225	1500	492	430	440	490	320	620	440	500	400	470	530
Dissolved Chloride (Cl)	mg/L		4	180	17	12.0	9.6	9.7	11.0	11.0	9.0	7.4	16.0	11.0	6.3
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	*<0.00010*	*<0.00010*	*<0.00010*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Dissolved Sulphate (SO_4)	mg/L		19	660	90	78	81	91	43	190	74	43	83	130	25
Nitrate (N)	mg/L		0.005	23.6	0.38	0.80	0.90	0.52	<0.10	2.14	1.87	0.87	<0.10	<0.10	<0.10
Nitrite (N)	mg/L		0.005	0.27	0.0127	0.046	0.018	0.015	<0.010	0.011	0.022	0.013	<0.010	0.011	<0.010
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	7.9	7.7	8.1	7.8	8.0	7.9	8.1	7.8	8.1	8.2
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	*<0.0040*	*<0.0040*	*<0.0040*	*<0.020*	***0.0023***	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*	*<0.0010*
Total Ammonia-N	mg/L		0.01	3.21	0.099	1.12	0.37	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	0.006	0.002	0.002	0.003	0.001	0.003	0.003	0.026	0.003	<0.001
Total Barium (Ba)	mg/L		0.014	3	0.057	0.140	0.040	0.046	0.049	0.035	0.046	0.053	0.300	0.027	0.027
Total BOD	mg/L		1.0	5.0	1.5	5.0	<2.0	<2.0	5.0	<2.0	<2.0	<2	<2	3.0	<2
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	**0.400**	0.160	0.150	0.080	0.120	0.100	0.130	0.130	0.170	0.030
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	**0.0003**	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		30	2900	78	58	52	75	55	86	66	70	180	46	78
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	36	15	25	40	10	17	13	17	21	29.0
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	**0.0300**	0.0060	0.0060	**0.0130**	<0.005	**0.0110**	**0.0100**	**0.0900**	<0.005	<0.005
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	**0.014**	0.004	**0.007**	**0.039**	**0.006**	**0.010**	**0.009**	**0.076**	0.004	0.003
Total Dissolved Solids	mg/L		84	715	320	290	294	316	280	285	255	225	270	345	275
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**18.0**	**3.50**	**6.10**	**9.60**	**3.20**	**9.30**	**9.40**	**92.0**	**1.00**	**0.3**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	1.9	0.9	0.6	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	**0.007**	0.002	0.003	**0.016**	0.001	0.004	0.004	**0.031**	0.001	<0.0005
Total Magnesium (Mg)	mg/L		8	650	23	21	16	21	12	26	20	22	45	20	18
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.024	0.006	0.010	0.018	0.006	0.013	0.013	**0.120**	0.003	0.001
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.34**	**0.09**	**0.15**	**0.30**	**0.08**	**0.18**	**0.17**	**1.10**	**0.04**	**0.10**
Total Potassium (K)	mg/L		1.9	110	6.2	16.0	6.4	5.4	9.0	5.2	5.6	5.2	16.0	4.2	3.5
Total Sodium (Na)	mg/L		2.8	128	13	9.4	6.3	8.2	9.4	12.0	8.0	9.4	13.0	9.8	6.2
Total Suspended Solids	mg/L		4	32000	106	340	75	110	190	81	170	170	2100	26	6
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	0.0027	0.0008	<0.0012	<0.0047	<0.0029	<0.0025	<0.0005	<0.0005	<0.001	<0.00073
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	0.050	0.010	0.020	**0.160**	0.010	0.030	**0.030**	**0.210**	<0.01	<0.01
Ion Percentage	%		0.001	47.5	3.0	7.3	0.1	4.8	6.8	3.1	6.8	12.0	28.4	1.8	1.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						24-Jan-19	17-Apr-19	2-Oct-19	27-Oct-19	11-Jan-20	29-Mar-20	18-May-20	15-Nov-20	26-Nov-20	26-Mar-21
Laboratory						Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Routine	Routine	Verification	Routine	Verification	Routine	Routine	Verification	Routine
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	100	130	69	120	120	180	140	110	120	65
Conductivity	umho/cm		225	1500	492	430	610	520	550	570	610	510	440	890	640
Dissolved Chloride (Cl)	mg/L		4	180	17	17.0	19.0	8.5	15.0	24.0	20.0	22.0	28	24	22
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	*<0.0001*	*<0.0001*	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	660	90	73	140	160	130	140	170	93	72	300	230
Nitrate (N)	mg/L		0.005	23.6	0.38	0.74	0.54	0.34	0.23	0.65	0.54	0.17	<0.10	1.09	0.86
Nitrite (N)	mg/L		0.005	0.27	0.0127	0.025	<0.010	<0.010	<0.010	0.014	0.053	<0.010	<0.010	0.031	<0.010
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	7.7	8.2	8.0	8.1	8.0	7.9	8.1	7.9	8.0	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	*<0.0010*	*<0.0010*	**0.0012**	<0.0010	<0.0010	<0.0010	<0.0010	*0.0012*	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.01	3.21	0.099	0.50	<0.15	0.19	<0.15	<0.15	0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	<0.001	<0.001	0.040	0.002	0.003	0.037	0.002	0.005	0.003	**0.28**
Total Barium (Ba)	mg/L		0.014	3	0.057	0.022	0.026	0.560	0.022	0.062	0.390	0.0350	0.06	0.053	3.0
Total BOD	mg/L		1.0	5.0	1.5	3.0	<2	<2	<2	<2	<2	3.0	5	<2	3
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.090	0.140	**0.300**	0.180	0.140	**0.210**	0.090	0.11	0.17	**0.7**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	<0.0001	<0.0001	<0.001	<0.0001	0.0001	**0.0006**	<0.0001	0.0001	<0.0001	**0.004**
Total Calcium (Ca)	mg/L		30	2900	78	42	66	450	62	87	480	60	63	110	2900
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	18.0	21.0	5.6	18.0	10.0	<4.0	38.0	38	14	<4.0
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	<0.005	<0.005	**0.190**	<0.005	**0.012**	**0.160**	<0.005	**0.014**	**0.010**	**1.1**
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	0.003	0.004	**0.130**	0.004	**0.023**	**0.130**	**0.009**	**0.024**	**0.009**	**0.88**
Total Dissolved Solids	mg/L		84	715	320	270	365	345	335	385	465	340	360	580	390
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**0.800**	**0.700**	**180**	**1.7**	**8.9**	**150**	**3.1**	**12.0**	**7.4**	**1200**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	1.0	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	0.8
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	0.0005	<0.0005	**0.066**	0.0007	**0.009**	**0.063**	0.002	**0.009**	0.0031	**0.42**
Total Magnesium (Mg)	mg/L		8	650	23	14	26	120	26	32	110	19.0	21	46	650
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.002	0.003	**0.260**	0.005	0.015	0.240	0.0	0.019	0.012	**1.6**
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.09**	**0.05**	**2.80**	**0.07**	**0.29**	**2.90**	**0.11**	**0.53**	**0.16**	**16**
Total Potassium (K)	mg/L		1.9	110	6.2	6.9	4.2	44.0	5.2	8.4	18.0	4.9	15	8.6	110
Total Sodium (Na)	mg/L		2.8	128	13	8.9	13.0	13.0	15.0	17.0	16.0	15.0	12	23	27
Total Suspended Solids	mg/L		4	32000	106	20	18	3200	30	270	6000	150	230	220	32000
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	<0.00061	<0.0079	0.016	<0.013	<0.0052	0.007	<0.0034	<0.00061	<0.00076	<0.00089
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	<0.01	<0.01	**0.40**	<0.01	**0.09**	**0.38**	0.02	**0.09**	0.02	**2.7**
Ion Percentage	%		0.001	47.5	3.0	1.4	0.1	38.7	2.1	7.2	32.5	0.2	6.8	2.9	47.5

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						9-Apr-21	3-Jun-21	9-Jul-21	30-Jul-21	4-Oct-21	15-Oct-21	17-Feb-22	4-May-22	16-May-22	4-Aug-22
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Verification	Routine	Routine	Verification	Routine	Verification	Routine	Routine	Verification	Routine
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	200	110	87	75	70	110	90	160	110	110
Conductivity	umho/cm		225	1500	492	800	860	730	590	670	700	312	730	810	922
Dissolved Chloride (Cl)	mg/L		4	180	17	46	35	40	31	20	34	19	29	30	18
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	660	90	150	310	220	180	250	200	58	180	340	390
Nitrate (N)	mg/L		0.005	23.6	0.38	<0.10	<0.010	<0.10	0.21	0.44	0.45	0.58	0.45	0.46	1.07
Nitrite (N)	mg/L		0.005	0.27	0.0127	<0.010	0.24	0.012	0.02	0.026	0.023	0.045	0.012	0.035	0.043
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	8.1	8.0	8.1	7.9	7.8	7.9	8.0	8.3	7.4	8.1
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.01	3.21	0.099	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	1.17	<0.15	0.26	<0.15
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	0.002	0.001	0.003	0.003	<0.001	0.002	0.007	0.002	0.007	0.002
Total Barium (Ba)	mg/L		0.014	3	0.057	0.047	0.043	0.030	0.024	0.023	0.031	0.083	0.04	0.1	0.038
Total BOD	mg/L		1.0	5.0	1.5	5	<2	<2	2.0	<2	2	3	<2	3	<2
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	**0.25**	0.1	**0.26**	**0.26**	**0.22**	**0.47**	0.08	**0.36**	0.19	0.11
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		30	2900	78	90	110	63	50	64	72	75	80	140	140
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	46	8.1	26	28	10	29	27	23	29	11
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	**0.026**	<0.005	**0.019**	<0.005
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	**0.009**	0.005	0.003	0.002	0.002	0.005	**0.023**	0.005	**0.02**	**0.007**
Total Dissolved Solids	mg/L		84	715	320	530	645	485	385	420	360	230	370	695	715
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	**3.5**	**3**	1	<0.1	0.2	**2.1**	**26**	**4.4**	**21**	3.1
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	2.0	<0.7	<0.7	<0.7
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	0.0018	0.0012	<0.0005	<0.0005	<0.0005	0.0009	**0.011**	0.0017	**0.0077**	0.0012
Total Magnesium (Mg)	mg/L		8	650	23	31	35	35	29	31	33	23	34	52	51
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.008	0.006	0.005	0.003	0.002	0.006	**0.039**	0.009	**0.032**	0.006
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.12**	**0.05**	**0.04**	**0.07**	**0.04**	**0.08**	**0.48**	**0.088**	**0.30**	**0.054**
Total Potassium (K)	mg/L		1.9	110	6.2	5.7	4.9	3.4	4.0	4.7	7.6	9.6	5.1	8	5
Total Sodium (Na)	mg/L		2.8	128	13	30	27	31	24	21	30	11	26	28	26
Total Suspended Solids	mg/L		4	32000	106	74	73	35	39	16	49	660	95	1200	98
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	<0.0016	<0.0023	<0.0025	<0.0061	<0.0019	<0.0084	0.0089	<0.0047	0.0028	<0.0074
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	0.01	0.05	0.01
Ion Percentage	%		0.001	47.5	3.0	0.1	0.1	0.1	0.6	1.6	1.5	15.1	0.8	5.6	3.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Downstream of Landfill 60 m East of Lambton Rd. 79 - SS1									
Date						18-Oct-22	28-Nov-22								
Laboratory						Bureau Veritas	Bureau Veritas								
Routine/Verification Event						Routine	Verification								
Alkalinity (as $CaCO_3$)	mg/L	<25%***	55	270	118	55	110								
Conductivity	umho/cm		225	1500	492	700	1500								
Dissolved Chloride (Cl)	mg/L		4	180	17	23	29								
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010								
Dissolved Sulphate (SO_4)	mg/L		19	660	90	290	660								
Nitrate (N)	mg/L		0.005	23.6	0.38	0.41	2.06								
Nitrite (N)	mg/L		0.005	0.27	0.0127	0.037	0.022								
pH	(pH units)	6.5-8.5	6.8	8.3	7.9	7.9	7.9								
Phenols-4AAP	mg/L	0.001	0.0005	0.01	0.0007	<0.0010	<0.0010								
Total Ammonia-N	mg/L		0.01	3.21	0.099	0.47	<0.15								
Total Arsenic (As)	mg/L	0.100*	0.0005	0.28	0.0025	0.016	0.001								
Total Barium (Ba)	mg/L		0.014	3	0.057	0.19	0.043								
Total BOD	mg/L		1.0	5.0	1.5	5	2								
Total Boron (B)	mg/L	0.200	0.010	1.2	0.135	0.13	0.08								
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0040	0.00007	**0.0003**	<0.0001								
Total Calcium (Ca)	mg/L		30	2900	78	270	160								
Total Chemical Oxygen Demand (COD)	mg/L		2	300	23	16	19								
Total Chromium (Cr)	mg/L	0.0089	0.0005	1.10	0.0058	0.062	<0.005								
Total Copper (Cu)	mg/L	0.0050	0.0010	0.880	0.0082	**0.053**	**0.006**								
Total Dissolved Solids	mg/L		84	715	320	390	1020								
Total Iron (Fe)	mg/L	0.300	0.050	1200	3.38	64	3.0								
Total Kjeldahl Nitrogen (TKN)	mg/L		0.34	14	0.83	<0.7	<0.7								
Total Lead (Pb)	mg/L	0.005	0.0003	0.420	0.002	**0.026**	0.0010								
Total Magnesium (Mg)	mg/L		8	650	23	61	85								
Total Nickel (Ni)	mg/L	0.025	0.00050	1.60	0.0076	0.092	0.005								
Total Phosphorus	mg/L	0.02*	0.04	16.0	0.18	**0.94**	**0.048**								
Total Potassium (K)	mg/L		1.9	110	6.2	12	8.6								
Total Sodium (Na)	mg/L		2.8	128	13	15	39								
Total Suspended Solids	mg/L		4	32000	106	1400	70								
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.08	0.004	0.017	<0.00051								
Total Zinc (Zn)	mg/L	0.020	0.0025	2.7	0.016	**0.17**	<0.01								
Ion Percentage	%		0.001	47.5	3.0	21.7	0.0								

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow Into East Ditch Line (Background Surface Water Quality) - SS10									
Date						04-Apr-03	13-Jun-03	15-Oct-03	03-Nov-03	30-Dec-03	03-May-04	31-Jul-04	01-Dec-04	02-Apr-05	09-Nov-05
Laboratory						Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	22	203	67	33	105	83	74	40	76	86	41	55	57
Conductivity	umho/cm		62	1200	229										
Dissolved Chloride (Cl)	mg/L		1	46	6	3	1	8	6	2	5	5	3	3	24
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.0001	0.0001										
Dissolved Sulphate (SO_4)	mg/L		0.5	220	16	33	51	51	42	14	47	59	14	11	23
Nitrate (N)	mg/L		0.05	102	0.98	4.47	0.11	23.50	13.80	2.75	5.84	15.40	5.55	0.45	10.50
Nitrite (N)	mg/L		0.005	3.98	0.0213										
pH	(pH units)	6.5-8.5	6.7	8.7	7.7										
Phenols-4AAP	mg/L	0.001	0.0005	0.007	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Ammonia-N	mg/L		0.02	18.4	0.099	0.06	0.07	<0.02	0.03	0.02	0.16	0.11	0.02	0.09	0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.01000	0.00176										
Total Barium (Ba)	mg/L		0.01	0.36	0.040										0.080
Total BOD	mg/L		1	4	1										
Total Boron (B)	mg/L	0.200	0.0100	0.480	0.0756	<0.05	0.12	0.19	0.17	0.08	0.15	**0.39**	0.06	0.070	0.160
Total Cadmium (Cd)	mg/L	0.000	0.00005	0.0014	0.00009										<0.001
Total Calcium (Ca)	mg/L		5.4	170	34	22	32	84	46	17	38	60	29	22	52
Total Chemical Oxygen Demand (COD)	mg/L		18	110	47										
Total Chromium (Cr)	mg/L	0.0089	0.0005	0.0800	0.0054	<0.005	<0.005	0.004	0.002	0.003	<0.005	<0.001	0.002	0.0010	**0.0170**
Total Copper (Cu)	mg/L	0.0050	0.002	0.039	0.0054										**0.009**
Total Dissolved Solids	mg/L		26	1010	192										
Total Iron (Fe)	mg/L	0.300	0.250	79	3.67	**0.79**	**0.74**	**1.53**	**1.05**	**1.07**	**0.81**	**0.48**	**0.88**	**0.700**	**12.400**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	33	1.25017										
Total Lead (Pb)	mg/L	0.005	0.0003	0.024	0.002										<0.01
Total Magnesium (Mg)	mg/L		1.6	33	8	6	7	13	8	4	7	10	5	5.0	8.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.097	0.0068	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.015
Total Phosphorus	mg/L	0.02*	0.03	1.60	0.25										
Total Potassium (K)	mg/L		1	17	4.5	2	3	5	2	1	2	3	2	1.0	4.0
Total Sodium (Na)	mg/L		0.49	20	3	3	<2	6	3	2	3	4	4	2.0	<2
Total Suspended Solids	mg/L		13	980	82										
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.12	0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	0.200	0.0144	<0.005	<0.005	0.010	<0.01	<0.01	<0.01	<0.01	0.020	<0.01	**0.04**
Ion Percentage	%		0.67	30.37	5.47	7.6	4.8	18.3	8.4	6.6	3.1	9.6	16.8	7.6	12.2

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
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5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow Into East Ditch Line (Background Surface Water Quality) - SS10									
Date						18-Jan-06	09-Mar-06	05-Oct-06	17-Nov-06	02-Mar-07	09-Jan-08	19-Mar-08	11-Apr-08	14-Jun-08	23-Jul-08
Laboratory						Accutest	Accutest	Accutest	Accutest	Accutest	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	22	203	67	41	34	124	68	31	203	34	97	90	31
Conductivity	umho/cm		62	1200	229							89		194	89
Dissolved Chloride (Cl)	mg/L		1	46	6	4	3	40	9	5	24	4	4	2	4
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.0001	0.0001									<0.0002	
Dissolved Sulphate (SO_4)	mg/L		0.5	220	16	13	8	41	16	9	203	10	11	3	2
Nitrate (N)	mg/L		0.05	102	0.98	0.58	1.14	45.60	1.34	2.24	0.50	0.40	<0.1	0.1	0.4
Nitrite (N)	mg/L		0.005	3.98	0.0213							<0.01	<0.01	<0.01	0.02
pH	(pH units)	6.5-8.5	6.7	8.7	7.7							7.6	7.0	8.0	7.5
Phenols-4AAP	mg/L	0.001	0.0005	0.007	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Total Ammonia-N	mg/L		0.02	18.4	0.099	0.04	0.17	0.08	0.02	0.22		0.08	0.06	<0.15	0.17
Total Arsenic (As)	mg/L	0.100*	0.000500	0.01000	0.00176							<0.001		0.001	
Total Barium (Ba)	mg/L		0.01	0.36	0.040	0.020	0.020	0.360	0.030	0.010	0.083	0.023		0.017	
Total BOD	mg/L		1	4	1									4	
Total Boron (B)	mg/L	0.200	0.0100	0.480	0.0756	0.050	0.030	**0.210**	0.090	0.030	**0.480**	0.040	0.120	0.150	0.060
Total Cadmium (Cd)	mg/L	0.000	0.00005	0.0014	0.00009	<0.0001	<0.0001	**0.0014**	<0.0001	<0.0001	<0.0001	<0.0001		**0.0003**	
Total Calcium (Ca)	mg/L		5.4	170	34	15	14	120	27	16	110	13	36	29.0	9.8
Total Chemical Oxygen Demand (COD)	mg/L		18	110	47									48	
Total Chromium (Cr)	mg/L	0.0089	0.0005	0.0800	0.0054	0.0010	<0.001	0.0050	<0.001	<0.001	**0.0110**	<0.005	0.0080	<0.005	<0.005
Total Copper (Cu)	mg/L	0.0050	0.002	0.039	0.0054	0.002	0.002	**0.014**	0.003	0.002	**0.006**	0.002		0.004	
Total Dissolved Solids	mg/L		26	1010	192							59	151	134	60
Total Iron (Fe)	mg/L	0.300	0.250	79	3.67	**0.540**	**0.530**	**3.040**	**0.360**	0.250	**4.400**	**2.100**	**3.900**	**1.700**	**1.600**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	33	1.25017							0.8	1.1	<4	1.9
Total Lead (Pb)	mg/L	0.005	0.0003	0.024	0.002	<0.001	0.001	**0.012**	0.002	<0.001	0.002	0.001		0.0008	
Total Magnesium (Mg)	mg/L		1.6	33	8	3.0	2.0	20.0	6.0	3.0	33.0	3.3	8.5	5.8	2.5
Total Nickel (Ni)	mg/L	0.025	0.0005	0.097	0.0068	<0.005	<0.005	**0.028**	<0.005	<0.005	0.008	0.003	0.005	0.003	0.002
Total Phosphorus	mg/L	0.02*	0.03	1.60	0.25							<0.06	**0.15**	**<0.15**	**0.34**
Total Potassium (K)	mg/L		1	17	4.5	2.0	3.0	5.0	3.0	2.0	6.0	2.3	5.7	3.7	7.7
Total Sodium (Na)	mg/L		0.49	20	3	<2	<2	11.0	3.0	3.0	20.0	0.9	2.3	2.0	0.8
Total Suspended Solids	mg/L		13	980	82									18	
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.12	0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	0.200	0.0144	<0.01	<0.01	**0.04**	<0.01	0.02	0.02	<0.01	0.01	<0.01	<0.01
Ion Percentage	%		0.67	30.37	5.47	1.2	5.3	16.3	3.9	8.0	0.7	4.2	8.7	2.7	5.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow Into East Ditch Line (Background Surface Water Quality) - SS10									
Date						04-Nov-08	12-Feb-09	6-Apr-09	9-Aug-09	3-Dec-09	25-Jan-10	6-Apr-10	17-Nov-10	28-Feb-11	20-Apr-11
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	22	203	67	157	38	52	82	94	27	62	64	50	78
Conductivity	umho/cm		62	1200	229	410	110	147	625	202	65	400	541	164	197
Dissolved Chloride (Cl)	mg/L		1	46	6	21	5	5	23	2	1	1	46	4	9
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.0001	0.0001			<0.0001				<0.0001			<0.0001
Dissolved Sulphate (SO_4)	mg/L		0.5	220	16	21	12	7	220	10	3	9	27	10	8
Nitrate (N)	mg/L		0.05	102	0.98	0.9	1.2	3.0	0.6	0.3	0.5	29.0	24.0	3.6	2.4
Nitrite (N)	mg/L		0.005	3.98	0.0213	1.3	0.05	0.04	0.04	0.03	0.02	0.40	0.06	0.020	0.020
pH	(pH units)	6.5-8.5	6.7	8.7	7.7	7.8	7.3	7.1	7.3	7.8	7.2	7.7	7.6	7.5	7.8
Phenols-4AAP	mg/L	0.001	0.0005	0.007	0.0007	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001
Total Ammonia-N	mg/L		0.02	18.4	0.099	0.21	<0.15	<0.15	<0.15	<0.15	0.18	18.40	0.17	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.01000	0.00176	0.007		0.005				0.010			0.006
Total Barium (Ba)	mg/L		0.01	0.36	0.040	0.130		0.085				0.220			0.120
Total BOD	mg/L		1	4	1			<2				<2			<2
Total Boron (B)	mg/L	0.200	0.0100	0.480	0.0756	0.130	0.050	0.060	0.090	0.090	0.030	0.070	0.150	0.050	0.100
Total Cadmium (Cd)	mg/L	0.000	0.00005	0.0014	0.00009	0.0002		0.0001				0.0004			0.0002
Total Calcium (Ca)	mg/L		5.4	170	34	67.0	17.0	25.0	70.0	34.0	8.3	41.0	75.0	25.0	35.0
Total Chemical Oxygen Demand (COD)	mg/L		18	110	47	62		37				110.000			55
Total Chromium (Cr)	mg/L	0.0089	0.0005	0.0800	0.0054	**0.0250**	**0.0200**	**0.0200**	<0.005	**0.0260**	<0.005	**0.0560**	**0.0410**	0.005	**0.024**
Total Copper (Cu)	mg/L	0.0050	0.002	0.039	0.0054	**0.019**		**0.012**				0.029			**0.039**
Total Dissolved Solids	mg/L		26	1010	192	270	68	90		130	43	260	348	98	110
Total Iron (Fe)	mg/L	0.300	0.250	79	3.67	**27.000**	**19.000**	**20.000**	**3.900**	**26.000**	**3.000**	**55.000**	**20.000**	**5.500**	**23.000**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	33	1.25017	5	2	<4	1	4	1.7	33	4	2.0	2.7
Total Lead (Pb)	mg/L	0.005	0.0003	0.024	0.002	**0.008**		**0.007**				0.024			**0.009**
Total Magnesium (Mg)	mg/L		1.6	33	8	15.0	6.4	8.9	25.0	11.0	2.3	18.0	17.0	5.7	11.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.097	0.0068	**0.029**	0.021	0.024	0.007	**0.030**	0.004	**0.067**	0.021	0.007	**0.027**
Total Phosphorus	mg/L	0.02*	0.03	1.60	0.25	**1.20**	**0.28**	**0.35**	**0.07**	**0.64**	**0.16**	**1.60**	**0.50**	**0.23**	**0.53**
Total Potassium (K)	mg/L		1	17	4.5	9.8	5.2	4.9	4.6	7.4	3.7	9.2	17	3.2	6.6
Total Sodium (Na)	mg/L		0.49	20	3	3.3	1.2	1.5	13	1.6	0.6	1.7	3.7	2.0	1.9
Total Suspended Solids	mg/L		13	980	82	270		240	410			980			240
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.12	0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	**0.06**	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	0.200	0.0144	**0.07**	**0.04**	**0.06**	0.01	**0.06**	<0.01	**0.15**	**0.05**	0.02	**0.06**
Ion Percentage	%		0.67	30.37	5.47	4.9	8.5	13.4	2.7	8.1	4.1	24.8	16.0	9.7	10.5

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
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3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow Into East Ditch Line (Background Surface Water Quality) - SS10									
Date						20-Oct-11	30-Oct-12	13-Jan-13	10-Apr-13	5-Jul-13	7-Oct-13	11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event												Routine	Routine	Verification	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	22	203	67	88	69	45	40	70	78	22	69	66	64
Conductivity	umho/cm		62	1200	229	190	230	120	110	350	190	62.0	170	150	400
Dissolved Chloride (Cl)	mg/L		1	46	6	3	11	9	2	4	4	2	6	3	6
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.0001	0.0001				<0.00010				<0.00010	<0.00010	
Dissolved Sulphate (SO_4)	mg/L		0.5	220	16	6	13	12	2	82	9	1	9	1	120
Nitrate (N)	mg/L		0.05	102	0.98	<0.1	6.1	<0.10	0.74	2.2	<0.10	0.55	<0.10	<0.10	1.33
Nitrite (N)	mg/L		0.005	3.98	0.0213	<0.01	<0.010	<0.010	0.035	0.051	<0.010	0.016	<0.010	<0.010	0.109
pH	(pH units)	6.5-8.5	6.7	8.7	7.7	7.8	6.9	7.3	7.3	7.6	7.7	7.9	8.2	7.7	7.8
Phenols-4AAP	mg/L	0.001	0.0005	0.007	0.0007	**0.006**	<0.0010	<0.0010	<0.0010	<0.0010	**0.003**	<0.0010	**0.007**	**0.002**	**0.002**
Total Ammonia-N	mg/L		0.02	18.4	0.099	<0.15	0.25	<0.15	<0.15	<0.15	0.15	0.61	<0.15	<0.15	2.31
Total Arsenic (As)	mg/L	0.100*	0.000500	0.01000	0.00176				0.002				0.001	<0.001	
Total Barium (Ba)	mg/L		0.01	0.36	0.040				0.046				0.013	0.02	
Total BOD	mg/L		1	4	1				<2.0				3.0	3.0	
Total Boron (B)	mg/L	0.200	0.0100	0.480	0.0756	0.090	0.180	0.060	0.070	0.130	0.090	<0.02	0.070	0.060	**0.300**
Total Cadmium (Cd)	mg/L	0.000	0.00005	0.0014	0.00009				<0.0001				<0.0001	<0.0001	
Total Calcium (Ca)	mg/L		5.4	170	34	35.0	32.0	19.0	18.0	49.0	28.0	5.4	25.0	24	63
Total Chemical Oxygen Demand (COD)	mg/L		18	110	47				44				48	55	
Total Chromium (Cr)	mg/L	0.0089	0.0005	0.0800	0.0054	**0.020**	**0.067**	**0.012**	0.008	<0.005	**0.013**	<0.005	<0.005	<0.005	**0.016**
Total Copper (Cu)	mg/L	0.0050	0.002	0.039	0.0054				**0.007**				0.0029	0.003	
Total Dissolved Solids	mg/L		26	1010	192	122	604	194	288	258	216	26.0	192	142	524
Total Iron (Fe)	mg/L	0.300	0.250	79	3.67	**20.000**	**26.000**	**11.000**	**8.800**	**3.800**	**6.900**	0.320	**1.400**	**1.500**	**15.000**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	33	1.25017	3.0	2.7	1.8	2.1	1.5	2.2	1.6	1.6	1.60	3.10
Total Lead (Pb)	mg/L	0.005	0.0003	0.024	0.002				0.004				0.001	0.001	
Total Magnesium (Mg)	mg/L		1.6	33	8	10.0	10.0	5.8	5.1	12.0	7.3	1.6	5.0	5.0	15.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.097	0.0068	0.025	**0.048**	0.014	0.011	0.006	0.008	<0.001	0.002	0.003	0.020
Total Phosphorus	mg/L	0.02*	0.03	1.60	0.25	**0.50**	**0.85**	**0.27**	**0.27**	**0.12**	**0.36**	**0.36**	**0.14**	**0.12**	**0.33**
Total Potassium (K)	mg/L		1	17	4.5	7.0	12.0	4.9	4.3	5.2	9.7	4.8	4.7	4.2	6.3
Total Sodium (Na)	mg/L		0.49	20	3	1.3	1.7	1.1	1.3	5.1	1.2	0.5	1.5	1.4	7.2
Total Suspended Solids	mg/L		13	980	82				55				28	19	
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.12	0.005	<0.02	<0.02	<0.02	<0.02	<0.0089	0.0021	0.0064	<0.0021	<0.00074	**0.12**
Total Zinc (Zn)	mg/L	0.020	0.0025	0.200	0.0144	**0.05**	**0.10**	**0.03**	0.02	0.01	0.02	<0.01	<0.01	<0.01	**0.04**
Ion Percentage	%		0.67	30.37	5.47	9.9	10.1	3.7	13.9	4.2	6.2	1.8	1.7	6.3	5.3

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow Into East Ditch Line (Background Surface Water Quality) - SS10									
Date						15-Oct-14	24-Nov-14	4-Jan-15	10-Apr-15	25-Oct-15	7-Apr-16	12-Jan-17	6-Apr-17	13-Jul-17	28-Oct-17
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Verification	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	22	203	67	79	43	30	51	79	49	120	160	48	71
Conductivity	umho/cm		62	1200	229	250	120	98	130	560	110	360	340	370	470
Dissolved Chloride (Cl)	mg/L		1	46	6	8	3	4	4	30	1.2	13	3.7	4.6	8.8
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.0001	0.0001				<0.00010		<0.00010		<0.00010		
Dissolved Sulphate (SO_4)	mg/L		0.5	220	16	34	11	12	15	150	1	35	19	80.0	130.0
Nitrate (N)	mg/L		0.05	102	0.98	<0.10	<0.10	<0.10	<0.10	0.59	<0.10	0.48	<0.10	12.90	3.78
Nitrite (N)	mg/L		0.005	3.98	0.0213	0.016	<0.010	0.029	0.011	0.049	<0.010	0.021	<0.010	0.017	0.015
pH	(pH units)	6.5-8.5	6.7	8.7	7.7	7.7	7.3	8.2	6.7	7.8	7.1	7.9	8.1	7.7	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.007	0.0007	<0.001	<0.001	**0.005**	**0.002**	<0.0010	<0.0010	<0.0040	<0.0040	*<0.0080*	*<0.0010*
Total Ammonia-N	mg/L		0.02	18.4	0.099	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.25	<0.15	<0.15	<0.050
Total Arsenic (As)	mg/L	0.100*	0.000500	0.01000	0.00176				<0.001		0.001				
Total Barium (Ba)	mg/L		0.01	0.36	0.040				0.015		0.027				
Total BOD	mg/L		1	4	1				<2.0		<2.0		<2.0		
Total Boron (B)	mg/L	0.200	0.0100	0.480	0.0756	0.070	0.060	0.030	0.060	0.100	0.040	0.040	0.040	0.080	0.050
Total Cadmium (Cd)	mg/L	0.000	0.00005	0.0014	0.00009				<0.0001		<0.0001				
Total Calcium (Ca)	mg/L		5.4	170	34	39	17	14	20	63	17	45	61	69	71
Total Chemical Oxygen Demand (COD)	mg/L		18	110	47				40		44		34		
Total Chromium (Cr)	mg/L	0.0089	0.0005	0.0800	0.0054	**0.011**	**0.012**	<0.005	<0.005	<0.005	0.007	0.005	0.008	**0.0320**	**0.0060**
Total Copper (Cu)	mg/L	0.0050	0.002	0.039	0.0054				0.003		0.004				
Total Dissolved Solids	mg/L		26	1010	192	288	296	96	128	382	156	194	222	294	420
Total Iron (Fe)	mg/L	0.300	0.250	79	3.67	**10.000**	**12.000**	**1.300**	**2.000**	**1.500**	**4.900**	**3.600**	**6.700**	**32.000**	**3.400**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	33	1.25017	4.10	2.20	0.75	0.57	0.60	0.41	0.90	<0.7	<0.7	0.8
Total Lead (Pb)	mg/L	0.005	0.0003	0.024	0.002				0.001		0.002				
Total Magnesium (Mg)	mg/L		1.6	33	8	11.0	5.7	2.8	4.7	15.0	4.5	12.0	15.0	18	14
Total Nickel (Ni)	mg/L	0.025	0.0005	0.097	0.0068	0.014	0.014	0.002	0.003	0.004	0.007	0.005	0.010	**0.042**	0.005
Total Phosphorus	mg/L	0.02*	0.03	1.60	0.25	**0.91**	**0.37**	**0.18**	**0.12**	**0.066**	**0.15**	**0.32**	**0.16**	**0.51**	**0.10**
Total Potassium (K)	mg/L		1	17	4.5	15.0	7.1	4.9	3.2	11.0	3.2	12.0	4.7	5.6	2.8
Total Sodium (Na)	mg/L		0.49	20	3	1.5	0.9	0.6	1.5	16.0	1.1	4.1	4.0	3.2	3.6
Total Suspended Solids	mg/L		13	980	82				13		16		160		
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.12	0.005	<0.0036	*<0.024*	<0.0021	<0.0096	<0.0028	<0.0005	0.0007	<0.00051	<0.013	*<0.00066*
Total Zinc (Zn)	mg/L	0.020	0.0025	0.200	0.0144	**0.03**	**0.03**	<0.01	<0.01	0.01	0.01	0.02	0.02	**0.070**	*<0.01*
Ion Percentage	%		0.67	30.37	5.47	7.7	7.7	3.3	1.6	1.0	7.5	1.8	5.8	16.0	3.0

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow Into East Ditch Line (Background Surface Water Quality) - SS10									
Date						23-Jan-18	4-Apr-18	8-Aug-18	2-Oct-18	24-Jan-19	17-Apr-19	2-Oct-19	11-Jan-20	18-May-20	15-Nov-20
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	22	203	67	42	150	64	190	50	200	80	55	84	96
Conductivity	umho/cm		62	1200	229	130	300	1200	650	140	720	390	114	190	420
Dissolved Chloride (Cl)	mg/L		1	46	6	5.5	3.0	25.0	26.0	3.8	22.0	10.0	1.6	2.1	29
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.0001	0.0001		<0.00010				<0.00010			<0.00010	
Dissolved Sulphate (SO_4)	mg/L		0.5	220	16	15.0	8.9	67.0	120.0	7.3	160.0	72.0	1.2	*0.5*	29
Nitrate (N)	mg/L		0.05	102	0.98	0.89	<0.10	102.00	2.33	0.47	<0.10	6.03	0.17	61	9.51
Nitrite (N)	mg/L		0.005	3.98	0.0213	0.011	<0.010	3.980	0.014	0.014	0.013	0.024	0.084	0.012	0.078
pH	(pH units)	6.5-8.5	6.7	8.7	7.7	7.4	8.0	7.4	8.2	7.4	8.5	7.9	**8.7**	7.9	7.5
Phenols-4AAP	mg/L	0.001	0.0005	0.007	0.0007	**0.003**	*<0.0010*	*<0.0010*	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001
Total Ammonia-N	mg/L		0.02	18.4	0.099	0.050	0.056	0.094	<0.050	0.190	<0.050	0.100	0.084	0.13	0.53
Total Arsenic (As)	mg/L	0.100*	0.000500	0.01000	0.00176		0.003				<0.001			0.002	
Total Barium (Ba)	mg/L		0.01	0.36	0.040		0.048				0.028			0.03	
Total BOD	mg/L		1	4	1		<2				<2			4	
Total Boron (B)	mg/L	0.200	0.0100	0.480	0.0756	0.040	0.020	0.140	**0.290**	<0.02	**0.240**	0.090	0.070	0.06	0.06
Total Cadmium (Cd)	mg/L	0.000	0.00005	0.0014	0.00009		<0.0001				<0.0001			<0.0001	
Total Calcium (Ca)	mg/L		5.4	170	34	19	54	170	87	15	95	60	39	29	51
Total Chemical Oxygen Demand (COD)	mg/L		18	110	47		18				81			38	
Total Chromium (Cr)	mg/L	0.0089	0.0005	0.0800	0.0054	**0.0090**	**0.0090**	<0.005	<0.005	<0.005	<0.005	0.0050	**0.08**	0.006	0.007
Total Copper (Cu)	mg/L	0.0050	0.002	0.039	0.0054		**0.007**				0.003			0.005	
Total Dissolved Solids	mg/L		26	1010	192	140	135	1010	450	115	460	275	630	185	300
Total Iron (Fe)	mg/L	0.300	0.250	79	3.67	**7.800**	**8.900**	**3.100**	**3.800**	**0.600**	**0.900**	**4.800**	**79**	**5.0**	**5.7**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	33	1.25017	<0.7	<0.7	<5	0.7	0.8	<0.7	0.9	<0.7	<0.7	1.6
Total Lead (Pb)	mg/L	0.005	0.0003	0.024	0.002		0.003				<0.0005			0.0022	
Total Magnesium (Mg)	mg/L		1.6	33	8	5.2	13	29	27	3.6	33	11	21	6.8	13
Total Nickel (Ni)	mg/L	0.025	0.0005	0.097	0.0068	0.010	0.012	0.006	0.007	0.001	0.003	0.007	**0.097**	0.007	0.009
Total Phosphorus	mg/L	0.02*	0.03	1.60	0.25	**0.19**	**0.27**	**0.13**	**0.16**	**0.14**	**0.05**	**0.20**	**1.40**	**0.21**	**0.80**
Total Potassium (K)	mg/L		1	17	4.5	3.2	4.6	5.0	7.0	5.0	4.5	2.8	11.0	2.9	13
Total Sodium (Na)	mg/L		0.49	20	3	1.2	3.9	14.0	15.0	1.1	15.0	4.1	1.1	1.5	5.8
Total Suspended Solids	mg/L		13	980	82		310				14			95	
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.12	0.005	0.0038	<0.0005	0.0013	<0.00061	<0.00061	<0.0008	0.0056	0.0056	0.014	0.014
Total Zinc (Zn)	mg/L	0.020	0.0025	0.200	0.0144	0.020	**0.030**	<0.01	0.010	<0.01	<0.01	0.010	**0.2**	0.02	**0.04**
Ion Percentage	%		0.67	30.37	5.47	4.0	5.9	28.1	1.3	0.8	0.8	5.3	30.4	5.7	6.3

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow Into East Ditch Line (Background Surface Water Quality) - SS10									
Date						26-Mar-21	9-Jul-21	4-May-22							
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas							
Routine/Verification Event						Routine	Routine	Routine							
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	22	203	67	65	160	96							
Conductivity	umho/cm		62	1200	229	290	740	200							
Dissolved Chloride (Cl)	mg/L		1	46	6	8.9	16	2.5							
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.0001	0.0001			<0.00010							
Dissolved Sulphate (SO_4)	mg/L		0.5	220	16	41	180	0.5							
Nitrate (N)	mg/L		0.05	102	0.98	5.04	8.24	0.3							
Nitrite (N)	mg/L		0.005	3.98	0.0213	0.046	0.03	0.016							
pH	(pH units)	6.5-8.5	6.7	8.7	7.7	7.8	8.0	8.3							
Phenols-4AAP	mg/L	0.001	0.0005	0.007	0.0007	<0.0010	<0.0010	<0.0010							
Total Ammonia-N	mg/L		0.02	18.4	0.099	0.097	<0.15	<0.15							
Total Arsenic (As)	mg/L	0.100*	0.000500	0.01000	0.00176			0.003							
Total Barium (Ba)	mg/L		0.01	0.36	0.040			0.048							
Total BOD	mg/L		1	4	1			<2							
Total Boron (B)	mg/L	0.200	0.0100	0.480	0.0756	0.07	0.14	0.07							
Total Cadmium (Cd)	mg/L	0.000	0.00005	0.0014	0.00009			0.0001							
Total Calcium (Ca)	mg/L		5.4	170	34	42	110	33.0							
Total Chemical Oxygen Demand (COD)	mg/L		18	110	47			42							
Total Chromium (Cr)	mg/L	0.0089	0.0005	0.0800	0.0054	**0.019**	0.008	**0.010**							
Total Copper (Cu)	mg/L	0.0050	0.002	0.039	0.0054			**0.007**							
Total Dissolved Solids	mg/L		26	1010	192	160	535	140.0							
Total Iron (Fe)	mg/L	0.300	0.250	79	3.67	**17**	**5.5**	**9.7**							
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	33	1.25017	<0.7	0.8	<0.7							
Total Lead (Pb)	mg/L	0.005	0.0003	0.024	0.002			0.0034							
Total Magnesium (Mg)	mg/L		1.6	33	8	12	25	8.3							
Total Nickel (Ni)	mg/L	0.025	0.0005	0.097	0.0068	0.022	0.008	0.013							
Total Phosphorus	mg/L	0.02*	0.03	1.60	0.25	**0.34**	**0.25**	**0.22**							
Total Potassium (K)	mg/L		1	17	4.5	4.7	3.8	3.6							
Total Sodium (Na)	mg/L		0.49	20	3	4.1	9.2	2.1							
Total Suspended Solids	mg/L		13	980	82			94							
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.12	0.005	0.00082	<0.0027	<0.031							
Total Zinc (Zn)	mg/L	0.020	0.0025	0.200	0.0144	**0.04**	0.02	0.02							
Ion Percentage	%		0.67	30.37	5.47	9.0	2.1	6.4							

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" Denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow From Township Land to South (Background Surface Water Quality) - SS16									
Date						19-Mar-08	11-Apr-08	12-May-08	23-Jul-08	04-Nov-08	12-Feb-09	06-Apr-09	10-Oct-09	25-Jan-10	06-Apr-10
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	40	228	116	50	152	228	50	118	77	102	138	65	181
Conductivity	umho/cm		109	620	310	123		478	109	305	190	231	409	212	389
Dissolved Chloride (Cl)	mg/L		1.2	20	5	3	7	9	2	6	4	6	4	11	7
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001			<0.0002				<0.0001			<0.0001
Dissolved Sulphate (SO_4)	mg/L		0.5	220	22	12	22	15	2	35	11	14	58	21	20
Nitrate (N)	mg/L		0.05	1.5	0.14	0.3	<0.1	<0.1	<0.1	1.0	0.6	0.8	1.5	1.0	<0.1
Nitrite (N)	mg/L		0.005	0.059	0.0078	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	0.02	0.02
pH	(pH units)	6.5-8.5	7.4	8.4	7.9	7.7	8.3	8.1	7.8	8.0	7.7	7.6	7.9	7.8	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.0078	0.0008	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Ammonia-N	mg/L		0.025	0.3	0.076	0.05	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00500	0.00167			0.002		0.005		0.003			0.001
Total Barium (Ba)	mg/L		0.027	0.072	0.040			0.04		0.072		0.059			0.038
Total BOD	mg/L		1	4	1			<2				<2			3
Total Boron (B)	mg/L	0.200	0.0100	0.400	0.0374	<0.02	0.040	0.050	0.030	0.030	0.020	0.030	0.040	<0.02	0.040
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00013	0.00006			0.0001		0.0001		0.0001			<0.0001
Total Calcium (Ca)	mg/L		13	1300	55	17	53	82	15	44	27	38	64	28	62
Total Chemical Oxygen Demand (COD)	mg/L		18	51	33			36		36		33			45
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.5200	0.0057	<0.005	<0.005	0.006	<0.005	**0.0140**	0.0080	**0.0130**	**0.0120**	<0.005	0.0060
Total Copper (Cu)	mg/L	0.005	0.002	0.012	0.0049			0.004		**0.012**		**0.009**			0.003
Total Dissolved Solids	mg/L		50	720	213	84	238	290	70	200	120	142	265	135	250
Total Iron (Fe)	mg/L	0.300	0.050	540	4.28	**1.800**	**1.000**	**3.700**	**1.900**	**16.000**	**7.900**	**12.000**	**10.000**	**2.800**	**2.900**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.31	7.2	0.82549	<0.7	0.7	1.0	1.7	2.0	1.0	<4	2.2	0.7	1.0
Total Lead (Pb)	mg/L	0.005	0.0007	0.006	0.002			0.003		**0.006**		0.004			0.001
Total Magnesium (Mg)	mg/L		2.4	290	14	4.6	12.0	22.0	3.3	13.0	7.1	11.0	14.0	7.4	15.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.790	0.0067	0.002	0.001	0.006	0.003	0.019	0.009	0.016	0.013	0.004	0.004
Total Phosphorus	mg/L	0.02*	0.03	13.00	0.18	<0.06	**0.06**		**0.22**	**0.50**	*<0.15*	*<0.15*	**0.27**	**0.10**	**0.15**
Total Potassium (K)	mg/L		3.1	60	5.9	3.1	3.2	4.2	4.8	8.8	4.2	5.3	4.7	4.3	5.4
Total Sodium (Na)	mg/L		1.1	18	5	2.3	8.6	14.0	2.6	3.2	4.2	4.6	4.6	6.1	6.4
Total Suspended Solids	mg/L		21	2100	79			40		200		150			37
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.01	0.003	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0050	1.200	0.0155	0.010	<0.01	0.020	0.010	**0.040**	0.020	**0.030**	**0.030**	0.010	0.010
Ion Percentage	%		0.55	47.20	3.87	5.3	6.9	11.1	8.3	6.5	8.5	10.0	6.9	7.1	7.5

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow From Township Land to South (Background Surface Water Quality) - SS16									
Date						17-Nov-10	28-Feb-11	20-Apr-11	20-Oct-11	13-Mar-12	04-May-12	13-Jan-13	10-Apr-13	05-Jul-13	12-Sep-13
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	40	228	116	82	100	140	123	140	200	84	87	99	130
Conductivity	umho/cm		109	620	310	254	256	323	314	310	410	220	220	250	470
Dissolved Chloride (Cl)	mg/L		1.2	20	5	6	5	7	7	6	4	3	5	8	20
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001			<0.0001			<0.00010		<0.00010		
Dissolved Sulphate (SO_4)	mg/L		0.5	220	22	36	21	21	30	20	<1	23	19	31	80
Nitrate (N)	mg/L		0.05	1.5	0.14	<0.1	0.5	<0.1	<0.1	<0.10	<0.10	0.3	0.5	0.1	<0.10
Nitrite (N)	mg/L		0.005	0.059	0.0078	<0.01	0.01	<0.01	<0.01	<0.010	<0.010	<0.010	0.027	<0.010	<0.010
pH	(pH units)	6.5-8.5	7.4	8.4	7.9	7.9	7.7	8.1	7.9	8.0	8.1	7.5	7.9	7.8	7.8
Phenols-4AAP	mg/L	0.001	0.0005	0.0078	0.0008	0.001	0.001	<0.001	**0.005**	**0.002**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	0.3	0.076	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00500	0.00167			0.001			0.002		0.003		
Total Barium (Ba)	mg/L		0.027	0.072	0.040			0.028			0.055		0.054		
Total BOD	mg/L		1	4	1			<2			3		<2.0		
Total Boron (B)	mg/L	0.200	0.0100	0.400	0.0374	0.040	0.020	0.020	0.030	0.030	0.050	0.020	0.040	0.170	**0.320**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00013	0.00006			<0.0001			0.0001		<0.0001		
Total Calcium (Ca)	mg/L		13	1300	55	34	38	52	46	47	61	31	39	320	55
Total Chemical Oxygen Demand (COD)	mg/L		18	51	33			32			51		32		
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.5200	0.0057	**0.0140**	<0.005	<0.005	<0.005	0.0050	0.0080	0.0060	**0.0090**	**0.2000**	<0.005
Total Copper (Cu)	mg/L	0.005	0.002	0.012	0.0049			0.002			0.0045		**0.010**		
Total Dissolved Solids	mg/L		50	720	213	168	156	192	236	248	264	238	236	264	300
Total Iron (Fe)	mg/L	0.300	0.050	540	4.28	**8.000**	**0.900**	**2.600**	**2.100**	**4.500**	**4.500**	**5.200**	**11.000**	**200.000**	**1.300**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.31	7.2	0.82549	1.00	0.80	0.80	1.00	3.50	1.40	1.00	1.50	7.20	1.40
Total Lead (Pb)	mg/L	0.005	0.0007	0.006	0.002			0.001			0.003		0.004		
Total Magnesium (Mg)	mg/L		2.4	290	14	9.1	9.0	12.0	9.9	11.0	16.0	7.5	9.2	85.0	20.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.790	0.0067	0.009	0.002	0.004	0.003	0.006	0.006	0.007	0.015	0.27	0.006
Total Phosphorus	mg/L	0.02*	0.03	13.00	0.18	**0.24**	**0.07**	**0.10**	**0.30**	**0.13**	**0.17**	**0.15**	*<0.3*	**3.10**	**0.17**
Total Potassium (K)	mg/L		3.1	60	5.9	8.6	3.4	3.2	6.1	4.4	5.6	4.3	5.3	25.0	6.9
Total Sodium (Na)	mg/L		1.1	18	5	3.8	4.0	5.8	4.4	4.6	5.1	3.1	3.5	5.0	17.0
Total Suspended Solids	mg/L		21	2100	79			27			55		81		
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.01	0.003	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.0054	<0.0037
Total Zinc (Zn)	mg/L	0.020	0.0050	1.200	0.0155	0.020	<0.01	0.010	0.010	0.020	0.020	0.020	**0.030**	**0.400**	<0.01
Ion Percentage	%		0.55	47.20	3.87	2.7	3.1	3.6	1.4	1.4	3.7	1.9	7.3	39.9	2.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow From Township Land to South (Background Surface Water Quality) - SS16									
Date						7-Oct-13	11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	6-Sep-14	15-Oct-14	24-Nov-14	25-Dec-14	4-Jan-15
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event							Routine	Routine	Verification	Routine	Verification	Routine	Verifcation	Verification	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	40	228	116	160	74	120	170	100	160	140	120	170	100
Conductivity	umho/cm		109	620	310	490	270	280	350	590	490	610	320	400	280
Dissolved Chloride (Cl)	mg/L		1.2	20	5	5	15	5	4	20	9	5	10	7	7
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001			<0.00010	<0.00010						
Dissolved Sulphate (SO_4)	mg/L		0.5	220	22	78	29	22	27	170	83	160	44	32	33
Nitrate (N)	mg/L		0.05	1.5	0.14	<0.10	1.30	0.22	0.12	<0.10	<0.10	<0.10	0.15	<0.50	0.12
Nitrite (N)	mg/L		0.005	0.059	0.0078	<0.010	0.035	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.059	0.041
pH	(pH units)	6.5-8.5	7.4	8.4	7.9	8.0	8.0	7.4	8.1	8.0	8.0	7.8	7.8	7.9	7.9
Phenols-4AAP	mg/L	0.001	0.0005	0.0078	0.0008	**0.002**	0.001	**0.004**	<0.0010	0.001	<0.0010	<0.001	<0.001	<0.001	**0.008**
Total Ammonia-N	mg/L		0.025	0.3	0.076	<0.15	0.19	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00500	0.00167			0.001	0.002						
Total Barium (Ba)	mg/L		0.027	0.072	0.040			0.030	0.046						
Total BOD	mg/L		1	4	1			<2.0	<2.0						
Total Boron (B)	mg/L	0.200	0.0100	0.400	0.0374	0.040	0.030	0.020	0.030	0.140	0.050	0.050	0.090	0.020	0.030
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00013	0.00006			<0.0001	<0.0001						
Total Calcium (Ca)	mg/L		13	1300	55	71	27	44	63	100	89	89	200	56	41
Total Chemical Oxygen Demand (COD)	mg/L		18	51	33			32	42						
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.5200	0.0057	<0.005	<0.005	<0.005	0.0060	**0.0140**	<0.005	<0.005	**0.0790**	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.002	0.012	0.0049			0.004	**0.0053**						
Total Dissolved Solids	mg/L		50	720	213	320	134	284	304	410	316	442	166	354	178
Total Iron (Fe)	mg/L	0.300	0.050	540	4.28	**2.900**	0.300	**4.300**	**6.200**	**13.000**	**4.900**	**3.000**	**76.000**	<0.10	**1.800**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.31	7.2	0.82549	1.2	1.4	1.2	1.6	1.3	0.9	1.5	3.8	1.2	0.58
Total Lead (Pb)	mg/L	0.005	0.0007	0.006	0.002			0.0016	0.003						
Total Magnesium (Mg)	mg/L		2.4	290	14	19.0	8.7	11.0	14.0	22.0	19.0	27.0	49.0	14.0	11.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.790	0.0067	0.004	0.001	0.005	0.01	0.018	0.008	0.004	**0.110**	<0.001	0.003
Total Phosphorus	mg/L	0.02*	0.03	13.00	0.18	**0.15**	**0.25**	**0.12**	**0.18**	**0.23**	**0.24**	**0.21**	**1.20**	**0.12**	**0.12**
Total Potassium (K)	mg/L		3.1	60	5.9	6.5	12.0	5.4	4.6	8.1	5.1	11.0	17.0	4.8	8.1
Total Sodium (Na)	mg/L		1.1	18	5	7.1	6.1	3.5	5.1	18.0	9.0	8.3	5.0		2.6
Total Suspended Solids	mg/L		21	2100	79			33	120						
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.01	0.003	<0.0038	0.0029	<0.00072	<0.0012	<0.0038	<0.0073	<0.0061	*<0.027*	<0.0014	<0.0011
Total Zinc (Zn)	mg/L	0.020	0.0050	1.200	0.0155	<0.01	<0.01	0.010	0.020	**0.040**	0.010	0.010	**0.180**	<0.01	0.010
Ion Percentage	%		0.55	47.20	3.87	3.1	1.3	3.3	3.5	6.1	6.0	3.9	31.1	1.3	3.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow From Township Land to South (Background Surface Water Quality) - SS16									
Date						10-Apr-15	1-Jun-15	25-Feb-16	7-Apr-16	12-Jan-17	6-Apr-17	13-Jul-17	19-Nov-17	23-Jan-18	4-Apr-18
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Verification	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	40	228	116	160	220	140	170	91	170	45	150	80	150
Conductivity	umho/cm		109	620	310	330	510	330	440	220	350	380	440	170	300
Dissolved Chloride (Cl)	mg/L		1.2	20	5	4.0	5.0	4.0	4.2	4.3	3.1	1.2	4.2	2.9	4.1
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010			<0.00010		<0.00010				<0.00010
Dissolved Sulphate (SO_4)	mg/L		0.5	220	22	27	41	33	47	19	18	120	69	1.0	17
Nitrate (N)	mg/L		0.05	1.5	0.14	<0.10	<0.10	0.15	0.38	0.27	<0.10	0.74	<0.10	<0.10	<0.10
Nitrite (N)	mg/L		0.005	0.059	0.0078	<0.010	0.015	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	0.014
pH	(pH units)	6.5-8.5	7.4	8.4	7.9	7.4	8.0	8.0	8.0	8.0	8.1	7.8	8.0	7.7	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.0078	0.0008	**0.002**	<0.0010	<0.0010	<0.0010	<0.0040	<0.0040	<0.0040	**0.002**	**0.002**	<0.0010
Total Ammonia-N	mg/L		0.025	0.3	0.076	<0.15	0.17	<0.15	<0.15	<0.15	<0.15	<0.15	<0.050	0.066	0.058
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00500	0.00167	0.001			0.002						0.003
Total Barium (Ba)	mg/L		0.027	0.072	0.040	0.032			0.039						0.057
Total BOD	mg/L		1	4	1	<2.0			<2.0		<2.0				<2
Total Boron (B)	mg/L	0.200	0.0100	0.400	0.0374	0.040	0.050	0.030	0.120	0.060	0.040	**0.400**	0.030	<0.02	0.030
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00013	0.00006	<0.0001			<0.0001						<0.0001
Total Calcium (Ca)	mg/L		13	1300	55	56	77	50	62	150	61	1300	66	24	60
Total Chemical Oxygen Demand (COD)	mg/L		18	51	33	26			28		36				18
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.5200	0.0057	<0.005	<0.005	0.0070	0.0060	0.0470	0.0070	0.5200	<0.005	<0.005	**0.0100**
Total Copper (Cu)	mg/L	0.005	0.002	0.012	0.0049	0.0035			**0.006**						**0.012**
Total Dissolved Solids	mg/L		50	720	213	246	364	212	720	164	254	188	180	140	130
Total Iron (Fe)	mg/L	0.300	0.050	540	4.28	**3.100**	**1.700**	**3.300**	**5.600**	**47.000**	**6.100**	**540.000**	**3.700**	**1.000**	**9.800**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.31	7.2	0.82549	0.55	0.97	0.31	0.39	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Total Lead (Pb)	mg/L	0.005	0.0007	0.006	0.002	0.002			0.002						0.004
Total Magnesium (Mg)	mg/L		2.4	290	14	12.0	20.0	12.0	20.0	33.0	15.0	290.0	16.0	4.8	14.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.790	0.0067	0.005	0.003	0.004	0.008	**0.067**	0.009	**0.790**	0.006	0.002	0.013
Total Phosphorus	mg/L	0.02*	0.03	13.00	0.18	**0.12**	**0.09**	**0.09**	**0.15**	**1.00**	**0.20**	**13.00**	**0.11**	**0.09**	**0.19**
Total Potassium (K)	mg/L		3.1	60	5.9	4.2	4.5	5.0	10.0	13.0	4.6	60.0	5.1	3.8	4.7
Total Sodium (Na)	mg/L		1.1	18	5	4.5	7.5	4.4	6.7	2.0	4.1	8.0	4.9	1.4	3.8
Total Suspended Solids	mg/L		21	2100	79	45			94		140				2100
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.01	0.003	<0.0013	0.0058	<0.0017	<0.0005	<0.0005	<0.0012	<0.015	<0.0005	0.0019	<0.0005
Total Zinc (Zn)	mg/L	0.020	0.0050	1.200	0.0155	0.010	<0.01	0.010	0.010	0.110	0.020	**1.200**	0.010	<0.01	**0.030**
Ion Percentage	%		0.55	47.20	3.87	1.4	2.5	1.5	4.4	33.8	4.7	47.2	2.2	0.9	6.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Off-Site Flow From Township Land to South (Background Surface Water Quality) - SS16									
Date						24-Jan-19	17-Apr-19	2-Oct-19	11-Jan-20	18-May-20	26-Mar-21	17-Feb-22	4-May-22		
Laboratory						Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas		
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine		
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	40	228	116	96	200	91	74	170	120	40	190		
Conductivity	umho/cm		109	620	310	290	400	620	221	190	290	224	370		
Dissolved Chloride (Cl)	mg/L		1.2	20	5	9.2	3.9	2.1	2.7	3.4	7.0	3.0	3.3		
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001		<0.00010			<0.00010			<0.00010		
Dissolved Sulphate (SO_4)	mg/L		0.5	220	22	34	10	220	30	1.9	29	*0.5*	9.4		
Nitrate (N)	mg/L		0.05	1.5	0.14	0.53	<0.10	0.30	0.15	0.23	0.21	0.29	<0.10		
Nitrite (N)	mg/L		0.005	0.059	0.0078	0.021	<0.010	0.014	0.026	<0.010	<0.010	0.012	<0.010		
pH	(pH units)	6.5-8.5	7.4	8.4	7.9	7.7	8.2	7.9	8.4	7.9	7.8	7.6	8.2		
Phenols-4AAP	mg/L	0.001	0.0005	0.0078	0.0008	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		
Total Ammonia-N	mg/L		0.025	0.3	0.076	0.300	<0.050	0.210	<0.050	<0.050	0.078	0.16	<0.15		
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00500	0.00167		<0.001			0.002			0.001		
Total Barium (Ba)	mg/L		0.027	0.072	0.040		0.028			0.031			0.027		
Total BOD	mg/L		1	4	1		<2			4			<2		
Total Boron (B)	mg/L	0.200	0.0100	0.400	0.0374	0.02	0.03	0.05	0.03	0.06	0.03	<0.02	0.04		
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00013	0.00006		<0.0001			<0.0001			<0.0001		
Total Calcium (Ca)	mg/L		13	1300	55	36	64	97	32	49	45	13	56		
Total Chemical Oxygen Demand (COD)	mg/L		18	51	33		25			39			31		
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.5200	0.0057	**0.0090**	<0.005	0.0060	0.006	<0.005	<0.005	<0.005	<0.005		
Total Copper (Cu)	mg/L	0.005	0.002	0.012	0.0049		0.003			0.005			0.003		
Total Dissolved Solids	mg/L		50	720	213	255	240	425	190	200	195	50	190		
Total Iron (Fe)	mg/L	0.300	0.050	540	4.28	**7.0**	**1.5**	**5.8**	**5.3**	**5.0**	**2.9**	**0.5**	**2.7**		
Total Kjeldahl Nitrogen (TKN)	mg/L		0.31	7.2	0.82549	0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7		
Total Lead (Pb)	mg/L	0.005	0.0007	0.006	0.002		0.001			0.0022			0.0012		
Total Magnesium (Mg)	mg/L		2.4	290	14	10	14	25	8	12	10	2.4	12		
Total Nickel (Ni)	mg/L	0.025	0.0005	0.790	0.0067	0.011	0.003	0.009	0.008	0.007	0.004	0.001	0.005		
Total Phosphorus	mg/L	0.02*	0.03	13.00	0.18	**0.22**	**0.07**	**0.22**	**0.20**	**0.21**	**0.15**	**0.10**	**0.08**		
Total Potassium (K)	mg/L		3.1	60	5.9	8.6	3.1	6.0	6.7	3.3	4.6	3.3	3.4		
Total Sodium (Na)	mg/L		1.1	18	5	4.5	4.2	7.3	1.6	2.4	3.4	1.1	3.1		
Total Suspended Solids	mg/L		21	2100	79		21			95			40		
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.01	0.003	<0.00061	<0.0018	0.0062	<0.0023	0.014	<0.00061	<0.00061	<0.0026		
Total Zinc (Zn)	mg/L	0.020	0.0050	1.200	0.0155	0.02	<0.01	0.02	0.02	0.01	0.01	<0.01	<0.01		
Ion Percentage	%		0.55	47.20	3.87	1.4	1.8	3.3	4.0	0.7	1.1	2.6	0.6		

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP1									
Date						23-Nov-11	6-Dec-11	10-Jan-12	13-Mar-12	27-Mar-12	22-Jun-12	15-Aug-12	14-Oct-12	13-Jan-13	10-Apr-13
Laboratory						Maxxam	Maxxam	Lambton Sci	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	39	190	95	106	116		120	110	50	57	140	80	96
Conductivity	umho/cm		180	930	474	408	396		470	460	360	350	530	380	420
Dissolved Chloride (Cl)	mg/L		2.1	48	13	16	11	11	14	13	11	11	11	10	13
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0001	<0.0001		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		29	350	107	71	61		110	110	120	99	110	85	85
Nitrate (N)	mg/L		0.013	2.66	0.31	0.80	0.30		0.75	<0.10	<0.10	<0.10	<0.10	0.91	0.78
Nitrite (N)	mg/L		0.005	0.17	0.0126	0.02	<0.01		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.032
pH	(pH units)	6.5-8.5	7.0	9.6	8.1	8.0	8.0		8.0	8.4	**9.2**	**9.2**	7.7	7.6	7.9
Phenols-4AAP	mg/L	0.001	0.0005	0.004	0.0007	<0.001	**0.004**		**0.002**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	7.98	0.117	<0.15	<0.15		<0.15	<0.15	<0.15	0.21	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00900	0.00203	0.004	0.004		0.003	0.001	0.003	0.003	0.004	0.001	0.003
Total Barium (Ba)	mg/L		0.009	0.14	0.037	0.069	0.130		0.066	0.034	0.024	0.013	0.038	0.033	0.063
Total BOD	mg/L		1	4	2	4.00	<2		4.00	4.00	<2.0	<2.0	3.00	<2.0	<2.0
Total Boron (B)	mg/L	0.200	0.0700	2.300	0.2190	0.170	**0.220**	0.160	**0.210**	**0.240**	0.190	**0.210**	0.190	0.120	0.200
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0002	0.00005	<0.0001	<0.0001		0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		22	110	53	61	52		63	52	35	28	52	46	57
Total Chemical Oxygen Demand (COD)	mg/L		9	40	23	33	27		27	32	34	25	35	20	37
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0360	0.0044	**0.0130**	**0.0270**	<0.005	**0.0110**	<0.005	<0.005	<0.005	<0.005	0.0060	**0.0110**
Total Copper (Cu)	mg/L	0.005	0.001	0.026	0.0037	**0.010**	**0.009**		**0.008**	0.003	0.003	0.002	<0.002	0.004	**0.010**
Total Dissolved Solids	mg/L		116	585	315	262	296		328	294	248	262	334	316	344
Total Iron (Fe)	mg/L	0.300	0.270	35	2.71	**13.000**	**14.000**		**11.000**	**1.300**	**1.200**	**1.300**	**2.700**	**4.400**	**12.000**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	9.9	0.79615	2.00	2.00		1.70	1.10	0.93	0.59	1.30	1.20	2.00
Total Lead (Pb)	mg/L	0.005	0.0003	0.015	0.001	0.005	0.005		0.005	0.001	0.001	0.001	0.001	0.002	0.005
Total Magnesium (Mg)	mg/L		8	56	22	17	17		20	20	18	21	25	15	17
Total Nickel (Ni)	mg/L	0.025	0.0005	0.048	0.0054	0.017	0.016	<0.01	0.014	0.003	0.003	0.003	0.006	0.006	0.017
Total Phosphorus	mg/L	0.02*	0.01	0.78	0.10	**0.40**	**0.30**		**0.25**	**0.08**	**0.05**	**0.06**	**0.10**	**0.13**	**0.25**
Total Potassium (K)	mg/L		0.81	12	4.8	8.2	11.0		5.1	3.9	1.7	3.5	3.5	4.2	5.6
Total Sodium (Na)	mg/L		3.6	36	12	10.0	9.7		13.0	13.0	13.0	14.0	13.0	9.6	11.0
Total Suspended Solids	mg/L		7	530	57	200	120		130	34	25	26	60	73	170
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.61	0.004	<0.02	<0.02	<0.003	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0025	0.090	0.0096	**0.030**	**0.040**	0.012	**0.030**	<0.01	<0.01	<0.01	<0.01	0.010	**0.040**
Ion Percentage	%		0.01	23.35	2.52	5.9	4.9		1.9	0.2	0.0	2.0	0.6	2.6	4.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP1									
Date						29-Apr-13	5-Jul-13	07-Oct-13	11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	24-Nov-14	15-Dec-14	4-Jan-15
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event									Routine	Routine	Verification	Routine	Routine	Verification	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	39	190	95	120	50	130	190	130	130	65	110	110	130
Conductivity	umho/cm		180	930	474	430	260	460	720	470	480	260	430	420	560
Dissolved Chloride (Cl)	mg/L		2.1	48	13	9	5	18	25	16	14	7	16	13	13
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		29	350	107	83	65	71	140	79	94	52	76	73	140
Nitrate (N)	mg/L		0.013	2.66	0.31	<0.10	<0.10	0.14	0.9	0.44	1.34	<0.10	1.66	0.47	1.64
Nitrite (N)	mg/L		0.005	0.17	0.0126	<0.010	<0.010	0.020	0.020	<0.010	0.025	<0.010	0.012	0.013	0.025
pH	(pH units)	6.5-8.5	7.0	9.6	8.1	8.3	**8.5**	8.0	8.1	8.1	8.1	**9.6**	7.8	8.1	7.7
Phenols-4AAP	mg/L	0.001	0.0005	0.004	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	**0.002**	<0.0010	0.0013	<0.001	<0.001	**0.004**
Total Ammonia-N	mg/L		0.025	7.98	0.117	<0.15	<0.15	<0.15	0.41	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00900	0.00203	<0.001	0.003	0.003	<0.001	0.002	0.002	0.005	0.003	<0.001	0.001
Total Barium (Ba)	mg/L		0.009	0.14	0.037	0.030	0.014	0.06	0.061	0.037	0.052	0.023	0.068	0.036	0.048
Total BOD	mg/L		1	4	2	<2.0	<2.0	4.0	4.0	2.0	<2.0	<2.0	3.0	<2.0	3.0
Total Boron (B)	mg/L	0.200	0.0700	2.300	0.2190	**0.220**	0.180	**0.320**	**0.290**	0.170	**0.260**	**0.230**	0.140	0.100	0.120
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0002	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		22	110	53	50	23	55	110	63	71	22	59	50	77
Total Chemical Oxygen Demand (COD)	mg/L		9	40	23	37	18	34	32	30	30	40	33	10	25
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0360	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	0.0070	<0.005	**0.0100**	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.026	0.0037	0.003	<0.002	0.002	0.003	0.004	**0.006**	<0.002	**0.009**	0.003	0.003
Total Dissolved Solids	mg/L		116	585	315	278	164	290	478	372	344	164	338	276	404
Total Iron (Fe)	mg/L	0.300	0.270	35	2.71	**0.670**	**0.380**	**3.000**	0.270	**3.400**	**6.300**	**0.590**	**9.900**	**0.970**	**1.600**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	9.9	0.79615	1.10	0.75	1.60	1.30	1.20	1.20	1.30	1.90	0.79	0.87
Total Lead (Pb)	mg/L	0.005	0.0003	0.015	0.001	<0.0005	<0.0005	0.0015	<0.0005	0.0013	0.0028	<0.0005	0.004	0.0005	0.0008
Total Magnesium (Mg)	mg/L		8	56	22	18	14	17	32	18	21	14	19	16	26
Total Nickel (Ni)	mg/L	0.025	0.0005	0.048	0.0054	0.002	<0.001	0.006	0.003	0.006	0.010	0.002	0.014	0.002	0.003
Total Phosphorus	mg/L	0.02*	0.01	0.78	0.10	**0.06**	**0.03**	**0.08**	**0.06**	**0.14**	**0.18**	**0.07**	**0.24**	**0.05**	**0.06**
Total Potassium (K)	mg/L		0.81	12	4.8	3.7	0.8	7.1	10.0	4.3	5.8	2.0	8.5	5.1	7.5
Total Sodium (Na)	mg/L		3.6	36	12	11.0	8.8	15.0	21.0	11.0	14.0	12.0	6.8	7.2	9.6
Total Suspended Solids	mg/L		7	530	57	21	9	85	7	68	82	15	150	21	33
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.61	0.004	<0.02	<0.097	<0.0085	0.0073	<0.0042	<0.0028	*<0.022*	<0.012	<0.012	<0.00079
Total Zinc (Zn)	mg/L	0.020	0.0025	0.090	0.0096	<0.01	<0.01	<0.01	<0.01	0.01	0.02	<0.01	**0.03**	<0.01	<0.01
Ion Percentage	%		0.01	23.35	2.52	0.9	1.9	2.1	8.2	5.4	7.5	4.7	6.9	3.8	5.0

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP1									
Date						10-Apr-15	30-Apr-15	3-Aug-15	25-Feb-16	7-Apr-16	1-Aug-16	3-Nov-16	24-Nov-16	12-Dec-16	12-Jan-17
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Verification	Routine	Routine	Routine	Routine	Assessment	Assessment	Assessment	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	39	190	95	98	110	68	110	120	39	190			110
Conductivity	umho/cm		180	930	474	310	410	330	420	420	460	620			410
Dissolved Chloride (Cl)	mg/L		2.1	48	13	14	8	5.4	8.5	6	2.3	13	13	11	11
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			<0.00010
Dissolved Sulphate (SO_4)	mg/L		29	350	107	54	78	86	78	74	180	100			74
Nitrate (N)	mg/L		0.013	2.66	0.31	1.23	<0.10	<0.10	1.29	0.65	0.013	0.21			0.86
Nitrite (N)	mg/L		0.005	0.17	0.0126	0.03	<0.010	<0.010	0.013	<0.010	0.17	0.053			0.045
pH	(pH units)	6.5-8.5	7.0	9.6	8.1	7.0	8.1	8.1	8.0	7.7	8.8	8.1			7.9
Phenols-4AAP	mg/L	0.001	0.0005	0.004	0.0007	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0040	<0.0040	<0.0010	<0.0010	<0.0040
Total Ammonia-N	mg/L		0.025	7.98	0.117	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	7.98	6.30	4.20	1.26
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00900	0.00203	0.009	<0.001	0.005	0.002	0.003	0.003	0.004			0.003
Total Barium (Ba)	mg/L		0.009	0.14	0.037	0.140	0.025	0.052	0.068	0.050	0.020	0.037			0.088
Total BOD	mg/L		1	4	2	<2.0	<2.0	4.0	<2.0	<2.0	<2.0	3.0			4.0
Total Boron (B)	mg/L	0.200	0.0700	2.300	0.2190	0.130	0.130	0.130	0.120	0.110	0.130	**2.300**	**2.200**	**1.900**	**0.410**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0002	0.00005	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			<0.0001
Total Calcium (Ca)	mg/L		22	110	53	64	43	34	54	60	45	46			47
Total Chemical Oxygen Demand (COD)	mg/L		9	40	23	31	20	33	21	29	9.8	40			36
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0360	0.0044	**0.0360**	<0.005	0.0070	**0.0130**	**0.0090**	<0.005	<0.005	<0.005	<0.005	**0.0160**
Total Copper (Cu)	mg/L	0.005	0.001	0.026	0.0037	**0.026**	0.003	**0.006**	0.005	0.007	<0.002	0.003			**0.008**
Total Dissolved Solids	mg/L		116	585	315	262	238	284	292	282	390	432			300
Total Iron (Fe)	mg/L	0.300	0.270	35	2.71	**35.000**	**0.870**	**6.700**	**6.000**	**8.400**	**1.100**	**2.700**			**8.900**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	9.9	0.79615	0.87	0.50	0.57	0.50	0.52	0.45	9.90			2.00
Total Lead (Pb)	mg/L	0.005	0.0003	0.015	0.001	**0.015**	<0.0005	0.0034	0.0023	0.0035	0.0005	0.0012			0.0034
Total Magnesium (Mg)	mg/L		8	56	22	21	16	19	16	17	24	24			17
Total Nickel (Ni)	mg/L	0.025	0.0005	0.048	0.0054	**0.048**	0.002	0.010	0.007	0.012	<0.001	0.006	0.004	0.003	0.012
Total Phosphorus	mg/L	0.02*	0.01	0.78	0.10	**0.78**	**0.05**	**0.21**	**0.14**	**0.22**	**0.04**	**0.11**			0.30
Total Potassium (K)	mg/L		0.81	12	4.8	7.3	3.4	2.9	7.4	4.5	2.7	9.0			12.0
Total Sodium (Na)	mg/L		3.6	36	12	5.9	6.8	6.9	6.2	6.4	10.0	36.0			8.8
Total Suspended Solids	mg/L		7	530	57	530	32	170	18	98	31	59			140
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.61	0.004	0.0059	<0.0005	*<0.074*	<0.00098	<0.0013	<0.00063	**0.610**	**0.290**	0.009	0.007
Total Zinc (Zn)	mg/L	0.020	0.0025	0.090	0.0096	**0.090**	<0.01	0.020	0.02	0.02	<0.01	<0.01	<0.005	0.006	0.020
Ion Percentage	%		0.01	23.35	2.52	13.4	1.5	4.4	2.5	4.0	0.5	0.9			2.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP1									
Date						24-Jan-17	6-Apr-17	13-Jul-17	23-Jan-18	4-Apr-18	27-Aug-18	2-Oct-18	24-Jan-19	19-Apr-19	27-Oct-19
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas
Routine/Verification Event						Verification	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	39	190	95	55	130	49	110	120	46	190	81	140	120
Conductivity	umho/cm		180	930	474	180	490	360	450	480	460	650	320	610	560
Dissolved Chloride (Cl)	mg/L		2.1	48	13	4.2	8.7	2.1	13	9.5	9.2	26	14	18	20
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		29	350	107	29	96	120	98	120	150	120	44	150	130
Nitrate (N)	mg/L		0.013	2.66	0.31	0.31	0.50	<0.10	2.09	0.94	0.81	2.33	0.79	0.75	1.31
Nitrite (N)	mg/L		0.005	0.17	0.0126	0.016	0.040	<0.010	0.027	0.014	0.047	0.014	0.018	0.021	0.049
pH	(pH units)	6.5-8.5	7.0	9.6	8.1	7.7	8.1	8.1	7.7	8.1	8.7	8.2	7.6	8.2	8.2
Phenols-4AAP	mg/L	0.001	0.0005	0.004	0.0007	<0.0040	<0.0040	<0.0040	0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	7.98	0.117	0.590	<0.15	<0.15	0.160	0.110	0.064	<0.050	0.720	<0.050	<0.050
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00900	0.00203	<0.001	0.002	0.004	0.003	0.004	0.002	0.003	<0.001	0.001	0.002
Total Barium (Ba)	mg/L		0.009	0.14	0.037	0.023	0.041	0.050	0.050	0.072	0.009	0.025	0.017	0.039	0.023
Total BOD	mg/L		1	4	2	<2.0	3.0	2.0	<2	<2	<2	<2	4.0	4.0	<2
Total Boron (B)	mg/L	0.200	0.0700	2.300	0.2190	0.130	0.150	**0.210**	0.110	0.150	0.160	0.180	0.070	0.200	**0.230**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0002	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		22	110	53	27	69	43	61	74	43	52	32	77	58
Total Chemical Oxygen Demand (COD)	mg/L		9	40	23	12	13	15	20	15	15	23	25	26	18
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0360	0.0044	<0.005	<0.005	0.0050	**0.0100**	**0.0150**	<0.005	<0.005	<0.005	0.0050	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.026	0.0037	0.003	0.005	0.005	0.008	**0.011**	0.003	0.004	0.003	0.005	<0.002
Total Dissolved Solids	mg/L		116	585	315	116	296	236	225	200	235	450	195	440	325
Total Iron (Fe)	mg/L	0.300	0.270	35	2.71	**1.700**	**4.500**	**4.100**	**8.600**	**14.000**	**0.800**	**1.900**	**1.000**	**3.300**	**1.000**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	9.9	0.79615	1.10	<0.70	0.49	0.35	0.35	0.40	0.70	1.40	0.57	0.50
Total Lead (Pb)	mg/L	0.005	0.0003	0.015	0.001	0.0007	0.0024	0.0017	0.0034	**0.0057**	<0.0005	0.0009	0.0007	0.0013	<0.0005
Total Magnesium (Mg)	mg/L		8	56	22	8	20	20	19	25	25	23	11	28	27
Total Nickel (Ni)	mg/L	0.025	0.0005	0.048	0.0054	0.002	0.007	0.007	0.012	0.018	0.003	0.005	0.002	0.006	0.004
Total Phosphorus	mg/L	0.02*	0.01	0.78	0.10	**0.10**	<0.15	**0.20**	**0.26**	**0.31**	**0.04**	**0.16**	**0.17**	**0.08**	**0.05**
Total Potassium (K)	mg/L		0.81	12	4.8	5.6	4.9	3.1	5.5	5.9	3.8	4.9	7.3	5.0	4.7
Total Sodium (Na)	mg/L		3.6	36	12	3.6	7.6	8.6	7.5	8.9	12.0	11.0	6.9	12.0	17.0
Total Suspended Solids	mg/L		7	530	57	15	120	120	160	320	35	58	29	70	29
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.61	0.004	0.004	<0.0005	<0.052	0.0015	<0.0005	0.0014	<0.00061	0.0013	<0.0036	<0.0069
Total Zinc (Zn)	mg/L	0.020	0.0025	0.090	0.0096	<0.01	0.01	0.01	0.02	**0.04**	<0.01	<0.01	0.01	<0.01	<0.01
Ion Percentage	%		0.01	23.35	2.52	6.4	3.5	4.5	2.5	5.1	2.8	8.7	0.5	1.4	1.3

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP1									
Date						11-Jan-20	18-May-20	15-Nov-20	26-Mar-21	9-Jul-21	4-Oct-21	17-Feb-22	4-May-22	20-Jul-22	2-Aug-22
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Verification
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	39	190	95	160	89	110	130	63	57	82	160	52	42
Conductivity	umho/cm		180	930	474	762	600	930	750	700	660	320	730	760	850
Dissolved Chloride (Cl)	mg/L		2.1	48	13	44	25	18	48	40	21	17	29	28	26
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		29	350	107	170	180	350	160	220	250	44	190	280	310
Nitrate (N)	mg/L		0.013	2.66	0.31	2.34	0.10	0.21	2.66	<0.10	0.60	0.56	0.46	<0.10	0.24
Nitrite (N)	mg/L		0.005	0.17	0.0126	0.024	<0.010	<0.010	0.032	<0.010	0.026	0.043	0.012	<0.010	<0.010
pH	(pH units)	6.5-8.5	7.0	9.6	8.1	8.3	8.1	8.0	8.0	8.3	8.2	7.8	8.2	**8.7**	8.2
Phenols-4AAP	mg/L	0.001	0.0005	0.004	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.0012**	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	7.98	0.117	<0.050	<0.050	0.083	0.096	<0.15	<0.15	1.3	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00900	0.00203	0.002	0.001	0.003	0.003	0.004	0.001	0.004	0.001	0.002	0.001
Total Barium (Ba)	mg/L		0.009	0.14	0.037	0.053	0.016	0.043	0.061	0.037	0.020	0.05	0.037	0.026	0.022
Total BOD	mg/L		1	4	2	3	<2	<2	4	<2	2	3	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.0700	2.300	0.2190	**0.32**	**0.25**	**0.23**	**0.39**	**0.27**	**0.25**	0.08	**0.37**	**0.43**	**0.35**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0002	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		22	110	53	99	46	110	84	53	64	41	76	53	67
Total Chemical Oxygen Demand (COD)	mg/L		9	40	23	19	37	11	27	29	14	30	22	20	19
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0360	0.0044	0.0060	<0.005	**0.009**	**0.010**	<0.005	<0.005	**0.013**	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.026	0.0037	**0.006**	0.003	**0.007**	**0.009**	0.002	0.003	**0.012**	0.004	<0.002	<0.002
Total Dissolved Solids	mg/L		116	585	315	530	395	585	465	470	450	195	375	510	545
Total Iron (Fe)	mg/L	0.300	0.270	35	2.71	**4.9**	**1.6**	**8.1**	**8.7**	**1.7**	**0.9**	**13**	**2.8**	**0.6**	**0.9**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	9.9	0.79615	0.45	0.61	0.4	0.5	<0.7	<0.7	2.2	<0.7	<0.7	<0.7
Total Lead (Pb)	mg/L	0.005	0.0003	0.015	0.001	0.002	0.0007	0.0032	0.0035	0.0007	<0.0005	**0.0052**	0.0011	<0.0005	<0.0005
Total Magnesium (Mg)	mg/L		8	56	22	35	32	56	32	35	33	14	34	45	48
Total Nickel (Ni)	mg/L	0.025	0.0005	0.048	0.0054	0.010	0.005	0.014	0.017	0.006	0.003	0.019	0.007	0.003	0.003
Total Phosphorus	mg/L	0.02*	0.01	0.78	0.10	**0.15**	**0.06**	**0.14**	**0.21**	**0.05**	**0.04**	**0.33**	**0.084**	0.015	0.009
Total Potassium (K)	mg/L		0.81	12	4.8	7.5	3.6	6.5	7.7	3.1	5.2	8.7	4.9	3.4	3.8
Total Sodium (Na)	mg/L		3.6	36	12	29	21	22	34	30	22	8.7	26	31	31
Total Suspended Solids	mg/L		7	530	57	150	42	250	220	46	39	250	19	13	81
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.61	0.004	<0.0015	<0.0069	0.0022	0.00098	<0.0068	<0.013	0.0076	<0.0015	<0.082	<0.075
Total Zinc (Zn)	mg/L	0.020	0.0025	0.090	0.0096	0.02	<0.01	0.02	**0.03**	<0.01	<0.01	**0.04**	<0.01	<0.01	<0.01
Ion Percentage	%		0.01	23.35	2.52	15.2	5.7	11.1	15.5	1.6	0.2	23.3	2.2	0.8	7.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP1									
Date						**18-Oct-22**									
Laboratory						**Bueau Veritas**									
Routine/Verification Event						**Routine**									
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	39	190	95	65									
Conductivity	umho/cm		180	930	474	810									
Dissolved Chloride (Cl)	mg/L		2.1	48	13	24									
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010									
Dissolved Sulphate (SO_4)	mg/L		29	350	107	320									
Nitrate (N)	mg/L		0.013	2.66	0.31	<0.10									
Nitrite (N)	mg/L		0.005	0.17	0.0126	<0.010									
pH	(pH units)	6.5-8.5	7.0	9.6	8.1	8.1									
Phenols-4AAP	mg/L	0.001	0.0005	0.004	0.0007	<0.0010									
Total Ammonia-N	mg/L		0.025	7.98	0.117	<0.15									
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00900	0.00203	<0.001									
Total Barium (Ba)	mg/L		0.009	0.14	0.037	0.022									
Total BOD	mg/L		1	4	2	<2									
Total Boron (B)	mg/L	0.200	0.0700	2.300	0.2190	**0.33**									
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0002	0.00005	<0.0001									
Total Calcium (Ca)	mg/L		22	110	53	65									
Total Chemical Oxygen Demand (COD)	mg/L		9	40	23	9.3									
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0360	0.0044	<0.005									
Total Copper (Cu)	mg/L	0.005	0.001	0.026	0.0037	<0.002									
Total Dissolved Solids	mg/L		116	585	315	510									
Total Iron (Fe)	mg/L	0.300	0.270	35	2.71	0.3									
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	9.9	0.79615	<0.7									
Total Lead (Pb)	mg/L	0.005	0.0003	0.015	0.001	<0.0005									
Total Magnesium (Mg)	mg/L		8	56	22	50									
Total Nickel (Ni)	mg/L	0.025	0.0005	0.048	0.0054	0.002									
Total Phosphorus	mg/L	0.02*	0.01	0.78	0.10	0.006									
Total Potassium (K)	mg/L		0.81	12	4.8	3.5									
Total Sodium (Na)	mg/L		3.6	36	12	30									
Total Suspended Solids	mg/L		7	530	57	9									
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.61	0.004	<0.0067									
Total Zinc (Zn)	mg/L	0.020	0.0025	0.090	0.0096	<0.01									
Ion Percentage	%		0.01	23.35	2.52	0.5									

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						14-Sep-08	17-Oct-08	04-Nov-08	05-Dec-08	12-Feb-09	19-Feb-09	08-Mar-09	06-Apr-09	26-Apr-09	07-May-09
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	87	112	79	115	69		76	100	70	95
Conductivity	umho/cm		223	1100	591	339	436	282	422	223		239	389	223	310
Dissolved Chloride (Cl)	mg/L		7	93	30	14	11	10	14	7	14	7	22	9	11
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001		<0.0001	0.0001	<0.0001	<0.0001
Dissolved Sulphate (SO_4)	mg/L		27	420	142	54	98	41	76	27		37	66	30	51
Nitrate (N)	mg/L		0.005	3.65	0.32	0.6	<0.1	1.6	1.0	1.1		1.2	1.2	1.1	0.7
Nitrite (N)	mg/L		0.01	0.34	0.0150	0.03	<0.01	0.01	0.01	0.02		0.01	0.01	0.03	0.03
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	7.9	7.7	8.0	8.0	7.8		7.1	8.0	7.5	7.6
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Ammonia-N	mg/L		0.025	1.2	0.120	<0.15	<0.15	0.21	<0.15	<0.15		<0.15	<0.15	0.19	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	0.006	0.002	0.015	0.001	0.008		0.002	0.026	0.011	<0.001
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.075	0.042	0.200	0.038	0.110		0.032	0.360	0.140	0.022
Total BOD	mg/L		1	29	2	<2	2	<2	<2	<2		<2	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	0.120	0.110	0.060	0.150	0.080		0.030	0.190	0.100	0.130
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	<0.0001	<0.0001	**0.0003**	<0.0001	<0.0001		<0.0001	**0.0005**	0.0001	<0.0001
Total Calcium (Ca)	mg/L		26	320	65	48	43	60	51	46		42	320	49	39
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	30	12	26	16	12		20	99	28	18
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	**0.0160**	0.0060	**0.0530**	0.0070	**0.0250**		<0.005	**0.1000**	**0.0370**	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	**0.014**	**0.006**	**0.041**	0.004	**0.021**		0.005	**0.086**	**0.029**	0.003
Total Dissolved Solids	mg/L		140	795	379	246	275	185	272	140		155	250	142	200
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**16.000**	**5.100**	**54.000**	**2.800**	**26.000**		**3.800**	**110.000**	**36.000**	**0.400**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	1.6	1.2	4.0	0.6	1.9		1.3	5.0	2.4	0.8
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	**0.006**	0.002	**0.021**	0.002	**0.010**		0.002	**0.047**	**0.013**	<0.0005
Total Magnesium (Mg)	mg/L		11	87	26	15	23	21	16	14		13	87	18	11
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	0.022	0.008	**0.067**	0.004	**0.034**		0.006	**0.140**	**0.050**	0.002
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**0.32**	**0.26**	**1.30**	*<0.15*	**0.32**		*<0.15*	**2.00**	**0.57**	*<0.03*
Total Potassium (K)	mg/L		0.8	12	4.6	6.1	2.9	10.0	4.2	5.9		2.0	11.0	6.5	2.5
Total Sodium (Na)	mg/L		4.5	62	23	9.2	14.0	4.5	11.0	5.2		5.3	12.0	5.6	7.2
Total Suspended Solids	mg/L		4	5300	40	140	190	1100	<10	450		45	5300	380	15
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	<0.02	<0.02	<0.02	<0.02	<0.02		<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	**0.039**	0.018	**0.140**	0.013	**0.060**		<0.01	**0.240**	**0.080**	<0.01
Ion Percentage	%		0.03	36.92	2.21	8.9	3.1	18.3	3.7	17.2		11.2	36.9	18.4	2.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						24-Oct-09	25-Jan-10	06-Apr-10	14-Oct-10	28-Feb-11	20-Apr-11	08-Aug-11	20-Oct-11	13-Mar-12	27-Mar-12
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	75	84	82	91	105	98	52	75	110	84
Conductivity	umho/cm		223	1100	591	574	543	487	509	510	472	428	417	620	640
Dissolved Chloride (Cl)	mg/L		7	93	30	28	34	35	22	32	35	25	18	60	61
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		27	420	142	160	120	100	120	87	76	110	95	120	130
Nitrate (N)	mg/L		0.005	3.65	0.32	2.00	1.60	0.20	<0.1	1.10	0.50	<0.1	0.30	0.91	<0.10
Nitrite (N)	mg/L		0.01	0.34	0.0150	0.05	0.04	0.01	<0.01	0.03	0.01	<0.01	0.01	0.015	<0.010
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	7.0	8.1	7.9	7.9	8.0	8.1	**9.3**	8.0	8.1	8.2
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	**0.002**	<0.0010
Total Ammonia-N	mg/L		0.025	1.2	0.120	<0.15	<0.15	<0.15	<0.15	0.34	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	<0.001	<0.001	<0.001	0.002	<0.001	0.001	0.004	0.003	0.001	0.001
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.032	0.025	0.026	0.040	0.027	0.037	0.008	0.046	0.037	0.034
Total BOD	mg/L		1	29	2	6.0	<2	<2	4.0	<2	<2	2.0	3.0	3.0	4.0
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	0.060	0.060	0.070	0.090	0.150	0.100	0.130	0.060	0.070	0.100
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		26	320	65	57	64	48	52	54	53	26	51	65	56
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	19	19	29	31	18	11	23	22	20	26
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0060	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	0.003	0.003	0.003	<0.002	0.003	0.003	<0.002	**0.008**	**0.006**	0.004
Total Dissolved Solids	mg/L		140	795	379	370	365	312	322	306	282	300	292	410	402
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**1.300**	**1.000**	**1.000**	**0.800**	**0.900**	**2.300**	0.300	**6.200**	**3.600**	**1.300**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	1.4	1.2	1.0	1.2	1.1	1.0	0.6	1.0	1.3	1.1
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	0.001	<0.0005	0.001	0.001	<0.0005	0.001	<0.0005	0.003	0.002	0.001
Total Magnesium (Mg)	mg/L		11	87	26	24	22	18	23	19	17	23	17	22	26
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	0.003	0.003	0.002	0.002	0.006	0.004	0.002	0.010	0.006	0.003
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**0.09**	**0.05**	**0.05**	**0.08**	**0.03**	**0.06**	**0.04**	**0.19**	**0.06**	**0.07**
Total Potassium (K)	mg/L		0.8	12	4.6	3.8	4.1	3.5	3.4	4.1	3.7	2.4	4.9	4.0	4.0
Total Sodium (Na)	mg/L		4.5	62	23	14	23	24	17	24	24	23	13	39	43
Total Suspended Solids	mg/L		4	5300	40	30	18	18	19	8	27	9	150	69	30
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.02	0.010	<0.01
Ion Percentage	%		0.03	36.92	2.21	0.8	5.9	3.2	3.6	2.9	3.4	1.2	3.8	1.7	3.0

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						30-Oct-12	15-Nov-12	13-Jan-13	10-Apr-13	05-Jul-13	07-Oct-13	11-Jan-14	28-Jan-14	8-Apr-14	30-Apr-14
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event												Routine	Verification	Routine	Verification
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	110	110	77	97	55	100	71	190	100	100
Conductivity	umho/cm		223	1100	591	620	650	410	590	350	520	310	960	410	530
Dissolved Chloride (Cl)	mg/L		7	93	30	35	31	21	61	23	18	32	93	24	31
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		27	420	142	140	150	79	88	81	120	29	170	55	100
Nitrate (N)	mg/L		0.005	3.65	0.32	0.79	2.00	1.90	0.78	<0.10	<0.10	0.92	0.27	0.34	0.86
Nitrite (N)	mg/L		0.01	0.34	0.0150	<0.010	0.078	<0.010	0.030	<0.010	<0.010	0.014	<0.010	<0.010	0.015
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	7.2	7.8	7.7	7.9	8.4	7.9	8.0	7.3	8.0	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.0013**	<0.0010	**0.002**	<0.0010
Total Ammonia-N	mg/L		0.025	1.2	0.120	0.36	0.25	<0.15	0.21	<0.15	0.18	0.45	0.52	0.17	0.17
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	0.021	<0.001	0.001	0.001	0.004	0.004	0.004	<0.001	0.001	0.002
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.280	0.041	0.027	0.035	0.018	0.062	0.050	0.053	0.030	0.037
Total BOD	mg/L		1	29	2	4.0	5.0	<2.0	<2.0	<2.0	4.0	3.0	3.0	2.0	<2.0
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	0.130	0.080	0.060	0.080	0.070	0.110	0.050	0.090	0.050	0.100
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	**0.0003**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		26	320	65	200	73	48	60	34	63	37	100	50	61
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	74	22	17	10	11	32	13	20	18	18
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	**0.0800**	<0.005	<0.005	<0.005	<0.005	0.0050	**0.0170**	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	**0.066**	0.002	0.005	**0.006**	0.003	0.004	**0.014**	0.004	0.004	**0.006**
Total Dissolved Solids	mg/L		140	795	379	410	402	274	374	196	316	234	578	282	338
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**83.000**	**0.580**	**2.700**	**3.000**	**1.100**	**5.200**	**13.000**	**0.640**	**2.800**	**2.700**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	6.3	1.0	1.2	1.5	1.0	2.0	<2.0	2.1	1.2	1.3
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	**0.033**	<0.0005	0.0013	0.0014	0.0006	0.0024	**0.0056**	<0.0005	0.0013	0.0013
Total Magnesium (Mg)	mg/L		11	87	26	56	23	14	17	16	23	11	31	13	20
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	**0.110**	0.002	0.005	0.006	0.002	0.009	0.019	0.004	0.006	0.006
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**1.40**	**0.04**	**0.07**	**0.07**	**0.07**	**0.18**	**0.28**	**0.05**	**0.09**	**0.09**
Total Potassium (K)	mg/L		0.8	12	4.6	12.0	3.8	3.0	3.4	0.8	5.2	6.6	5.8	3.4	3.9
Total Sodium (Na)	mg/L		4.5	62	23	30	25	15	35	20	16	21	62	15	25
Total Suspended Solids	mg/L		4	5300	40	1600	18	38	61	24	150	52	13	47	44
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	<0.02	<0.02	<0.02	<0.02	<0.022	0.011	0.0056	0.0014	0.003	0.002
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	**0.210**	<0.01	0.010	0.010	<0.01	0.010	**0.050**	0.020	<0.01	0.010
Ion Percentage	%		0.03	36.92	2.21	24.0	3.7	5.1	4.0	4.7	5.9	9.2	2.9	5.6	6.2

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						07-Jul-14	24-Jul-14	24-Nov-14	15-Dec-14	4-Jan-15	10-Apr-15	30-Apr-15	3-Aug-15	25-Oct-15	25-Feb-16
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Verification	Routine	Verification	Routine	Routine	Verification	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	61	52	89	82	100	96	78	72	69	94
Conductivity	umho/cm		223	1100	591	360	520	630	630	660	470	520	570	760	580
Dissolved Chloride (Cl)	mg/L		7	93	30	29	20	34	20	29	30	36	22	36	21
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		27	420	142	69	170	160	200	190	100	110	180	270	150
Nitrate (N)	mg/L		0.005	3.65	0.32	<0.10	<0.10	0.90	0.59	1.31	1.24	<0.10	<0.10	<0.10	1.49
Nitrite (N)	mg/L		0.01	0.34	0.0150	<0.010	<0.010	0.026	0.022	0.047	0.104	<0.010	<0.010	<0.010	0.023
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	**9.1**	**8.9**	7.8	8.2	7.7	7.0	7.8	7.9	7.5	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	**0.002**	<0.0010	<0.001	<0.001	**0.004**	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	1.2	0.120	<0.15	0.35	<0.15	0.26	0.24	0.58	<0.15	<0.15	<0.15	0.27
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	0.006	0.005	0.002	<0.001	0.001	0.004	<0.001	0.003	0.002	<0.001
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.028	0.020	0.040	0.029	0.038	0.051	0.031	0.059	0.075	0.026
Total BOD	mg/L		1	29	2	<2.0	<2.0	3.0	5.0	3.0	<2.0	<2.0	<2.0	10	<2.0
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	0.080	0.090	0.080	0.080	0.080	0.060	0.070	0.110	0.140	0.050
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		26	320	65	28	44	65	52	67	60	39	54	67	62
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	37	15	22	11	18	15	12	16	63	17
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0110**	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	0.004	<0.002	**0.008**	0.003	0.004	**0.011**	0.002	0.002	0.002	0.003
Total Dissolved Solids	mg/L		140	795	379	270	388	410	416	420	290	318	428	550	342
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**2.500**	**0.440**	**2.900**	0.290	**0.980**	**11.000**	**0.640**	**1.700**	**0.500**	**1.200**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	1.20	0.88	1.30	1.20	1.00	1.60	0.43	0.46	1.30	0.81
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	0.001	<0.0005	0.001	<0.0005	0.001	0.004	<0.0005	0.001	<0.0005	0.001
Total Magnesium (Mg)	mg/L		11	87	26	17	28	27	30	29	20	20	27	38	21
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	0.004	0.001	0.006	0.002	0.003	0.016	0.002	0.005	0.003	0.003
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**0.07**	0.02	**0.13**	**0.03**	**0.07**	**0.28**	**0.28**	**0.08**	**0.29**	**0.04**
Total Potassium (K)	mg/L		0.8	12	4.6	1.9	2.4	8.3	5.7	7.5	4.7	3.2	3.6	4.9	3.8
Total Sodium (Na)	mg/L		4.5	62	23	23	21	25	19	22	19	24	20	30	16
Total Suspended Solids	mg/L		4	5300	40	42	9	100	6	14	180	24	50	38	21
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	<0.0027	**0.060**	<0.01	**0.061**	0.001	**0.027**	<0.0019	*<0.039*	<0.0012	0.002
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	<0.01	<0.01	0.010	<0.01	<0.01	**0.030**	<0.01	<0.01	<0.01	<0.01
Ion Percentage	%		0.03	36.92	2.21	4.2	2.4	4.1	0.2	1.8	5.5	0.8	1.4	0.6	0.0

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						07-Apr-16	1-Aug-16	21-Oct-16	12-Jan-17	6-Apr-17	13-Jul-17	12-Oct-17	23-Jan-18	4-Apr-18	2-Oct-18
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	110	47	60	86	110	55	110	110	120	77
Conductivity	umho/cm		223	1100	591	540	710	800	470	670	580	800	680	670	680
Dissolved Chloride (Cl)	mg/L		7	93	30	22	27	26	21	23	17	27	47	33	21
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		27	420	142	130	260	320	100	190	190	270	130	100	250
Nitrate (N)	mg/L		0.005	3.65	0.32	1.03	0.03	<0.10	0.86	0.95	<0.10	<0.10	1.35	0.68	0.89
Nitrite (N)	mg/L		0.01	0.34	0.0150	0.028	0.340	<0.010	0.054	0.046	<0.010	<0.010	0.030	0.017	0.050
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	7.7	7.8	7.9	7.8	7.9	8.6	8.0	7.8	8.1	8.1
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	<0.0010	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0010	0.0023	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	1.2	0.120	0.18	<0.15	<0.15	0.54	0.22	<0.15	<0.050	0.44	0.27	0.11
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	0.002	0.002	0.002	0.003	0.002	0.004	0.003	<0.001	0.002	0.001
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.047	0.040	0.063	0.050	0.045	0.029	0.030	0.029	0.042	0.019
Total BOD	mg/L		1	29	2	<2.0	<2.0	3.0	4.0	3.0	<2.0	<2.0	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	0.060	0.100	0.130	0.040	0.090	0.080	0.170	0.070	0.080	0.140
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		26	320	65	70	72	76	53	83	54	68	67	79	70
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	24	17	21	22	13	15	19	23	13	11
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	0.0080	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	**0.008**	0.003	<0.002	0.005	0.005	0.002	<0.002	**0.010**	**0.007**	0.003
Total Dissolved Solids	mg/L		140	795	379	298	606	562	236	414	380	570	335	305	405
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**7.400**	**0.600**	**1.100**	**3.400**	**2.100**	**0.500**	**0.500**	**0.700**	**4.100**	**0.600**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	0.69	0.65	0.64	1.30	0.80	0.41	0.41	0.95	0.71	0.36
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	0.003	<0.0005	0.001	0.002	0.001	<0.0005	<0.0005	0.001	0.002	<0.0005
Total Magnesium (Mg)	mg/L		11	87	26	23	31	38	14	27	26	42	20	26	29
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	0.012	0.001	0.003	0.005	0.006	0.002	0.003	0.003	0.007	0.003
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**0.18**	**0.04**	**0.05**	**0.19**	**0.05**	**0.04**	**0.04**	**0.07**	**0.12**	**0.03**
Total Potassium (K)	mg/L		0.8	12	4.6	4.0	4.3	4.9	7.1	5.1	1.3	6.5	5.4	4.7	4.8
Total Sodium (Na)	mg/L		4.5	62	23	17	24	23	22	19	19	26	35	30	19
Total Suspended Solids	mg/L		4	5300	40	120	18	37	98	62	13	17	6.0	130	25
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	0.0018	<0.0005	<0.002	0.0009	0.0014	<0.061	<0.0005	0.0019	0.0017	0.002
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	0.020	<0.01	<0.01	0.020	<0.01	<0.01	<0.01	<0.01	0.020	<0.01
Ion Percentage	%		0.03	36.92	2.21	3.0	0.5	1.9	3.0	1.8	0.5	1.5	1.6	8.4	2.0

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						07-Feb-19	17-Apr-19	31-Oct-19	11-Jan-20	18-May-20	4-Jun-20	15-Nov-20	26-Nov-20	26-Mar-21	9-Apr-21
Laboratory						Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Verification	Routine	Verification	Routine	Verification
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	120	95	86	130	95	48	60	63	100	73
Conductivity	umho/cm		223	1100	591	530	600	740	865	910	880	1100	1100	870	980
Dissolved Chloride (Cl)	mg/L		7	93	30	32	24	37	60	81	86	37	36	62	89
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		27	420	142	82	150	210	270	230	260	420	400	250	280
Nitrate (N)	mg/L		0.005	3.65	0.32	0.54	0.57	1.92	0.77	<0.10	<0.10	0.33	0.61	0.79	0.65
Nitrite (N)	mg/L		0.01	0.34	0.0150	0.056	0.020	0.136	0.024	<0.010	<0.010	<0.010	0.024	0.025	0.031
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	7.7	8.1	7.9	7.9	8.1	**9.5**	7.7	7.9	8.0	7.9
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	1.2	0.120	1.2	0.2	0.2	0.3	<0.050	<0.050	0.051	<0.050	0.12	<0.050
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	<0.001	0.001	0.001	0.002	0.001	0.003	<0.001	<0.001	0.003	<0.001
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.024	0.030	0.050	0.049	0.016	0.022	0.029	0.028	0.053	0.027
Total BOD	mg/L		1	29	2	29	<2	<2	2	<2	<2	<2	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	0.08	0.09	0.16	0.17	**0.24**	**0.43**	**0.22**	**0.22**	**0.21**	**0.33**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		26	320	65	54	59	72	93	49	51	110	110	91	69
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	55.0	8.7	16.0	11.0	30	32	12	13	10	19
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.011**	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	**0.006**	0.003	0.003	**0.006**	0.002	<0.002	<0.002	<0.002	**0.010**	0.003
Total Dissolved Solids	mg/L		140	795	379	360	350	440	590	620	545	765	750	500	615
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**0.700**	**0.700**	**0.900**	**3.600**	**0.500**	**0.400**	0.2	0.1	**9.7**	**0.5**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	1.9	0.8	0.7	0.7	0.63	0.77	0.46	0.36	0.41	0.59
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	0.0005	0.0007	<0.0005	0.002	<0.0005	<0.0005	<0.0005	<0.0005	0.0041	<0.0005
Total Magnesium (Mg)	mg/L		11	87	26	18	26	25	41	39	39	53	52	37	36
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	0.005	0.004	0.005	0.009	0.005	0.005	0.003	0.003	0.018	0.006
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**0.05**	**0.04**	**0.04**	**0.10**	**0.03**	**0.04**	0.018	**0.02**	**0.19**	**0.04**
Total Potassium (K)	mg/L		0.8	12	4.6	5.6	3.8	6.1	6.7	4.6	4.6	6.8	7.3	7	5.4
Total Sodium (Na)	mg/L		4.5	62	23	23	21	25	39	52	60	34	35	45	56
Total Suspended Solids	mg/L		4	5300	40	17	23	24	83	16	13	7	5	290	13
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	0.007	0.130	0.001	0.003	<0.0068	<0.058	0.0014	<0.00061	0.0012	<0.0017
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	**0.03**	<0.01
Ion Percentage	%		0.03	36.92	2.21	1.5	1.6	1.0	0.2	3.0	1.1	1.0	1.8	2.0	2.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						26-Jun-21	9-Jul-21	30-Jul-21	4-Oct-21	15-Oct-21	17-Feb-22	4-May-22	16-May-22	20-Jul-22	2-Aug-22
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Verification	Routine	Routine	Verification	Routine	Routine	Verification	Routine	Verification
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	43	47	46	65	53	81	99	100	53	59
Conductivity	umho/cm		223	1100	591	1096	1000	870	710	890	570	1000	952	1000	1000
Dissolved Chloride (Cl)	mg/L		7	93	30	85	48	23	24	28	34	84	70	71	70
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		27	420	142	410	360	390	280	310	140	280	330	330	330
Nitrate (N)	mg/L		0.005	3.65	0.32	<0.010	<0.10	0.93	1.03	0.72	0.55	0.12	<0.10	<0.10	<0.10
Nitrite (N)	mg/L		0.01	0.34	0.0150	<0.10	<0.010	0.060	0.017	0.027	0.035	<0.010	<0.010	<0.010	<0.010
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	8.1	7.8	7.8	8.0	7.6	7.9	8.1	7.9	8.0	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.0011**	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	1.2	0.120	<0.15	<0.15	<0.15	<0.15	<0.15	1.04	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	0.002	0.002	0.002	0.001	0.002	0.003	<0.001	0.001	0.002	0.003
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.043	0.034	0.038	0.026	0.044	0.043	0.032	0.033	0.028	0.025
Total BOD	mg/L		1	29	2	<2	<2	<2	<2	<2	2	<2	<2	<2	6
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	**0.31**	0.20	0.18	**0.26**	**0.30**	0.09	**0.39**	**0.50**	**0.40**	**0.39**
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		26	320	65	100	92	100	80	94	69	79	90	80	94
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	23	17	10	14	15	19	15	25	25	25
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	<0.005	<0.005	<0.005	<0.005	0.005	**0.013**	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	0.002	<0.002	0.006	0.004	0.004	**0.015**	0.004	0.004	<0.002	<0.002
Total Dissolved Solids	mg/L		140	795	379	795	700	590	500	595	280	465	720	725	630
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**0.5**	<0.1	**3.7**	**1.3**	**3.1**	**12**	0.3	**0.4**	<0.1	<0.1
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	<0.7	<0.7	<0.7	<0.7	<0.7	1.9	<0.7	<0.7	<0.7	<0.7
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	<0.0005	<0.0005	0.0016	0.001	0.0014	0.0049	<0.0005	<0.0005	<0.0005	<0.0005
Total Magnesium (Mg)	mg/L		11	87	26	51	46	44	30	45	27	43	48	51	49
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	0.004	0.002	0.007	0.004	0.007	0.021	0.005	0.005	0.003	0.003
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**0.04**	**0.04**	**0.10**	**0.05**	0.015	**0.20**	**0.029**	**0.052**	0.016	**0.028**
Total Potassium (K)	mg/L		0.8	12	4.6	4.7	4.8	6.6	6	7.5	7.2	5.4	6	2.5	2
Total Sodium (Na)	mg/L		4.5	62	23	61	45	26	22	28	25	60	59	56	56
Total Suspended Solids	mg/L		4	5300	40	18	4	200	42	100	380	12	23	7	4
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	<0.0074	<0.0068	<0.0017	<0.054	<0.016	0.0058	<0.0078	<0.0076	<0.013	<0.085
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	<0.01	<0.01	0.01	<0.01	<0.01	**0.04**	<0.01	<0.01	<0.01	<0.01
Ion Percentage	%		0.03	36.92	2.21	0.2	1.5	0.4	1.0	4.0	5.9	0.03	0.6	1.7	2.6

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP2									
Date						**18-Oct-22**	**13-Jan-22**								
Laboratory						**Bureau Veritas**	**Bureau Veritas**								
Routine/Verification Event						**Routine**	**Verification**								
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	190	82	140	120								
Conductivity	umho/cm		223	1100	591	740	980								
Dissolved Chloride (Cl)	mg/L		7	93	30	34	56								
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010								
Dissolved Sulphate (SO_4)	mg/L		27	420	142	210	320								
Nitrate (N)	mg/L		0.005	3.65	0.32	<0.10	3.65								
Nitrite (N)	mg/L		0.01	0.34	0.0150	0.012	0.052								
pH	(pH units)	6.5-8.5	7.0	9.5	7.9	8.1	8.0								
Phenols-4AAP	mg/L	0.001	0.0005	0.0043	0.0007	<0.0010	<0.0010								
Total Ammonia-N	mg/L		0.025	1.2	0.120	0.84	<0.15								
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02600	0.00173	0.005	0.002								
Total Barium (Ba)	mg/L		0.008	0.36	0.040	0.14	0.049								
Total BOD	mg/L		1	29	2	2	<2								
Total Boron (B)	mg/L	0.200	0.0300	0.500	0.1158	0.18	**0.28**								
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00005	<0.0001	<0.0001								
Total Calcium (Ca)	mg/L		26	320	65	99	120								
Total Chemical Oxygen Demand (COD)	mg/L		9	99	19	11	20								
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.1000	0.0039	0.016	<0.005								
Total Copper (Cu)	mg/L	0.005	0.001	0.086	0.0042	**0.013**	**0.008**								
Total Dissolved Solids	mg/L		140	795	379	375	620								
Total Iron (Fe)	mg/L	0.300	0.050	110	1.63	**15**	**3.3**								
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	6.3	0.87575	1.2	<0.7								
Total Lead (Pb)	mg/L	0.005	0.0003	0.047	0.001	**0.0063**	0.0018								
Total Magnesium (Mg)	mg/L		11	87	26	43	38								
Total Nickel (Ni)	mg/L	0.025	0.001	0.140	0.0055	0.025	0.008								
Total Phosphorus	mg/L	0.02*	0.02	2.00	0.08	**0.27**	**0.081**								
Total Potassium (K)	mg/L		0.8	12	4.6	8.4	6.6								
Total Sodium (Na)	mg/L		4.5	62	23	30	44								
Total Suspended Solids	mg/L		4	5300	40	440	160								
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.13	0.005	**0.035**	<0.0057								
Total Zinc (Zn)	mg/L	0.020	0.0050	0.240	0.0093	**0.04**	0.01								
Ion Percentage	%		0.03	36.92	2.21	5.3	1.2								

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP3									
Date						04-Nov-08	12-Feb-09	08-Mar-09	06-Apr-09	26-Apr-09	07-May-09	24-Oct-09	25-Jan-10	08-Apr-10	16-Jul-10
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	160	96	61	48	54	83	94	97	117	101	90	43
Conductivity	umho/cm		137	900	416	389	137	144	233	206	209	396	338	364	221
Dissolved Chloride (Cl)	mg/L		2	71	22	11	6	5	6	2	2	7	12	41	22
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0002	*<0.0015*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Sulphate (SO_4)	mg/L		7	340	51	106	13	16	27	24	25	67	48	36	27
Nitrate (N)	mg/L		0.015	2.8	0.13	2.8	1.4	1.2	1.6	1.5	1.0	1.8	1.1	0.4	<0.1
Nitrite (N)	mg/L		0.005	0.05	0.0092	0.02	0.02	0.02	0.02	0.04	0.05	0.03	0.03	0.04	0.02
pH	(pH units)	6.5-8.5	6.8	9.9	8.1	7.9	7.9	7.0	7.4	6.8	7.7	7.5	8.1	8.0	**9.7**
Phenols-4AAP	mg/L	0.001	0.0005	0.0036	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Ammonia-N	mg/L		0.025	0.6	0.090	<0.15	0.37	<0.15	<0.15	0.19	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02100	0.00178	0.001	0.021	0.005	0.006	0.011	<0.001	0.001	<0.001	0.002	0.003
Total Barium (Ba)	mg/L		0.0025	0.26	0.026	0.037	0.260	0.073	0.092	0.15	0.015	0.035	0.018	0.042	0.018
Total BOD	mg/L		1	8	1	<2	<2	<2	2	<2	<2	8	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.0100	0.220	0.0351	0.02	0.05	<0.02	0.03	0.04	<0.02	0.02	<0.02	0.02	0.04
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00006	<0.0001	**0.0003**	<0.0001	0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		17	90	46	45	63	23	42	45	31	50	51	46	19
Total Chemical Oxygen Demand (COD)	mg/L		2	50	21	25	50	18	35	39	14	36	33	19	39
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0760	0.0033	<0.005	**0.076**	**0.015**	**0.024**	**0.042**	<0.005	<0.005	<0.005	0.008	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.051	0.0022	0.004	**0.051**	**0.012**	**0.016**	**0.028**	0.002	0.003	0.003	**0.007**	0.002
Total Dissolved Solids	mg/L		30	695	249	250	87	94	155	118	30	255	220	250	140
Total Iron (Fe)	mg/L	0.300	0.050	75	0.90	**3.0**	**75.0**	**16.0**	**24.0**	**39.0**	**0.6**	**0.7**	**1.1**	**7.5**	**1.8**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	4	0.81	1.5	4.0	1.6	2.4	2.4	0.8	2.0	1.1	1.4	1.2
Total Lead (Pb)	mg/L	0.005	0.0003	0.028	0.001	0.001	**0.028**	**0.006**	**0.008**	**0.014**	<0.0005	<0.0005	0.001	0.003	0.001
Total Magnesium (Mg)	mg/L		6.2	54	16	14.0	24.0	6.7	13.0	15.0	6.2	16.0	14.0	13.0	9.2
Total Nickel (Ni)	mg/L	0.025	0.0005	0.096	0.0025	0.004	**0.096**	0.021	**0.030**	**0.052**	0.001	0.002	0.002	0.010	0.003
Total Phosphorus	mg/L	0.02*	0.01	0.99	0.06	**0.18**	**0.99**	**0.17**	**0.42**	*<0.15*	**0.04**	**0.10**	*<0.06*	**0.15**	*<0.15*
Total Potassium (K)	mg/L		0.3	12	3.7	3.6	9.3	3.8	4.9	6.7	1.9	2.5	2.4	3.6	1.3
Total Sodium (Na)	mg/L		1.4	45	15	5.3	2.2	1.4	2.3	2.0	1.9	5.7	7.3	21.0	14.0
Total Suspended Solids	mg/L		2	720	19	57	720	140	560	410	30	23	13	150	37
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.05	0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0050	0.170	0.0073	0.010	**0.170**	**0.040**	**0.060**	**0.090**	<0.01	<0.01	<0.01	0.020	<0.01
Ion Percentage	%		0.07	31.86	1.96	1.4	31.9	8.1	12.2	14.4	0.7	4.3	7.9	6.6	5.6

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP3									
Date						06-Nov-10	28-Feb-11	20-Apr-11	29-Jul-11	20-Oct-11	09-Nov-11	13-Mar-12	27-Mar-12	21-Dec-12	13-Jan-13
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	160	96	129	69	115	66	136	136	120	120	140	78
Conductivity	umho/cm		137	900	416	454	236	380	211	372	362	350	360	500	280
Dissolved Chloride (Cl)	mg/L		2	71	22	33	13	23	21	21	18	14	14	22	11
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		7	340	51	44	26	40	9	21	23	47	40	78	40
Nitrate (N)	mg/L		0.015	2.8	0.13	0.30	0.40	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	0.45	0.33
Nitrite (N)	mg/L		0.005	0.05	0.0092	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010
pH	(pH units)	6.5-8.5	6.8	9.9	8.1	7.9	7.7	8.1	**9.5**	8.1	8.3	8.2	8.2	7.8	7.7
Phenols-4AAP	mg/L	0.001	0.0005	0.0036	0.0007	<0.001	<0.001	<0.001	<0.001	**0.003**	<0.001	**0.0020**	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	0.6	0.090	0.18	0.17	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02100	0.00178	0.002	<0.001	<0.001	0.005	0.002	0.001	<0.001	0.002	0.001	<0.001
Total Barium (Ba)	mg/L		0.0025	0.26	0.026	0.044	0.018	0.023	<0.005	0.017	0.005	0.009	0.007	0.032	0.019
Total BOD	mg/L		1	8	1	4.0	<2	<2	3.0	2.0	<2	<2.0	3.0	3.0	<2.0
Total Boron (B)	mg/L	0.200	0.0100	0.220	0.0351	0.03	<0.02	<0.02	0.02	0.03	0.05	<0.02	0.03	0.03	<0.02
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		17	90	46	55	31	55	24	50	50	49	49	65	37
Total Chemical Oxygen Demand (COD)	mg/L		2	50	21	43	15	17	39	31	27	26	30	25	19
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0760	0.0033	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.051	0.0022	0.005	**0.007**	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.002	0.004
Total Dissolved Solids	mg/L		30	695	249	282	138	234	186	274	216	240	256	296	178
Total Iron (Fe)	mg/L	0.300	0.050	75	0.90	**5.80**	**1.20**	**1.10**	0.20	**0.80**	0.30	**1.00**	**0.72**	**0.48**	**1.60**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	4	0.81	2.3	0.8	0.9	1.5	1.0	0.8	0.83	0.9	1.1	1.0
Total Lead (Pb)	mg/L	0.005	0.0003	0.028	0.001	0.002	<0.0005	0.001	<0.0005	0.001	<0.0005	0.001	<0.0005	<0.0005	0.001
Total Magnesium (Mg)	mg/L		6.2	54	16	18.0	6.7	12.0	8.1	12.0	11.0	11.0	12.0	17.0	9.3
Total Nickel (Ni)	mg/L	0.025	0.0005	0.096	0.0025	0.008	0.002	0.002	<0.001	0.002	0.001	0.002	0.001	0.002	0.003
Total Phosphorus	mg/L	0.02*	0.01	0.99	0.06	**0.22**	**0.08**	**0.06**	**0.18**	**0.11**	**0.03**	**0.05**	**0.05**	**0.05**	**0.08**
Total Potassium (K)	mg/L		0.3	12	3.7	3.5	2.9	2.3	0.3	4.3	4.2	3.2	3.4	4.6	2.9
Total Sodium (Na)	mg/L		1.4	45	15	19.0	7.9	12.0	12.0	14.0	12.0	8.8	8.5	16.0	7.5
Total Suspended Solids	mg/L		2	720	19	150	3	32	14	9	4	15	11	11	19
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.05	0.005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0050	0.170	0.0073	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Ion Percentage	%		0.07	31.86	1.96	6.8	2.5	3.5	3.5	3.0	2.2	0.3	1.8	2.0	2.8

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP3									
Date						10-Apr-13	05-Jul-13	07-Oct-13	11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	15-Oct-14	4-Nov-14	4-Jan-15
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event									Routine	Routine	Verification	Routine	Routine	Verification	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	160	96	110	55	130	110	82	85	92	160	150	160
Conductivity	umho/cm		137	900	416	370	350	360	330	280	370	350	440	450	520
Dissolved Chloride (Cl)	mg/L		2	71	22	29	23	21	22	24	38	40	23	24	26
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		7	340	51	29	81	19	24	24	36	20	31	39	69
Nitrate (N)	mg/L		0.015	2.8	0.13	<0.10	<0.10	<0.10	0.68	<0.10	<0.10	<0.10	<0.10	<0.10	1.17
Nitrite (N)	mg/L		0.005	0.05	0.0092	0.027	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	<0.010	<0.010	0.028
pH	(pH units)	6.5-8.5	6.8	9.9	8.1	7.9	**8.8**	8.1	8.1	8.2	7.8	8.1	8.1	8.1	**8.6**
Phenols-4AAP	mg/L	0.001	0.0005	0.0036	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	**0.003**	<0.0010	**0.0011**	<0.001	<0.001	**0.003**
Total Ammonia-N	mg/L		0.025	0.6	0.090	<0.15	<0.15	<0.15	0.17	<0.15	<0.15	<0.15	0.17	0.35	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02100	0.00178	0.001	0.004	0.002	<0.001	0.001	0.002	0.007	0.002	0.001	0.001
Total Barium (Ba)	mg/L		0.0025	0.26	0.026	0.029	0.018	0.015	0.018	0.009	0.040	0.026	0.030	0.033	0.039
Total BOD	mg/L		1	8	1	<2.0	<2.0	3.0	4.0	2.0	<2.0	<2.0	3.0	<2.0	3.0
Total Boron (B)	mg/L	0.200	0.0100	0.220	0.0351	0.020	0.070	0.030	0.020	<0.02	<0.02	0.020	0.040	0.050	0.040
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.001
Total Calcium (Ca)	mg/L		17	90	46	45	34	42	45	34	39	30	60	53	71
Total Chemical Oxygen Demand (COD)	mg/L		2	50	21	16	11	24	27	21	34	36	21	20	27
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0760	0.0033	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.051	0.0022	0.003	0.003	<0.002	0.002	<0.002	0.003	<0.002	<0.002	<0.002	0.004
Total Dissolved Solids	mg/L		30	695	249	244	196	198	124	210	250	228	252	268	326
Total Iron (Fe)	mg/L	0.300	0.050	75	0.90	**1.700**	**1.100**	0.200	**0.310**	**0.850**	**2.200**	**1.400**	**0.380**	**0.390**	**0.750**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	4	0.81	1.10	0.98	1.20	1.30	1.00	1.20	1.10	0.91	0.94	1.10
Total Lead (Pb)	mg/L	0.005	0.0003	0.028	0.001	0.001	0.001	<0.0005	<0.0005	<0.0005	0.001	0.001	<0.0005	<0.0005	0.001
Total Magnesium (Mg)	mg/L		6.2	54	16	9.9	16.0	12.0	12.0	7.9	12.0	14.0	15.0	13.0	17.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.096	0.0025	0.002	0.002	<0.001	0.001	0.002	0.004	0.003	0.002	0.002	0.004
Total Phosphorus	mg/L	0.02*	0.01	0.99	0.06	**0.05**	**0.07**	**0.04**	**0.11**	**0.05**	**0.09**	**0.07**	**0.04**	**0.03**	**0.06**
Total Potassium (K)	mg/L		0.3	12	3.7	3.7	0.8	4.9	7.1	3.6	4.4	2.3	8.0	5.9	7.6
Total Sodium (Na)	mg/L		1.4	45	15	16	20	13	13	14	22	25	16	15	17
Total Suspended Solids	mg/L		2	720	19	20	24	6	7	20	44	34	7	7	13
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.05	0.005	<0.02	*<0.022*	<0.006	0.0029	<0.0045	<0.0005	<0.0019	0.011	**0.021**	<0.0057
Total Zinc (Zn)	mg/L	0.020	0.0050	0.170	0.0073	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ion Percentage	%		0.07	31.86	1.96	1.6	3.2	1.4	8.0	5.0	5.7	5.7	7.1	3.7	5.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP3									
Date						10-Apr-15	20-Aug-15	25-Oct-15	25-Feb-16	7-Apr-16	1-Aug-16	21-Oct-16	12-Jan-17	6-Apr-17	13-Jul-17
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	160	96	120	82	160	120	130	100	110	160	130	74
Conductivity	umho/cm		137	900	416	330	240	450	530	380	350	340	510	420	220
Dissolved Chloride (Cl)	mg/L		2	71	22	26	23	29	41	21	38	35	36	22	17
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		7	340	51	31	7	27	61	40	13	12	35	42	14
Nitrate (N)	mg/L		0.015	2.8	0.13	0.29	<0.10	<0.10	1.21	0.59	0.015	<0.10	0.37	0.33	<0.10
Nitrite (N)	mg/L		0.005	0.05	0.0092	0.016	<0.010	0.011	0.020	0.015	<0.10	<0.010	0.036	0.022	<0.010
pH	(pH units)	6.5-8.5	6.8	9.9	8.1	7.1	8.1	8.0	8.1	7.9	8.1	8.6	7.9	8.2	8.7
Phenols-4AAP	mg/L	0.001	0.0005	0.0036	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Total Ammonia-N	mg/L		0.025	0.6	0.090	<0.15	<0.15	0.60	<0.15	0.27	0.48	<0.15	0.31	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02100	0.00178	0.001	0.004	0.004	<0.001	0.002	0.009	0.005	0.002	0.001	0.007
Total Barium (Ba)	mg/L		0.0025	0.26	0.026	0.026	0.008	0.045	0.029	0.035	0.023	0.017	0.048	0.027	0.007
Total BOD	mg/L		1	8	1	<2.0	<2.0	5.0	<2.0	<2.0	2.0	5.0	3.0	<2.0	3.0
Total Boron (B)	mg/L	0.200	0.0100	0.220	0.0351	0.020	0.020	0.060	0.020	0.020	0.030	0.050	0.040	0.020	<0.02
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		17	90	46	43	18	49	56	51	26	29	44	53	17
Total Chemical Oxygen Demand (COD)	mg/L		2	50	21	20	23	31	23	24	46	40	32	19	23
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0760	0.0033	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.051	0.0022	0.003	<0.002	0.003	0.002	0.005	<0.002	0.003	0.005	0.003	<0.002
Total Dissolved Solids	mg/L		30	695	249	214	146	244	292	224	240	216	242	226	132
Total Iron (Fe)	mg/L	0.300	0.050	75	0.90	**2.200**	0.300	**1.900**	**0.800**	**4.500**	**1.200**	**3.300**	**3.700**	**1.500**	**0.400**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	4	0.81	0.71	0.68	1.50	0.67	0.70	1.70	0.81	0.98	<0.7	0.66
Total Lead (Pb)	mg/L	0.005	0.0003	0.028	0.001	0.001	<0.005	0.001	<0.0005	0.002	0.001	0.002	0.002	0.001	<0.0005
Total Magnesium (Mg)	mg/L		6.2	54	16	11.0	9.5	15.0	14.0	12.0	12.0	13.0	12.0	12.0	9.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.096	0.0025	0.004	0.001	0.004	0.002	0.007	<0.001	0.006	0.006	0.003	0.001
Total Phosphorus	mg/L	0.02*	0.01	0.99	0.06	**0.08**	**0.04**	**0.10**	**0.06**	**0.13**	**0.11**	**0.10**	**0.16**	**0.05**	**0.06**
Total Potassium (K)	mg/L		0.3	12	3.7	4.2	3.3	7.2	4.8	3.7	4.3	3.4	12.0	4.0	1.0
Total Sodium (Na)	mg/L		1.4	45	15	15.0	14.0	18.0	26.0	14.0	26.0	24.0	4.1	15.0	15.0
Total Suspended Solids	mg/L		2	720	19	32	3	49	12	52	22	88	39	40	10
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.05	0.005	<0.0048	*<0.042*	0.02	<0.0015	0.0026	0.0031	<0.0005	0.001	<0.0012	<0.012
Total Zinc (Zn)	mg/L	0.020	0.0050	0.170	0.0073	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01
Ion Percentage	%		0.07	31.86	1.96	3.6	3.0	0.4	1.9	1.4	1.4	1.6	8.3	8.3	0.1

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP3									
Date						12-Oct-17	23-Jan-18	04-Apr-18	08-Aug-18	2-Oct-18	24-Jan-19	17-Apr-19	27-Oct-19	3-Dec-19	11-Jan-20
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Verification	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	160	96	160	130	140	84	110	130	97	80	110	93
Conductivity	umho/cm		137	900	416	420	420	470	300	460	690	540	830	880	881
Dissolved Chloride (Cl)	mg/L		2	71	22	26	31	36	37	16	42	49	19	25	26
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		7	340	51	24.0	35.0	41.0	7.1	98.0	140.0	70.0	310.0	310.0	320.0
Nitrate (N)	mg/L		0.015	2.8	0.13	<0.10	0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	0.18
Nitrite (N)	mg/L		0.005	0.05	0.0092	0.017	0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
pH	(pH units)	6.5-8.5	6.8	9.9	8.1	8.1	7.9	8.1	8.4	8.2	8.1	8.5	8.2	8.1	8.4
Phenols-4AAP	mg/L	0.001	0.0005	0.0036	0.0007	<0.0010	0.0036	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	0.6	0.090	0.280	0.290	0.087	<0.050	<0.050	0.057	0.052	**0.280**	<0.050	<0.050
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02100	0.00178	0.003	0.002	0.002	0.009	0.002	<0.001	<0.001	0.001	<0.001	<0.001
Total Barium (Ba)	mg/L		0.0025	0.26	0.026	0.042	0.043	0.046	0.010	0.024	0.025	0.022	0.035	0.031	0.032
Total BOD	mg/L		1	8	1	<2.0	4.0	<2	<2	<2	<2	<2	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.0100	0.220	0.0351	0.050	0.030	0.030	0.030	0.070	0.030	0.030	0.100	0.090	0.090
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		17	90	46	43	51	59	19	44	59	46	81	90	87
Total Chemical Oxygen Demand (COD)	mg/L		2	50	21	30.0	30.0	13.0	40.0	7.7	14.0	15.0	8.5	<4.0	<4.0
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0760	0.0033	<0.005	0.0070	0.0060	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.051	0.0022	<0.002	**0.013**	**0.006**	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	0.002
Total Dissolved Solids	mg/L		30	695	249	290	195	165	180	230	375	305	545	640	695
Total Iron (Fe)	mg/L	0.300	0.050	75	0.90	**0.400**	**5.900**	**4.600**	0.100	0.100	0.100	0.300	0.200	0.200	**0.900**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	4	0.81	1.00	0.68	0.31	1.10	0.27	0.37	0.35	0.29	0.44	0.31
Total Lead (Pb)	mg/L	0.005	0.0003	0.028	0.001	<0.0005	0.005	0.0021	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Total Magnesium (Mg)	mg/L		6.2	54	16	14	12	14	10	18	24	16	41	48	54
Total Nickel (Ni)	mg/L	0.025	0.0005	0.096	0.0025	0.002	0.010	0.006	<0.001	<0.001	0.001	0.001	0.001	0.002	0.003
Total Phosphorus	mg/L	0.02*	0.01	0.99	0.06	**0.07**	**0.26**	**0.10**	**0.04**	0.02	0.01	0.02	0.02	0.01	**0.03**
Total Potassium (K)	mg/L		0.3	12	3.7	5.3	6.1	5.5	3.6	3.6	4.1	2.3	4	4	4
Total Sodium (Na)	mg/L		1.4	45	15	21	21	23	25	17	30	35	25	27	30
Total Suspended Solids	mg/L		2	720	19	7	130	80	3	4	5	8	5	6	30
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.05	0.005	0.001	*0.0065*	<0.0005	<0.0005	<0.0014	<0.00061	0.015	**0.021**	<0.0034	<0.0019
Total Zinc (Zn)	mg/L	0.020	0.0050	0.170	0.0073	<0.01	**0.04**	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ion Percentage	%		0.07	31.86	1.96	0.6	2.4	3.1	0.6	1.2	1.6	2.1	0.1	0.8	2.3

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP3									
Date						18-May-20	15-Nov-20	26-Mar-21	03-Jun-21	9-Jul-21	4-Oct-21	15-Oct-21	17-Feb-22	4-May-22	2-Aug-22
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Verification	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	160	96	53	99	100	54	61	68	82	100	71	120
Conductivity	umho/cm		137	900	416	760	880	690	740	890	710	700	680	740	900
Dissolved Chloride (Cl)	mg/L		2	71	22	29	36	32	31	43	21	16	71	37	60
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		7	340	51	270	290	190	310	320	260	250	130	250	250
Nitrate (N)	mg/L		0.015	2.8	0.13	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	0.28	<0.10	<0.10
Nitrite (N)	mg/L		0.005	0.05	0.0092	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.02	<0.010	<0.010
pH	(pH units)	6.5-8.5	6.8	9.9	8.1	8.2	8.0	8.1	**9.9**	**9.1**	8.1	7.9	8.0	8.2	8.3
Phenols-4AAP	mg/L	0.001	0.0005	0.0036	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	0.6	0.090	<0.050	0.056	<0.050	<0.050	<0.15	<0.15	<0.15	0.46	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02100	0.00178	0.002	0.001	0.002	0.004	0.004	0.002	0.002	0.002	0.001	0.008
Total Barium (Ba)	mg/L		0.0025	0.26	0.026	0.016	0.054	0.04	0.028	0.03	0.02	0.03	0.041	0.021	0.041
Total BOD	mg/L		1	8	1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Boron (B)	mg/L	0.200	0.0100	0.220	0.0351	0.11	0.1	0.07	0.13	0.14	**0.22**	0.20	0.06	0.11	0.18
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00006	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		17	90	46	44	86	60	48	58	74	77	64	58	61
Total Chemical Oxygen Demand (COD)	mg/L		2	50	21	22	11	14	18	22	18	15	20	8.8	37
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0760	0.0033	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.051	0.0022	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	**0.009**	<0.002	<0.002
Total Dissolved Solids	mg/L		30	695	249	560	515	395	490	635	480	435	325	420	560
Total Iron (Fe)	mg/L	0.300	0.050	75	0.90	0.300	**0.6**	**1.9**	<0.1	<0.1	0.20	0.30	**6.6**	0.3	0.2
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	4	0.81	0.48	0.33	0.35	0.47	<0.7	<0.7	<0.7	0.9	<0.7	0.8
Total Lead (Pb)	mg/L	0.005	0.0003	0.028	0.001	<0.0005	<0.0005	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	0.0050	<0.0005	<0.0005
Total Magnesium (Mg)	mg/L		6.2	54	16	46	41	29	42	48	33	33	24	36	46
Total Nickel (Ni)	mg/L	0.025	0.0005	0.096	0.0025	0.002	0.002	0.004	0.002	0.001	0.001	0.002	0.012	0.002	0.002
Total Phosphorus	mg/L	0.02*	0.01	0.99	0.06	0.02	**0.03**	**0.06**	0.02	<0.030	0.02	0.02	**0.17**	0.02	**0.027**
Total Potassium (K)	mg/L		0.3	12	3.7	2	5.1	3.3	2.1	3.9	4.3	4.0	4.8	2.7	12
Total Sodium (Na)	mg/L		1.4	45	15	36	33	27	38	45	25	23	45	36	43
Total Suspended Solids	mg/L		2	720	19	8	19	60	11	2	3	8	95	12	10
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.05	0.005	<0.026	0.002	<0.00065	<0.055	<0.097	<0.031	<0.0068	0.003	<0.033	<0.045
Total Zinc (Zn)	mg/L	0.020	0.0050	0.170	0.0073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.03**	<0.01	<0.01
Ion Percentage	%		0.07	31.86	1.96	0.1	0.4	1.0	2.9	0.77	0.6	1.1	1.9	0.8	1.0

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP3									
Date						**18-Oct-22**									
Laboratory						**Bureau Veritas**									
Routine/Verification Event						**Routine**									
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	43	160	96	44									
Conductivity	umho/cm		137	900	416	840									
Dissolved Chloride (Cl)	mg/L		2	71	22	33									
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010									
Dissolved Sulphate (SO_4)	mg/L		7	340	51	340									
Nitrate (N)	mg/L		0.015	2.8	0.13	<0.10									
Nitrite (N)	mg/L		0.005	0.05	0.0092	<0.010									
pH	(pH units)	6.5-8.5	6.8	9.9	8.1	**8.8**									
Phenols-4AAP	mg/L	0.001	0.0005	0.0036	0.0007	<0.0010									
Total Ammonia-N	mg/L		0.025	0.6	0.090	<0.15									
Total Arsenic (As)	mg/L	0.100*	0.000500	0.02100	0.00178	0.001									
Total Barium (Ba)	mg/L		0.0025	0.26	0.026	0.023									
Total BOD	mg/L		1	8	1	<2									
Total Boron (B)	mg/L	0.200	0.0100	0.220	0.0351	0.15									
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.0005	0.00006	<0.0001									
Total Calcium (Ca)	mg/L		17	90	46	73									
Total Chemical Oxygen Demand (COD)	mg/L		2	50	21	16									
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0760	0.0033	<0.005									
Total Copper (Cu)	mg/L	0.005	0.001	0.051	0.0022	<0.002									
Total Dissolved Solids	mg/L		30	695	249	525									
Total Iron (Fe)	mg/L	0.300	0.050	75	0.90	0.1									
Total Kjeldahl Nitrogen (TKN)	mg/L		0.27	4	0.81	<0.7									
Total Lead (Pb)	mg/L	0.005	0.0003	0.028	0.001	<0.0005									
Total Magnesium (Mg)	mg/L		6.2	54	16	46									
Total Nickel (Ni)	mg/L	0.025	0.0005	0.096	0.0025	0.001									
Total Phosphorus	mg/L	0.02*	0.01	0.99	0.06	0.008									
Total Potassium (K)	mg/L		0.3	12	3.7	4.9									
Total Sodium (Na)	mg/L		1.4	45	15	33									
Total Suspended Solids	mg/L		2	720	19	2									
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.05	0.005	*<0.06*									
Total Zinc (Zn)	mg/L	0.020	0.0050	0.170	0.0073	<0.01									
Ion Percentage	%		0.07	31.86	1.96	0.1									

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP4									
Date						6-May-10	16-Jul-10	01-Dec-10	28-Feb-11	20-Apr-11	09-Aug-11	13-Oct-11	13-Mar-12	27-Mar-12	21-Dec-12
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event															
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	46	160	109	107	142	99	72	82	46	82	92	85	160
Conductivity	umho/cm		240	730	451	475	489	402	381	446	301	342	360	350	570
Dissolved Chloride (Cl)	mg/L		11	95	30	30	31	24	39	46	42	38	26	27	39
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	150	57	85	62	62	42	55	23	19	54	45	62
Nitrate (N)	mg/L		0.005	0.61	0.12	0.2	<0.1	0.2	0.4	<0.1	<0.1	<0.1	<0.10	<0.10	0.22
Nitrite (N)	mg/L		0.005	0.05	0.0078	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010
pH	(pH units)	6.5-8.5	7.0	9.7	8.1	7.9	8.0	8.0	7.8	7.9	**9.7**	8.3	8.1	8.2	8.0
Phenols-4AAP	mg/L	0.001	0.0005	0.005	0.0007	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	**0.0017**	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	1.05	0.078	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00700	0.00159	0.002	0.002	<0.001	<0.001	<0.001	0.004	0.002	<0.001	0.001	0.001
Total Barium (Ba)	mg/L		0.0025	0.086	0.033	0.031	0.030	0.033	0.020	0.028	<0.005	0.005	0.019	0.015	0.048
Total BOD	mg/L		1	10	2	<2	<2	3	<2	<2	<2	<2	<2.0	<2.0	5.0
Total Boron (B)	mg/L	0.200	0.0100	0.110	0.0411	0.040	0.060	0.030	<0.02	0.020	0.020	0.040	0.020	0.030	0.050
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		18	77	50	56	48	50	38	42	18	26	38	34	63
Total Chemical Oxygen Demand (COD)	mg/L		5	48	22	25	31	22	15	20	20	26	14	17	16
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0120	0.0031	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.015	0.0028	0.004	0.003	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	0.002
Total Dissolved Solids	mg/L		126	456	272	300	310	274	234	262	220	224	222	234	294
Total Iron (Fe)	mg/L	0.300	0.050	12	1.84	**3.000**	**2.100**	**1.400**	**0.700**	**0.700**	<0.1	0.300	**0.370**	**0.390**	**1.100**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	2.5	0.66641	0.9	1.1	0.7	0.6	0.7	0.6	0.6	0.5	0.48	1.6
Total Lead (Pb)	mg/L	0.005	0.0003	0.006	0.001	0.001	0.001	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.001
Total Magnesium (Mg)	mg/L		5	26	15	18.0	23.0	14.0	8.1	12.0	7.9	9.6	12.0	12.0	18.0
Total Nickel (Ni)	mg/L	0.025	0.0005	0.020	0.0038	0.005	0.004	0.003	0.002	0.002	<0.001	0.001	<0.001	0.001	0.003
Total Phosphorus	mg/L	0.02*	0.02	0.32	0.08	**0.13**	**0.09**	**0.06**	*<0.03*	**0.03**	**0.03**	**0.02**	0.02	0.02	**0.07**
Total Potassium (K)	mg/L		0.6	8.5	3.4	2.60	3.20	2.50	2.10	1.90	0.60	1.30	1.50	0.87	4.40
Total Sodium (Na)	mg/L		4.7	56	20	19	22	15	25	30	27	24	19	22	29
Total Suspended Solids	mg/L		2	360	42	50	60	30	3	16	2	5	9	3	32
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.25	0.003	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Zinc (Zn)	mg/L	0.020	0.0050	0.040	0.0083	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ion Percentage	%		0.09	9.80	1.64	4.3	4.5	5.1	2.1	2.1	1.4	0.4	0.3	1.9	1.8

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP4									
Date						13-Jan-13	10-Apr-13	05-Jul-13	07-Oct-13	11-Jan-14	8-Apr-14	7-Jul-14	24-Nov-14	15-Dec-14	4-Jan-15
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event										Routine	Routine	Routine	Routine	Verification	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	46	160	109	69	130	110	100	120	87	130	110	64	98
Conductivity	umho/cm		240	730	451	240	450	360	430	470	330	590	730	360	600
Dissolved Chloride (Cl)	mg/L		11	95	30	12	33	33	25	26	19	72	95	36	68
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	150	57	28	41	19	60	61	45	52	110	44	92
Nitrate (N)	mg/L		0.005	0.61	0.12	0.38	0.17	<0.10	0.44	0.61	0.45	<0.10	0.36	0.19	0.35
Nitrite (N)	mg/L		0.005	0.05	0.0078	<0.010	<0.010	<0.010	0.01	0.022	<0.010	<0.010	<0.010	0.013	0.012
pH	(pH units)	6.5-8.5	7.0	9.7	8.1	7.6	7.9	**8.9**	8.0	7.9	7.9	8.0	7.9	7.6	8.1
Phenols-4AAP	mg/L	0.001	0.0005	0.005	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.001	<0.001	**0.005**
Total Ammonia-N	mg/L		0.025	1.05	0.078	<0.15	<0.15	<0.15	<0.15	0.45	0.19	<0.15	<0.15	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00700	0.00159	<0.001	0.001	0.005	0.004	0.002	0.002	0.007	0.002	<0.001	<0.001
Total Barium (Ba)	mg/L		0.0025	0.086	0.033	0.013	0.044	0.043	0.068	0.038	0.032	0.086	0.052	0.027	0.032
Total BOD	mg/L		1	10	2	<2.0	<2.0	<2.0	5.0	6.0	4.0	10.0	<2.0	<2.0	5.0
Total Boron (B)	mg/L	0.200	0.0100	0.110	0.0411	<0.02	0.030	0.060	0.050	0.030	0.020	0.070	0.040	0.030	0.040
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		18	77	50	23	58	37	57	59	47	64	74	46	59
Total Chemical Oxygen Demand (COD)	mg/L		5	48	22	42	20	35	30	24	20	44	21	8.7	24
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0120	0.0031	<0.005	<0.005	<0.005	0.0060	<0.005	<0.005	**0.0100**	0.0050	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.015	0.0028	<0.002	0.004	0.002	0.005	0.002	0.004	**0.007**	**0.008**	0.002	0.003
Total Dissolved Solids	mg/L		126	456	272	126	276	204	258	210	248	382	456	220	378
Total Iron (Fe)	mg/L	0.300	0.050	12	1.84	**0.450**	**2.400**	**3.100**	**6.600**	**1.800**	**4.100**	**10.000**	**4.900**	**0.460**	**0.610**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	2.5	0.66641	0.72	1.40	1.50	2.00	1.60	1.50	2.50	1.10	0.58	0.87
Total Lead (Pb)	mg/L	0.005	0.0003	0.006	0.001	0.001	0.002	0.002	0.004	0.001	0.002	**0.006**	0.002	<0.0005	<0.0005
Total Magnesium (Mg)	mg/L		5	26	15	5	13	13	15	14	10	19	20	12	16
Total Nickel (Ni)	mg/L	0.025	0.0005	0.020	0.0038	0.001	0.004	0.004	0.009	0.003	0.006	0.014	0.009	0.001	0.002
Total Phosphorus	mg/L	0.02*	0.02	0.32	0.08	**0.02**	**0.10**	**0.18**	**0.13**	**0.10**	**0.11**	**0.32**	**0.13**	**0.06**	**0.07**
Total Potassium (K)	mg/L		0.6	8.5	3.4	1.8	3.5	3.8	4.3	4.7	3.0	4.5	5.7	3.7	5.9
Total Sodium (Na)	mg/L		4.7	56	20	6.5	23.0	27.0	16.0	4.7	12.0	45.0	56.0	31.0	41.0
Total Suspended Solids	mg/L		2	360	42	4	68	52	150	39	73	260	99	61	21
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.25	0.003	<0.02	<0.02	*<0.49*	<0.011	0.0055	0.0035	<0.0014	*<0.034*	<0.017	<0.0033
Total Zinc (Zn)	mg/L	0.020	0.0050	0.040	0.0083	<0.01	0.01	**0.03**	0.02	<0.01	0.01	**0.03**	**0.02**	<0.01	<0.01
Ion Percentage	%		0.09	9.80	1.64	1.8	6.6	7.5	7.8	0.1	4.1	4.6	2.5	9.8	1.7

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP4									
Date						10-Apr-15	3-Aug-15	25-Oct-15	25-Feb-16	7-Apr-16	14-Jul-16	21-Oct-16	12-Jan-17	6-Apr-17	13-Jul-17
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	46	160	109	100	130	150	93	120	120	140	110	120	130
Conductivity	umho/cm		240	730	451	490	460	540	420	430	450	460	390	440	320
Dissolved Chloride (Cl)	mg/L		11	95	30	47	39	49	20	15	28	31	26	16	15
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	150	57	62	40	42	75	74	53	45	41	69	23
Nitrate (N)	mg/L		0.005	0.61	0.12	0.33	<0.10	<0.10	0.56	0.30	<0.010	<0.10	0.33	0.17	<0.10
Nitrite (N)	mg/L		0.005	0.05	0.0078	0.034	<0.010	0.023	0.025	<0.010	<0.10	<0.010	0.018	0.025	<0.010
pH	(pH units)	6.5-8.5	7.0	9.7	8.1	7.0	7.9	8.2	8.1	7.9	8.0	8.0	7.9	8.1	7.9
Phenols-4AAP	mg/L	0.001	0.0005	0.005	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Total Ammonia-N	mg/L		0.025	1.05	0.078	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.16	<0.15	<0.15
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00700	0.00159	0.004	0.004	0.003	<0.001	0.001	0.004	0.003	0.002	0.001	0.004
Total Barium (Ba)	mg/L		0.0025	0.086	0.033	0.058	0.064	0.057	0.022	0.034	0.056	0.054	0.055	0.035	0.045
Total BOD	mg/L		1	10	2	<2.0	3.0	<2.0	<2.0	<2.0	<2.0	<2.0	4.0	<2.0	2.0
Total Boron (B)	mg/L	0.200	0.0100	0.110	0.0411	0.040	0.060	0.060	0.020	0.040	0.060	0.050	0.040	0.030	0.050
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		18	77	50	58	55	54	49	60	50	54	45	59	41
Total Chemical Oxygen Demand (COD)	mg/L		5	48	22	20	28	29	13	21	48	23	29	20	30
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0120	0.0031	**0.0120**	0.0070	0.0050	<0.005	<0.005	<0.005	<0.005	**0.0090**	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.015	0.0028	**0.011**	0.005	0.004	0.003	0.005	0.004	0.003	**0.007**	0.005	0.003
Total Dissolved Solids	mg/L		126	456	272	292	332	256	222	264	328	272	210	272	188
Total Iron (Fe)	mg/L	0.300	0.050	12	1.84	**11.000**	**6.200**	**4.100**	**1.600**	**3.700**	**4.500**	**3.700**	**4.700**	**2.900**	**3.400**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	2.5	0.66641	1.40	0.50	0.77	0.33	0.44	<0.7	0.53	0.67	<0.7	0.48
Total Lead (Pb)	mg/L	0.005	0.0003	0.006	0.001	0.005	0.003	0.003	0.001	0.002	0.003	0.003	0.003	0.002	0.002
Total Magnesium (Mg)	mg/L		5	26	15	16	14	17	13	16	17	16	11	16	13
Total Nickel (Ni)	mg/L	0.025	0.0005	0.020	0.0038	0.016	0.010	0.008	0.003	0.006	0.008	0.006	0.007	0.005	0.006
Total Phosphorus	mg/L	0.02*	0.02	0.32	0.08	**0.24**	**0.20**	**0.15**	**0.05**	**0.10**	**0.20**	**0.13**	**0.18**	*<0.060*	**0.16**
Total Potassium (K)	mg/L		0.6	8.5	3.4	4.8	3.8	4.1	3.1	3.3	3.5	3.2	8.5	3.9	3.4
Total Sodium (Na)	mg/L		4.7	56	20	32	26	35	13	12	22	21	13	13	13
Total Suspended Solids	mg/L		2	360	42	180	180	110	31	67	140	110	120	73	100
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.25	0.003	<0.0057	<0.011	<0.0033	<0.0024	<0.0012	<0.014	<0.0025	<0.0005	<0.0005	<0.015
Total Zinc (Zn)	mg/L	0.020	0.0050	0.040	0.0083	**0.040**	0.020	<0.01	<0.01	0.010	0.010	<0.01	0.020	0.010	0.010
Ion Percentage	%		0.09	9.80	1.64	5.5	3.2	2.2	1.1	3.1	3.7	2.2	1.0	1.0	2.0

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP4									
Date						12-Oct-17	23-Jan-18	04-Apr-18	08-Aug-18	31-Oct-18	24-Jan-19	19-Apr-19	2-Oct-19	11-Jan-20	18-May-20
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	46	160	109	160	87	120	130	150	97	150	160	130	150
Conductivity	umho/cm		240	730	451	430	310	490	380	450	360	590	440	583	700
Dissolved Chloride (Cl)	mg/L		11	95	30	23	11	20	20	17	17	25	21	27	34
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved Sulphate (SO_4)	mg/L		19	150	57	34	46	96	37	54	50	110	39	140	150
Nitrate (N)	mg/L		0.005	0.61	0.12	<0.10	0.46	0.24	<0.10	<0.10	0.47	0.33	<0.10	<0.10	<0.10
Nitrite (N)	mg/L		0.005	0.05	0.0078	<0.010	0.015	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	<0.010
pH	(pH units)	6.5-8.5	7.0	9.7	8.1	8.2	7.8	8.0	8.0	8.0	7.8	8.2	8.3	8.3	8.2
Phenols-4AAP	mg/L	0.001	0.0005	0.005	0.0007	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Ammonia-N	mg/L		0.025	1.05	0.078	<0.050	0.260	0.062	<0.050	0.093	0.750	<0.050	0.051	<0.050	<0.050
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00700	0.00159	0.002	<0.001	0.003	0.006	0.002	0.001	<0.001	0.004	<0.001	0.001
Total Barium (Ba)	mg/L		0.0025	0.086	0.033	0.053	0.025	0.058	0.063	0.045	0.027	0.034	0.045	0.042	0.047
Total BOD	mg/L		1	10	2	<2.0	<2	<2	<2	<2	5	8	4	<2	3
Total Boron (B)	mg/L	0.200	0.0100	0.110	0.0411	0.070	0.020	0.040	0.070	0.050	0.030	0.050	0.110	0.040	0.050
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Calcium (Ca)	mg/L		18	77	50	51	37	73	46	56	43	70	46	74	77
Total Chemical Oxygen Demand (COD)	mg/L		5	48	22	24	20	14	28	21	28	22	29	15	30
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0120	0.0031	*<0.005*	<0.005	**0.0090**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Copper (Cu)	mg/L	0.005	0.001	0.015	0.0028	*<0.002*	**0.006**	**0.013**	0.003	0.003	**0.007**	0.004	<0.002	0.004	0.003
Total Dissolved Solids	mg/L		126	456	272	270	170	190	265	415	215	370	280	395	450
Total Iron (Fe)	mg/L	0.300	0.050	12	1.84	**1.800**	**2.300**	**8.800**	**3.900**	**2.000**	**2.400**	**0.900**	**2.300**	**1.300**	**2.200**
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	2.5	0.66641	0.52	0.55	0.35	0.64	0.32	1.30	0.55	0.68	0.32	0.43
Total Lead (Pb)	mg/L	0.005	0.0003	0.006	0.001	0.001	0.002	**0.005**	0.003	0.002	0.002	0.001	0.003	0.001	0.0012
Total Magnesium (Mg)	mg/L		5	26	15	16	10	21	16	13	12	22	18	24	25
Total Nickel (Ni)	mg/L	0.025	0.0005	0.020	0.0038	0.004	0.004	0.012	0.006	0.004	0.005	0.003	0.004	0.003	0.004
Total Phosphorus	mg/L	0.02*	0.02	0.32	0.08	**0.09**	**0.10**	**0.21**	**0.19**	**0.08**	**0.11**	**0.05**	**0.12**	**0.04**	**0.09**
Total Potassium (K)	mg/L		0.6	8.5	3.4	3.9	3.4	5.2	3.8	4.0	7.2	4.7	3.0	4.8	3.7
Total Sodium (Na)	mg/L		4.7	56	20	17.0	7.2	14.0	16.0	10.0	9.1	16.0	18.0	17	23
Total Suspended Solids	mg/L		2	360	42	49	36	230	97	33	41	26	61	35	69
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.25	0.003	<0.0005	0.01	<0.0005	<0.0005	<0.00061	<0.00061	<0.0033	0.01	<0.0015	<0.0043
Total Zinc (Zn)	mg/L	0.020	0.0050	0.040	0.0083	*<0.01*	0.010	**0.030**	<0.01	<0.01	0.020	<0.01	<0.01	<0.01	<0.01
Ion Percentage	%		0.09	9.80	1.64	0.8	0.5	5.4	3.0	1.2	1.9	0.5	0.1	0.9	0.4

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-1
Precipitation Event Surface Water Quality - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Sedimentation Pond Surface Water Quality - SP4									
Date						15-Nov-20	26-Mar-21	03-Jun-21	09-Jul-21	04-Oct-21	17-Feb-22	04-May-22	18-Oct-22		
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureaus Veritas		
Routine/Verification Event						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine		
Alkalinity (Total as $CaCO_3$)	mg/L	<25%***	46	160	109	160	120	47	99	140	82	150	140		
Conductivity	umho/cm		240	730	451	550	540	450	570	500	570	650	570		
Dissolved Chloride (Cl)	mg/L		11	95	30	26	32	37	79	45	34	37	29		
Dissolved Mercury (Hg)	mg/L	0.0002	0.00005	0.05	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Dissolved Sulphate (SO_4)	mg/L		19	150	57	78	92	120	58	43	140	130	110		
Nitrate (N)	mg/L		0.005	0.61	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	0.54	0.18	<0.10		
Nitrite (N)	mg/L		0.005	0.05	0.0078	<0.010	<0.010	<0.010	<0.010	<0.010	0.034	<0.010	<0.010		
pH	(pH units)	6.5-8.5	7.0	9.7	8.1	8.1	8.1	**9.6**	8.5	8.1	8.0	8.2	8.1		
Phenols-4AAP	mg/L	0.001	0.0005	0.005	0.0007	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	**0.0011**	<0.0010	<0.0010		
Total Ammonia-N	mg/L		0.025	1.05	0.078	0.058	<0.050	<0.050	<0.15	<0.15	1.05	<0.15	<0.15		
Total Arsenic (As)	mg/L	0.100*	0.000500	0.00700	0.00159	0.002	0.001	0.001	0.005	0.002	0.003	0.001	0.003		
Total Barium (Ba)	mg/L		0.0025	0.086	0.033	0.037	0.039	0.019	0.008	0.032	0.042	0.037	0.041		
Total BOD	mg/L		1	10	2	<2	<2	<2	3	6	2	2	3		
Total Boron (B)	mg/L	0.200	0.0100	0.110	0.0411	0.07	0.04	0.06	0.07	0.07	0.09	0.07	0.07		
Total Cadmium (Cd)	mg/L	0.0002	0.00005	0.00005	0.00005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		
Total Calcium (Ca)	mg/L		18	77	50	68	65	32	35	52	67	74	65		
Total Chemical Oxygen Demand (COD)	mg/L		5	48	22	19	17	21	42	47	20	21	5.1		
Total Chromium (Cr)	mg/L	0.0089	0.0025	0.0120	0.0031	<0.005	<0.005	<0.005	<0.005	<0.005	**0.012**	<0.005	<0.005		
Total Copper (Cu)	mg/L	0.005	0.001	0.015	0.0028	<0.002	0.004	<0.002	<0.002	<0.002	**0.015**	0.004	<0.002		
Total Dissolved Solids	mg/L		126	456	272	300	310	280	355	275	315	350	305		
Total Iron (Fe)	mg/L	0.300	0.050	12	1.84	**1.2**	**2.0**	**0.6**	**0.5**	**1.4**	**12**	**2**	**1.8**		
Total Kjeldahl Nitrogen (TKN)	mg/L		0.32	2.5	0.66641	0.44	0.32	0.95	<0.7	<0.7	1.9	<0.7	<0.7		
Total Lead (Pb)	mg/L	0.005	0.0003	0.006	0.001	0.0009	0.0013	<0.0005	<0.0005	0.00	0.0048	0.0011	0.0011		
Total Magnesium (Mg)	mg/L		5	26	15	17	17	19	19	13	26	26	20		
Total Nickel (Ni)	mg/L	0.025	0.0005	0.020	0.0038	0.003	0.004	0.003	0.002	0.003	0.020	0.006	0.004		
Total Phosphorus	mg/L	0.02*	0.02	0.32	0.08	**0.06**	**0.07**	**0.03**	**0.05**	**0.17**	**0.19**	**0.077**	**0.047**		
Total Potassium (K)	mg/L		0.6	8.5	3.4	3.5	4.1	1.7	2.6	5.5	6.9	4.7	4.1		
Total Sodium (Na)	mg/L		4.7	56	20	18	22	26	51	33	25	25	20		
Total Suspended Solids	mg/L		2	360	42	38	64	16	11	45	360	41	32		
Total Un-ionized Ammonia	mg/L	0.02	0.0003	0.25	0.003	0.002	<0.00061	<0.048	<0.03	<0.014	0.0019	<0.0054	<0.0034		
Total Zinc (Zn)	mg/L	0.020	0.0050	0.040	0.0083	*<0.01*	0.01	<0.01	<0.01	<0.01	**0.03**	<0.01	<0.01		
Ion Percentage	%		0.09	9.80	1.64	0.5	2.3	1.0	0.76	1.4	5.1	1.0	0.3		

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Unionized ammonia values are calculated based on field determined pH and temperature values.
5) mg/L denotes milligrams per litre.
6) umho/cm denotes microsiemens per centimeter.
7) BOD denotes biological oxygen demand.
8) COD denotes chemical oxygen demand.
9) Blank denotes parameter not analyzed.
10) **Bolded** text and shading denotes concentration exceeds PWQO.
11) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
12) "BV" denotes Bureau Veritas Laboratories
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

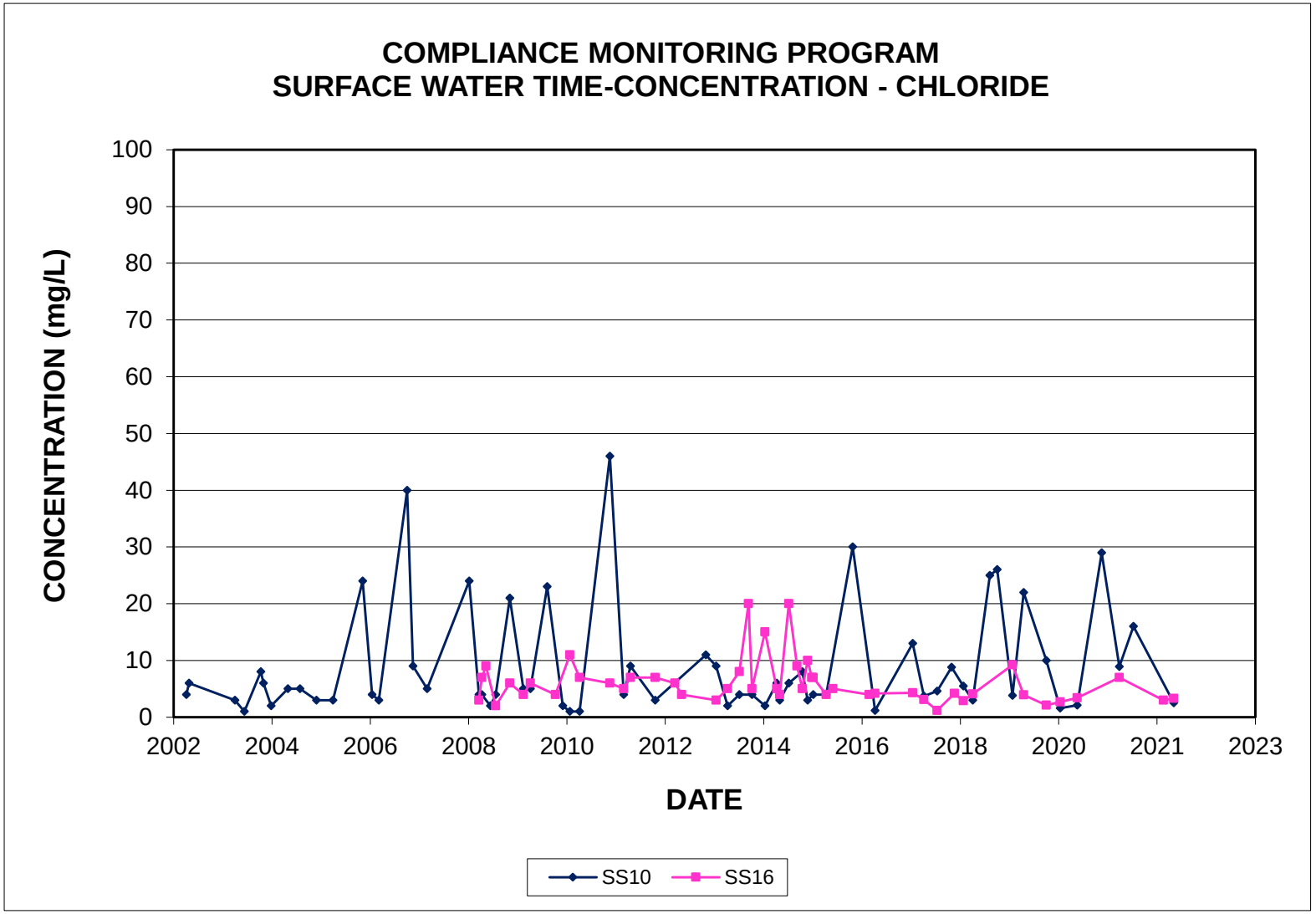

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - CHLORIDE
CONCENTRATION (mg/L)
100
90
80
70
60
50
40
30
20
10
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
DATE
SS10
SS16

FIGURE B-1

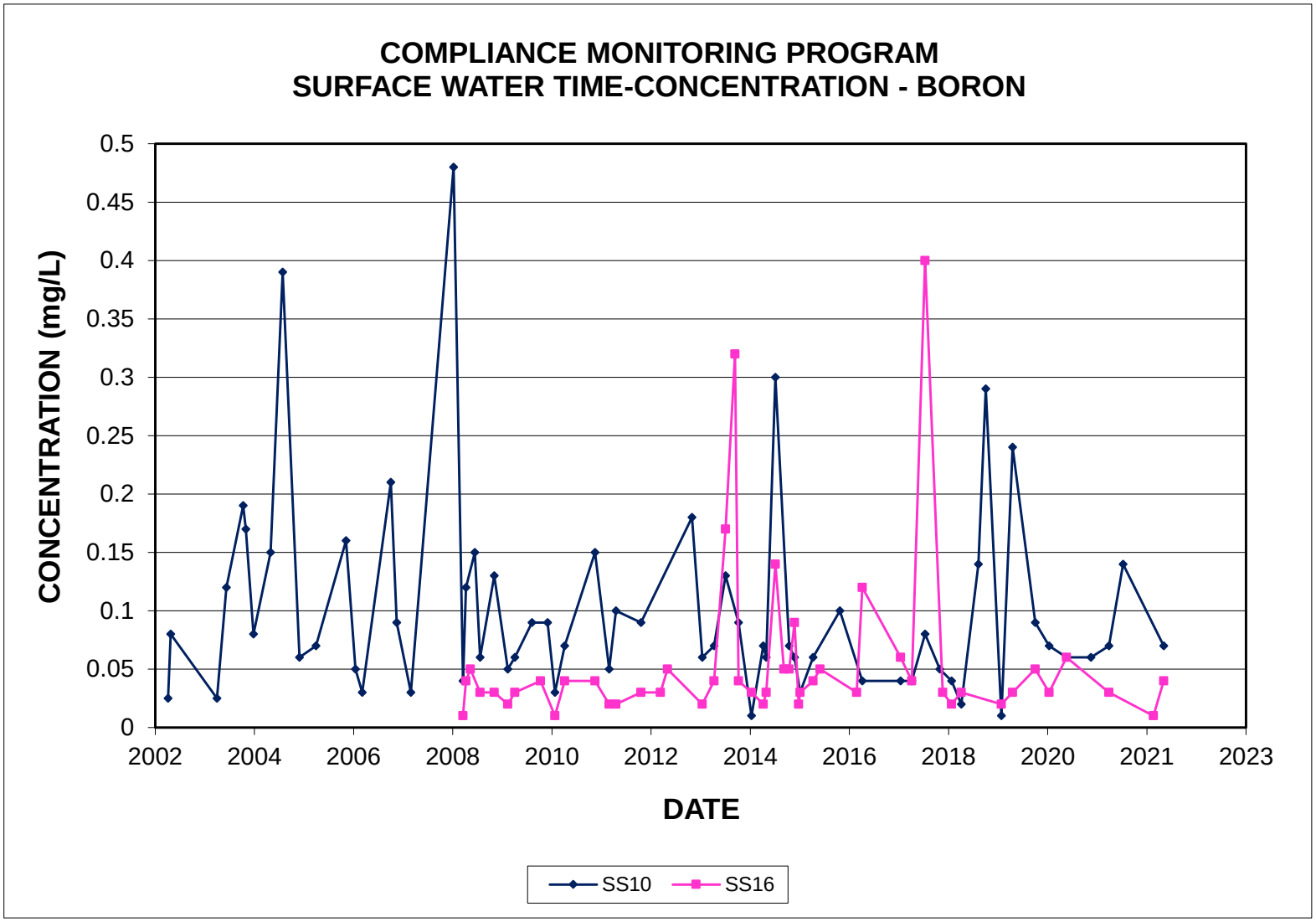

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - BORON
CONCENTRATION (mg/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
DATE
SS10
SS16

FIGURE B-2

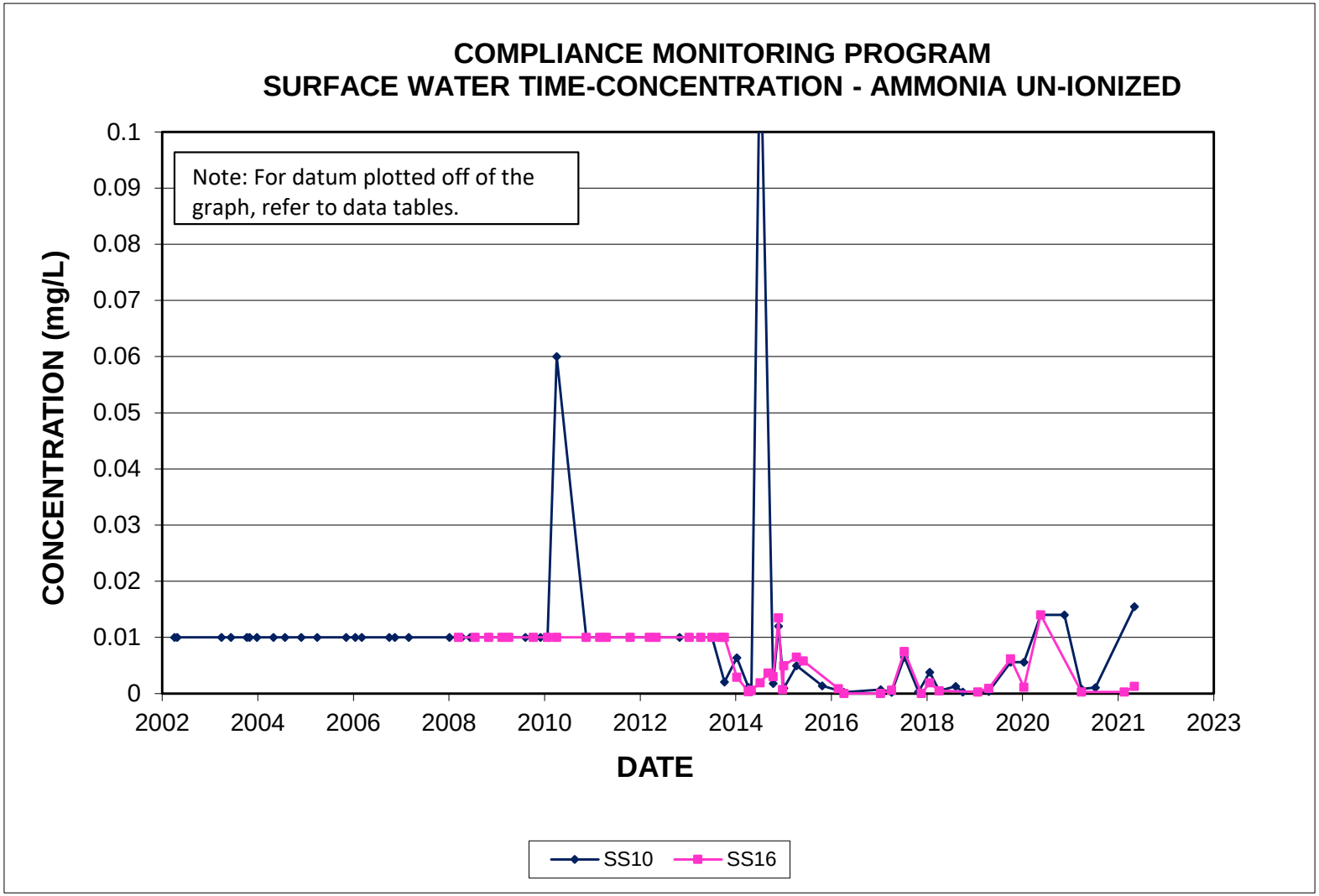

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - AMMONIA UN-IONIZED
Note: For datum plotted off of the graph, refer to data tables.
CONCENTRATION (mg/L)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
DATE
SS10
SS16

FIGURE B-3

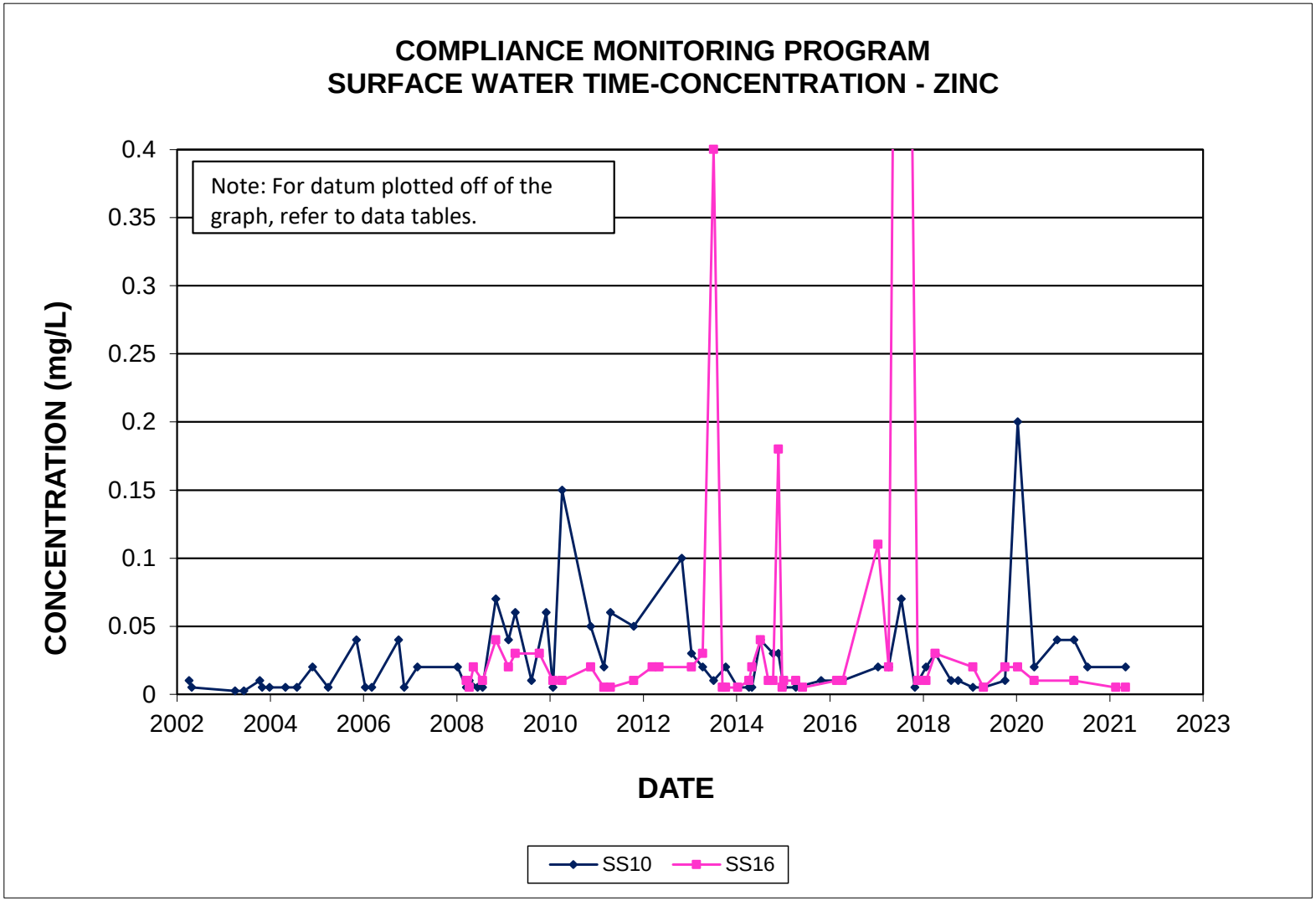

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - ZINC
Note: For datum plotted off of the graph, refer to data tables.
CONCENTRATION (mg/L)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
DATE
SS10
SS16

FIGURE B-4

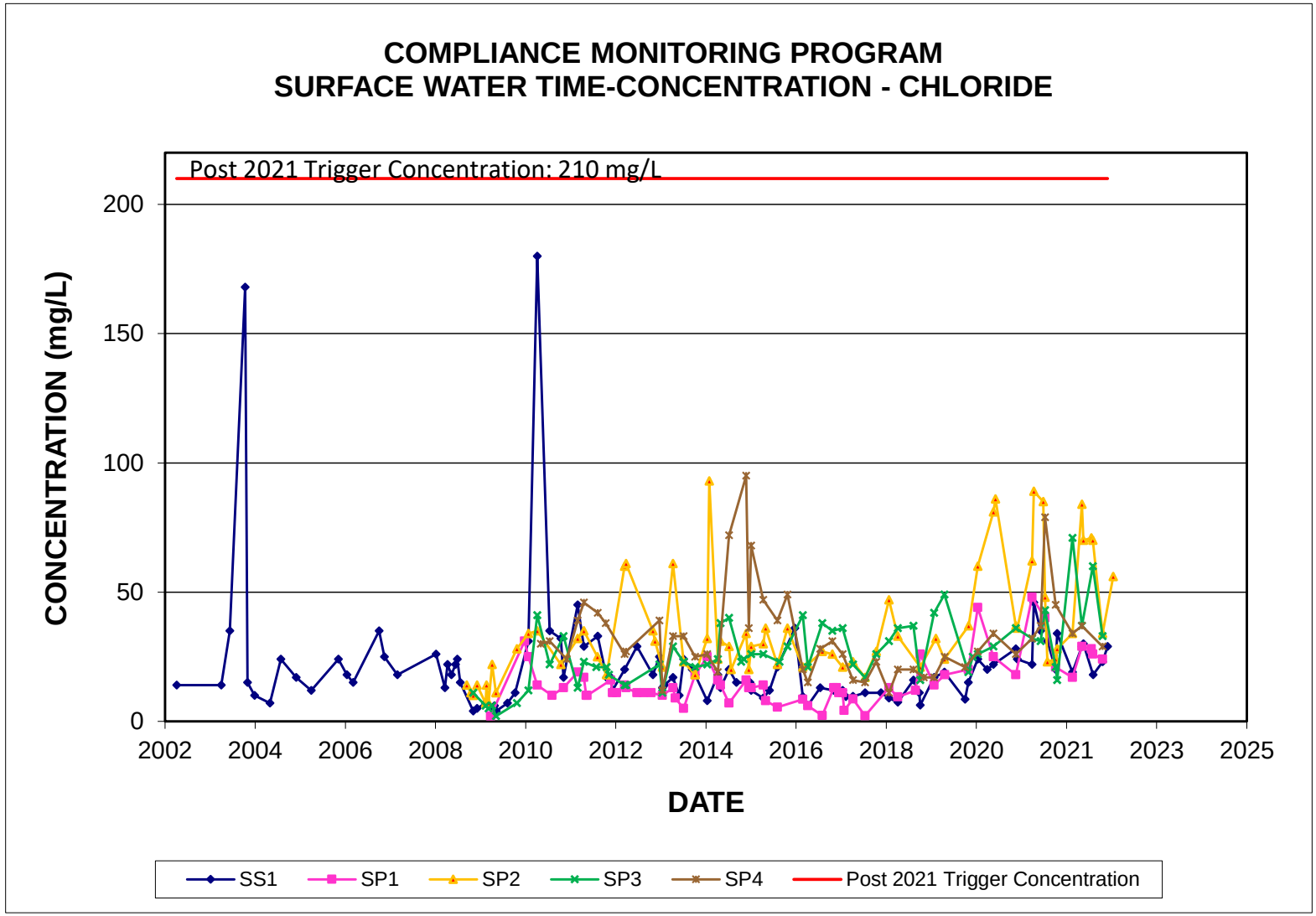

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - CHLORIDE
Post 2021 Trigger Concentration: 210 mg/L
CONCENTRATION (mg/L)
200
150
100
50
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
2025
DATE
SS1
SP1
SP2
SP3
SP4
Post 2021 Trigger Concentration

FIGURE B-5

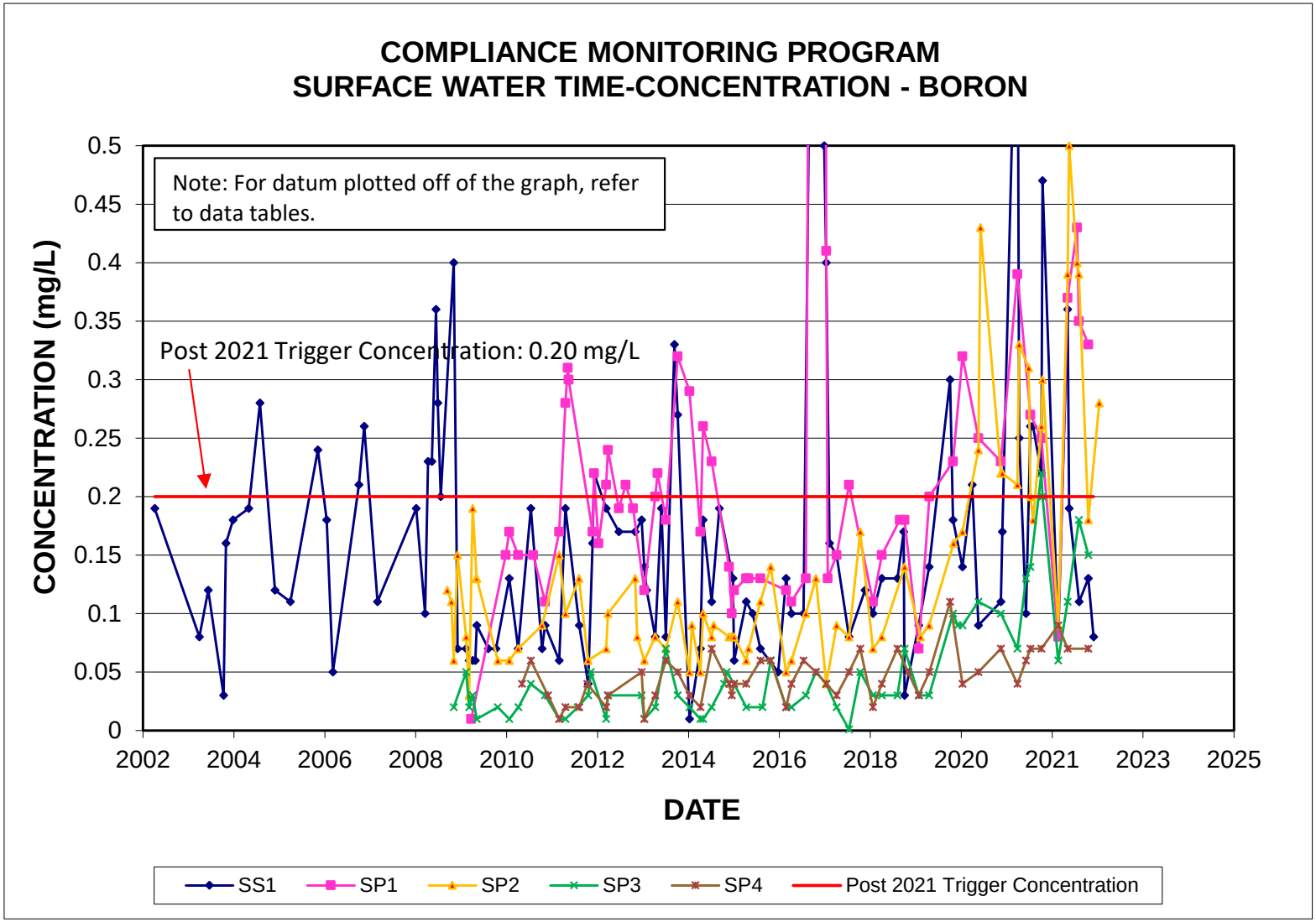

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - BORON
Note: For datum plotted off of the graph, refer to data tables.
Post 2021 Trigger Concentration: 0.20 mg/L
CONCENTRATION (mg/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
2025
DATE
SS1
SP1
SP2
SP3
SP4
Post 2021 Trigger Concentration

FIGURE B-6

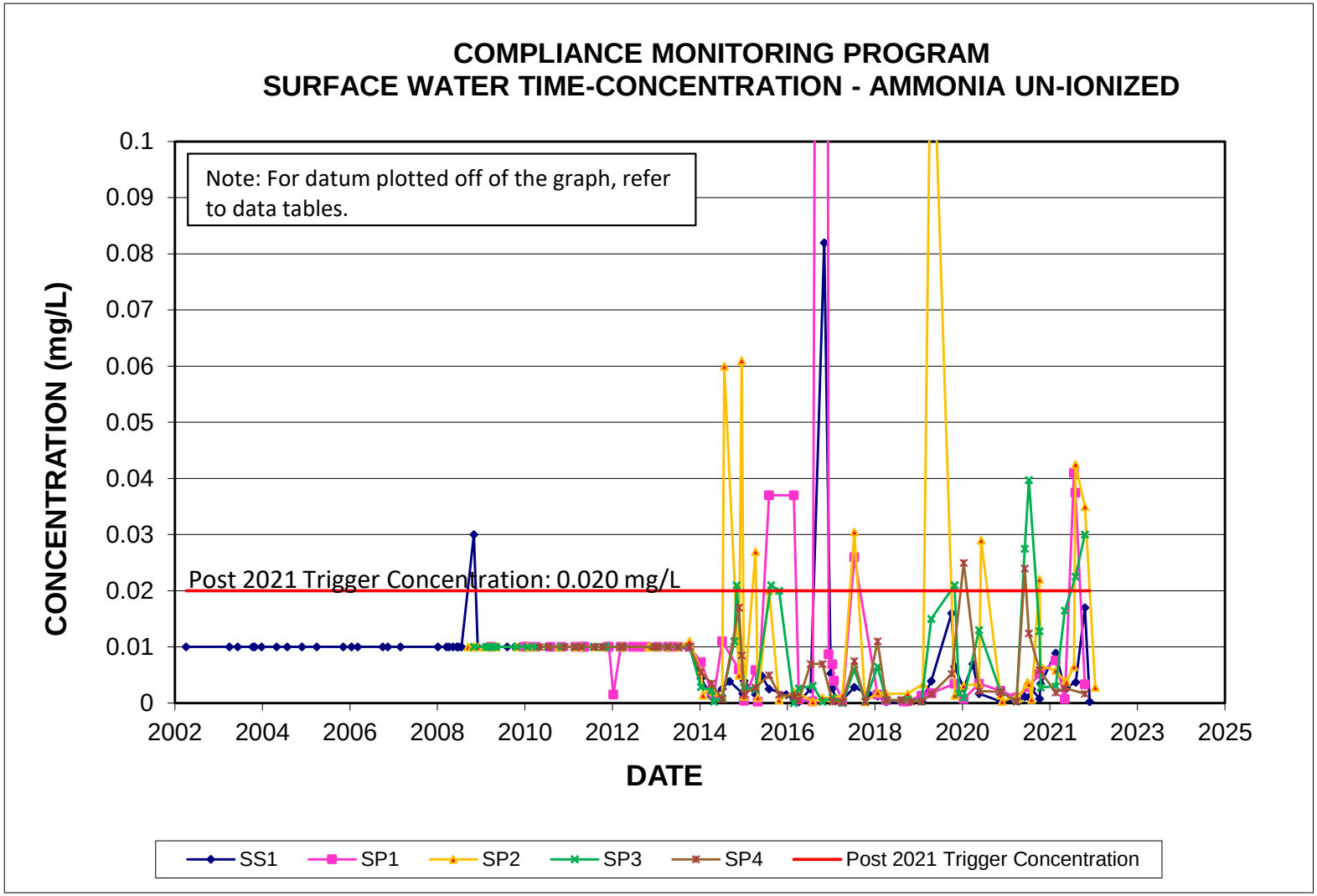

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - AMMONIA UN-IONIZED
Note: For datum plotted off of the graph, refer to data tables.
Post 2021 Trigger Concentration: 0.020 mg/L
CONCENTRATION (mg/L)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
2025
DATE
SS1
SP1
SP2
SP3
SP4
Post 2021 Trigger Concentration

FIGURE B-7

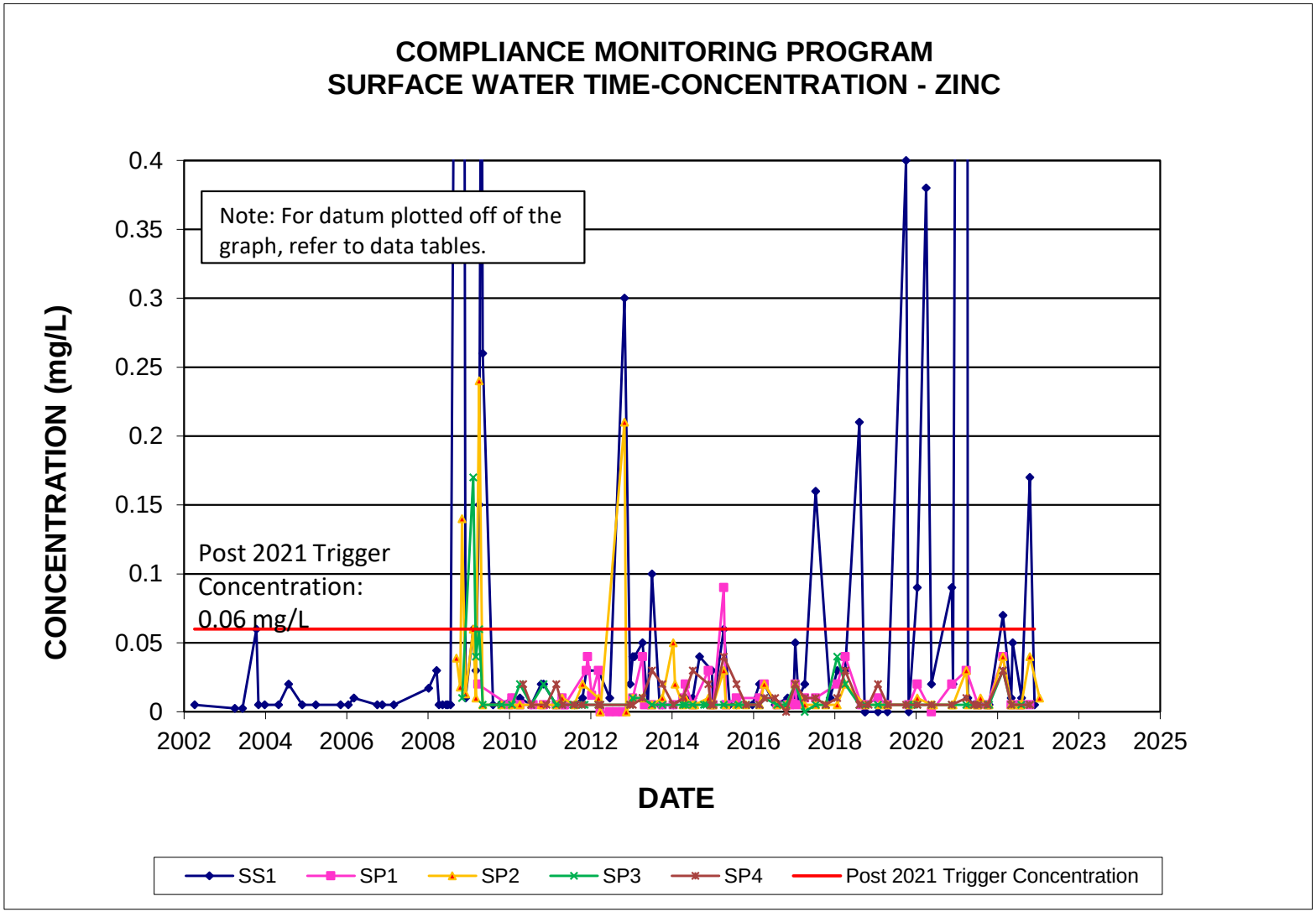

COMPLIANCE MONITORING PROGRAM
SURFACE WATER TIME-CONCENTRATION - ZINC
CONCENTRATION (mg/L)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Note: For datum plotted off of the graph, refer to data tables.
Post 2021 Trigger Concentration: 0.06 mg/L
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2021
2023
2025
DATE
SS1
SP1
SP2
SP3
SP4
Post 2021 Trigger Concentration

FIGURE B-8

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			19-Mar-08	11-Apr-08	12-May-08	14-Jun-08	29-Jun-08	23-Jul-08	4-Nov-08	5-Dec-08	12-Feb-09	8-Mar-09	6-Apr-09
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	**1.7**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2		<2			<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	µg/L	4	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	µg/L	8*	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloromethane	µg/L	100*	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	0.8*	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Vinyl Chloride	µg/L	600*	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p+m-Xylene	µg/L	32*	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o-Xylene	µg/L	40*	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene (Total)	µg/L		<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			26-Apr-09	9-May-09	9-Aug-09	10-Oct-09	25-Jan-10	6-Apr-10	16-Jul-10	14-Oct-10	28-Feb-11	20-Apr-11	9-Aug-11
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.2
1,4-Dichlorobenzene	µg/L	4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.4
Ethylbenzene	µg/L	8*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.2
Dichloromethane	µg/L	100*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<1
Toluene	µg/L	0.8*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.4
Vinyl Chloride	µg/L	600*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.4
p+m-Xylene	µg/L	32*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.2
o-Xylene	µg/L	40*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.2
Xylene (Total)	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.2

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			20-Oct-11	23-Nov-11	6-Dec-11	13-Mar-12	22-Jun-12	30-Oct-12	21-Dec-12	13-Jan-13	30-Jan-13	10-Apr-13	29-May-13
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.1	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.5	<0.10	<0.20	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.2	<1	<0.20	<0.40	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.1	<0.5	<0.10	<0.20	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.5	<3	<0.50	<1.0	<0.50	<0.50	<1.3	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.2	<1	<0.20	<0.40	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.2	<1	<0.20	<0.40	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.1	<0.5	<0.10	<0.20	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.1	<0.5	<0.10	<0.20	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.1	<0.5	<0.10	<0.20	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			5-Jul-13	12-Sep-13	7-Oct-13	11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	6-Sep-14	25-Dec-14	4-Jan-15	10-Apr-15
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	*<0.50*	*<0.50*	*<0.50*
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<1.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.25	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			1-Jun-15	3-Aug-15	25-Feb-16	7-Apr-16	14-Jul-16	3-Nov-16	27-Dec-16	12-Jan-17	6-Apr-17	13-Jul-17	19-Nov-17
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.80	<0.20	<0.80	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*	*<2.0*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	*<2.0*	*<0.50*	*<2.0*	*<0.50*	*<0.50*	*<0.50*
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*	*<1.2*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<2.0	<2.0	<8.0	<2.0	<8.0	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			23-Jan-18	4-Apr-18	8-Aug-18	26-Sep-18	2-Oct-18	24-Jan-19	17-Apr-19	2-Oct-19	27-Oct-19	11-Jan-20	29-Mar-20
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.80	<0.20	<0.80	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<2.0*	*<0.50*	*<2.0*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<2.0	<0.50	<2.0	<0.50	<0.50	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
2,4-Dichlorophenol	µg/L	0.2	*<1.2*	*<0.30*	*<1.2*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<8.0	<2.0	<8.0	<2.0	<2.0	**4.4**	<2.0	<2.0	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<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	4	<0.20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.40
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	100*	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40*	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L		<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			18-May-20	15-Nov-20	26-Nov-20	26-Mar-21	9-Apr-21	3-Jun-21	9-Jul-21	30-Jul-21	4-Oct-21	15-Oct-21	17-Feb-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.80	<0.20	<0.80	<0.20	<0.20	<0.20	<0.20	<0.80
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<2.0
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<2.0
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<2.0
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*	*<2.0*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	*<2.0*	<0.50	*<2.0*	<0.50	<0.50	<0.50	<0.50	*<2.0*
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*	*<1.2*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<2.0	**0.63**	<2.0	<0.50	<0.50	<0.50	<0.50	<2.0
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	<2.0
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	*<8.0*	<2.0	<8.0	<2.0	<2.0	<2.0	<2.0	*<8.0*
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Downstream of Landfill 60m East of Lambton Rd 79 - SS1										
Date			4-May-22	16-May-22	4-Aug-22	18-Oct-22	28-Nov-22						
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas						
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.80	<0.80						
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<2.0	<2.0						
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<2.0	<2.0						
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<2.0	<2.0						
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<2.0*						
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	*<2.0*	<2.0						
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<1.2*						
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<4.0*						
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<2.0	<2.0						
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<2.0	<2.0						
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	*<8.0*	<8.0						
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<4.0*						
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<4.0*						
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20						
1,4-Dichlorobenzene	µg/L	4	<0.40	<0.40	<0.40	<0.40	<0.40						
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20						
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0						
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20						
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20						
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20						
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20						
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20						

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP1										
Date			25-Mar-09	26-Dec-09	25-Jan-10	6-Apr-10	5-Aug-10	6-Nov-10	28-Feb-11	20-Apr-11	9-May-11	16-May-11	23-Nov-11
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*7*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.3
1,4-Dichlorobenzene	µg/L	4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.5
Ethylbenzene	µg/L	8*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.3
Dichloromethane	µg/L	100*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<1
Toluene	µg/L	0.8*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.5
Vinyl Chloride	µg/L	600*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.5
p+m-Xylene	µg/L	32*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.3
o-Xylene	µg/L	40*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.3
Xylene (Total)	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.3

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP1										
Date			6-Dec-11	13-Mar-12	27-Mar-12	22-Jun-12	15-Aug-12	14-Oct-12	13-Jan-13	10-Apr-13	29-Apr-13	5-Jul-13	7-Oct-13
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**0.6**	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<0.50	<1.3	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP1										
Date			11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	24-Nov-14	15-Dec-14	4-Jan-15	10-Apr-15	30-Apr-15	3-Aug-15	25-Feb-16
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.8	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<2	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<2	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<2	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<2*	*<0.5*	*<0.5*	*<0.5*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	*<2*	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<1*	<0.3	*<0.3*	*<0.3*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<4*	<1	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<2	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<2	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	*<8*	<2	<2	<2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<4*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<4*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP1										
Date			7-Apr-16	1-Aug-16	3-Nov-16	12-Jan-17	8-Feb-17	6-Apr-17	13-Jul-17	23-Jan-18	4-Apr-18	27-Aug-18	2-Oct-18
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.80	<0.80	<0.20	<0.20	<0.20	<0.80	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<2.0	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<2.0	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<2.0	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<2.0*	*<2.0*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	*<2.0*	*<2.0*	*<0.50*	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<1.2*	*<1.2*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<4.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<2.0	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<2.0	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	*<8.0*	*<8.0*	*<2.0*	<2.0	<2.0	<8.0	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<4.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<4.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<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	4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.50	<0.50	<0.50
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP1										
Date			24-Jan-19	19-Apr-19	27-Oct-19	11-Jan-20	18-May-20	15-Nov-20	26-Mar-21	9-Jul-21	4-Oct-21	17-Feb-22	4-May-22
Laboratory			Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.80	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	*<2.0*	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	*<8.0*	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP1										
Date			20-Jul-22	4-Aug-22	18-Oct-22								
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas								
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20								
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50								
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50								
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50								
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*								
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50								
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*								
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*								
Phenol	µg/L	5*	<0.50	<0.50	<0.50								
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50								
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0								
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*								
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*								
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20								
1,4-Dichlorobenzene	µg/L	4	<0.40	<0.40	<0.40								
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20								
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0								
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20								
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20								
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20								
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20								
Xylene (Total)	µg/L		<0.20	<0.20	<0.20								

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP2										
Date			14-Sep-08	17-Oct-08	4-Nov-08	5-Dec-08	12-Feb-09	8-Mar-09	6-Apr-09	26-Apr-09	7-May-09	24-Oct-09	25-Jan-10
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	,0.5	,0.5	,0.5	,0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	µg/L	4	<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	8*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloromethane	µg/L	100*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	0.8*	<0.2	<0.2	<0.2	<0.2	<.02	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Vinyl Chloride	µg/L	600*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p+m-Xylene	µg/L	32*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o-Xylene	µg/L	40*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene (Total)	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP2										
Date			6-Apr-10	14-Oct-10	28-Feb-11	20-Apr-11	8-Aug-11	20-Oct-11	13-Mar-12	27-Mar-12	30-Oct-12	15-Nov-12	13-Jan-13
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<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	4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP2										
Date			10-Apr-13	5-Jul-13	7-Oct-13	11-Jan-14	28-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	24-Jul-14	24-Nov-14	15-Dec-14
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<0.5	**0.6**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<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	4	<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	8*	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.2	<0.20	<0.20	**0.48**	<0.20	**0.29**	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.1	<0.10	<0.10	**0.12**	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.1	<0.10	<0.10	**0.12**	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP2										
Date			4-Jan-15	10-Apr-15	30-Apr-15	3-Aug-15	25-Oct-15	25-Feb-16	7-Apr-16	1-Aug-16	21-Oct-16	12-Jan-17	6-Apr-17
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<0.20	<0.80	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.5*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.5*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*
Pentachlorophenol	µg/L	0.5	<1.0	*<1.0*	*<1.0*	*<1.0*	*<5.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<2.0	<10	**3.0**	<2.0	<2.0	<2.0	<8.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<5.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<5.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP2										
Date			13-Jul-17	12-Oct-17	23-Jan-18	4-Apr-18	2-Oct-18	7-Feb-19	17-Apr-19	31-Oct-19	11-Jan-20	18-May-20	4-Jun-20
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	<1.0	<1.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<2.0	<2.1	<2.0	**4.9**	<2.0	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.20	<0.20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.40	<0.40
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP2										
Date			15-Nov-20	26-Nov-20	26-Mar-21	9-Apr-21	26-Jun-21	9-Jul-21	30-Jul-21	4-Oct-21	15-Oct-21	17-Feb-22	4-May-22
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.80	<0.80	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<2.0*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	*<2.0*	*<2.0*	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<1.2*	*<0.30*
Pentachlorophenol	µg/L	0.5	<1.0	<1.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<4.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<2.0	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	*<8.0*	*<8.0*	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<4.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<4.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP2										
Date			16-May-22	20-Jul-22	4-Aug-22	18-Oct-22	13-Jan-23						
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas						
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.80	<0.80						
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<2.0	<2.0						
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<2.0	<2.0						
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<2.0	<2.0						
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<2.0*						
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<2.0	<2.0						
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<1.2*						
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<4.0*						
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<2.0	<2.0						
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<2.0	<2.0						
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<8.0	<8.0						
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<4.0*	<4.0						
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<4.0*	<4.0						
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20						
1,4-Dichlorobenzene	µg/L	4	<0.40	<0.40	<0.40	<0.40	<0.40						
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20						
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0						
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20						
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20						
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20						
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20						
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20						

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP3										
Date			4-Nov-08	12-Feb-09	8-Mar-09	6-Apr-09	17-Apr-09	26-Apr-09	7-May-09	24-Oct-09	25-Jan-10	8-Apr-10	16-Jul-10
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	µg/L	4	<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	8*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dichloromethane	µg/L	100*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	0.8*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Vinyl Chloride	µg/L	600*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p+m-Xylene	µg/L	32*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o-Xylene	µg/L	40*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene (Total)	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP3										
Date			6-Nov-10	28-Feb-11	20-Apr-11	29-Jul-11	20-Oct-11	9-Nov-11	13-Mar-12	27-Mar-12	21-Dec-12	13-Jan-13	10-Apr-13
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP3										
Date			5-Jul-13	7-Oct-13	11-Jan-14	8-Apr-14	30-Apr-14	7-Jul-14	15-Oct-14	4-Nov-14	4-Jan-15	10-Apr-15	20-Aug-15
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<2*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<1*	<0.3	<0.3	<0.3	*<0.3*	*<0.3*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<4*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<2	<2	*<8*	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<4*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<4*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP3										
Date			25-Oct-15	25-Feb-16	7-Apr-16	1-Aug-16	21-Oct-16	12-Jan-17	6-Apr-17	13-Jul-17	12-Oct-17	23-Jan-18	4-Apr-18
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.80	<0.20	<0.20	<0.20	<0.80	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*	*<1.0*	<1.0	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50	<2.0	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<2.0	<2.0	*<8.0*	<2.0	<2.0	<2.0	<8.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20	<0.50	<0.50
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.3	<0.50
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP3										
Date			8-Aug-18	2-Oct-18	24-Jan-19	17-Apr-19	27-Oct-19	11-Jan-20	18-May-20	15-Nov-20	26-Mar-21	3-Jun-21	9-Jul-21
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.80	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.80	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,4-Dichlorobenzene	µg/L	4	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Hexachlorobenzene	µg/L	0.0065	*<2.0*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	*<2.0*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<1.2*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Phenol	µg/L	5*	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
2,4,6-Trichlorophenol	µg/L	18	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Di-N-butyl phthalate	µg/L	4	<8.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<8.0	<2.0
Diethyl phthalate	µg/L	0.2	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.40	<0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	Oct-	Sedimentation Pond Surface Water Quality - SP3										
Date			4-Oct-21	15-Oct-21	17-Feb-22	4-May-22	4-Aug-22	18-Oct-22					
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas					
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.80	<0.20	<0.20	<0.20					
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50					
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50					
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50					
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<2.0*	*<0.50*	*<0.50*	*<0.50*					
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	*<2.0*	<0.50	<0.50	<0.50					
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<1.2*	*<0.30*	*<0.30*	*<0.30*					
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*					
Phenol	µg/L	5*	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50					
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<2.0	<0.50	<0.50	<0.50					
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	*<8.0*	<2.0	<2.0	<2.0					
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*					
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<1.0*	*<1.0*					
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20					
1,4-Dichlorobenzene	µg/L	4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40					
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20					
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0					
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20					
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20					
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20					
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20					
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20					

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP4										
Date			6-May-10	16-Jul-10	1-Dec-10	28-Feb-11	20-Apr-11	9-Aug-11	13-Oct-11	13-Mar-12	27-Mar-12	21-Dec-12	13-Jan-13
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Phenol	µg/L	5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<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	4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP4										
Date			10-Apr-13	5-Jul-13	7-Oct-13	11-Jan-14	8-Apr-14	7-Jul-14	24-Nov-14	15-Dec-14	4-Jan-15	10-Apr-15	3-Aug-15
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.2	<0.2	<0.2	<0.8	<0.2	<1	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<2	<0.5	*<3*	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.5	<0.5	<0.5	<2	<0.5	*<3*	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.5	<0.5	<0.5	<2	<0.5	<3	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.5*	*<0.5*	*<0.5*	*<2*	*<0.5*	*<3*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	*<2*	<0.5	*<3*	<0.50	<0.50	<0.50	<0.50	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.3*	*<0.3*	*<0.3*	*<1*	*<0.3*	*<2*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1*	*<1*	*<1*	*<4*	*<1*	*<5*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Phenol	µg/L	5*	<0.5	**0.6**	<0.5	<2	<0.5	<3	<0.50	<0.50	<0.50	<0.50	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.5	<0.5	<0.5	<2	<0.5	<3	<0.50	<0.50	<0.50	<0.50	<0.50
Di-N-butyl phthalate	µg/L	4	<2	<2	<2	*<8*	*<2*	*<10*	<2.0	<2.0	<2.0	<2.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<4*	*<1*	*<5*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1*	*<1*	*<1*	*<4*	*<1*	*<5*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	8*	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.2	<0.20	<0.20	<0.20	**0.21**	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.
7) VOC's sampled on December 17, 2014 for SP4.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP4										
Date			25-Oct-15	25-Feb-16	7-Apr-16	14-Jul-16	21-Oct-16	12-Jan-17	6-Apr-17	13-Jul-17	12-Oct-17	23-Jan-18	4-Apr-18
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.80	<0.20	<0.80	<0.20	<0.80	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	*<2.0*	<0.50	<2.0	<0.50	<2.0	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	*<2.0*	<0.50	<2.0	<0.50	<2.0	<0.50
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<2.0	<0.50
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*	*<2.0*	*<0.50*	*<2.0*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	*<2.0*	<0.50	*<2.0*	*<0.50*	<2.0	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*	*<1.2*	*<0.30*	*<1.2*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*	*<4.0*	*<1.0*
Phenol	µg/L	5*	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<2.0	<0.50
2,4,6-Trichlorophenol	µg/L	18	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50	<2.0	<0.50	<2.0	<0.50
Di-N-butyl phthalate	µg/L	4	<2.0	<2.0	<2.0	<2.0	<2.0	*<8.0*	<2.0	*<8.0*	*<2.0*	<8.0	<2.0
Diethyl phthalate	µg/L	0.2	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	<4.0	<1.0	*<4.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<1.0*	**1.2**	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*	<4.0	<1.0	*<4.0*	**1.3**
Volatile Organics													
Benzene	µg/L	100*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<2.0	<0.20	<0.20	<0.50
Ethylbenzene	µg/L	8*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dichloromethane	µg/L	100*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	40*	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene (Total)	µg/L		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP4										
Date			8-Aug-18	31-Oct-18	24-Jan-19	19-Apr-19	2-Oct-19	11-Jan-20	18-May-20	15-Nov-20	26-Mar-21	3-Jun-21	9-Jul-21
Laboratory			Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Semivolatile Organics													
Benzo(a)pyrene	µg/L		<0.80	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.80	<0.20
1,2-Dichlorobenzene	µg/L	2.5	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,3-Dichlorobenzene	µg/L	2.5	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
1,4-Dichlorobenzene	µg/L	4	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Hexachlorobenzene	µg/L	0.0065	*<2.0*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<0.50*	*<2.0*	*<0.50*
1,2,4-Trichlorobenzene	µg/L	0.5	*<2.0*	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	*<0.50*	<0.50	<2.0	<0.50
2,4-Dichlorophenol	µg/L	0.2	*<1.2*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<0.30*	*<1.2*	*<0.30*
Pentachlorophenol	µg/L	0.5	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<4.0*	*<1.0*
Phenol	µg/L	5*	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**3.7**	<0.50
2,4,6-Trichlorophenol	µg/L	18	<2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<2.0	<0.50
Di-N-butyl phthalate	µg/L	4	<8.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<8.0	<2.0
Diethyl phthalate	µg/L	0.2	*<4.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	<1.0	*<1.0*	*<4.0*	*<1.0*
Dimethyl phthalate	µg/L	0.2	*<4.0*	<1.0	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	<1.0	*<1.0*	*<4.0*	*<1.0*
Volatile Organics													
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,4-Dichlorobenzene	µg/L	4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.40	<0.40	<0.40	<0.40	<0.40
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-2
Precipitation Event Surface Water Quality - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Sedimentation Pond Surface Water Quality - SP4											
Date			4-Oct-21	17-Feb-22	4-May-22	18-Oct-22								
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas								
Semivolatile Organics														
Benzo(a)pyrene	µg/L		<0.20	<0.80	<0.20	<0.80								
1,2-Dichlorobenzene	µg/L	2.5	<0.50	<2.0	<0.50	<2.0								
1,3-Dichlorobenzene	µg/L	2.5	<0.50	<2.0	<0.50	<2.0								
1,4-Dichlorobenzene	µg/L	4	<0.50	<2.0	<0.50	<2.0								
Hexachlorobenzene	µg/L	0.0065	*<0.50*	*<2.0*	*<0.50*	*<2.0*								
1,2,4-Trichlorobenzene	µg/L	0.5	<0.50	*<2.0*	<0.50	<2.0								
2,4-Dichlorophenol	µg/L	0.2	*<0.30*	*<1.2*	*<0.30*	*<1.2*								
Pentachlorophenol	µg/L	0.5	*<1.0*	*<4.0*	*<1.0*	*<4.0*								
Phenol	µg/L	5*	<0.50	<2.0	<0.50	<2.0								
2,4,6-Trichlorophenol	µg/L	18	<0.50	<2.0	<0.50	<2.0								
Di-N-butyl phthalate	µg/L	4	<2.0	*<8.0*	<2.0	<8.0								
Diethyl phthalate	µg/L	0.2	*<1.0*	*<4.0*	*<1.0*	*<4.0*								
Dimethyl phthalate	µg/L	0.2	*<1.0*	*<4.0*	*<1.0*	*<4.0*								
Volatile Organics														
Benzene	µg/L	100*	<0.20	<0.20	<0.20	<0.20								
1,4-Dichlorobenzene	µg/L	4	<0.40	<0.40	<0.40	<0.40								
Ethylbenzene	µg/L	8*	<0.20	<0.20	<0.20	<0.20								
Dichloromethane	µg/L	100*	<2.0	<2.0	<2.0	<2.0								
Toluene	µg/L	0.8*	<0.20	<0.20	<0.20	<0.20								
Vinyl Chloride	µg/L	600*	<0.20	<0.20	<0.20	<0.20								
p+m-Xylene	µg/L	32*	<0.20	<0.20	<0.20	<0.20								
o-Xylene	µg/L	40*	<0.20	<0.20	<0.20	<0.20								
Xylene (Total)	µg/L		<0.20	<0.20	<0.20	<0.20								

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** indicates select parameter was detected at concentration greater than the laboratory reportable detection limit (RDL).
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14 / SS14A									
Date						4-Apr-03	13-Jun-03	15-Sep-03	3-May-04	31-Jul-04	23-Sep-05	9-Nov-05	18-Jan-06	9-Mar-06	3-Aug-06
Routine/Storm Monitoring						Routine	Routine	Routine	Routine	Routine	Storm	Routine	Routine	Routine	Storm
Laboratory						Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125	91	42	66	74	82	129	69	227	105	98
Chloride	mg/L		3	210	13	11	8	18	8	9	51	25	21	14	22
Sulphate	mg/L		14	443	126	193	443	340	426	178	244	103	163	78	318
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.08	0.04	0	0.17	0.11	0.06	0.35	1.94	0.61	0.09
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate	mg/L		0.02	53.2	0.38	1.70	1.37	0.15	0.77	0.81	6.02	7.85	0.54	0.74	0.37
Nitrite	mg/L		0.005	0.3	0.021						0.18				<0.10
Phenols	mg/L	0.001	0.0005	0.015	0.00074	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.200	0.030	1.500	0.145	0.12	0.08	**0.22**	0.14	0.17	**0.32**	0.16	**0.38**	0.14	**0.24**
Calcium	mg/L		25	670	82	74	119	116	112	65	102	66	94	46	106
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	<0.005	<0.005	<0.005	<0.005	0.003	0.002	**0.026**	0.003	0.002	0.005
Iron	mg/L	0.300	0.050	260.000	2.505	**1.24**	**0.93**	0.22	**1.97**	**1.21**	**0.64**	**19.4**	**0.66**	**0.83**	**3.08**
Magnesium	mg/L		6.9	160	25	27	58	33	53	22	32	21	32	15	38
Potassium	mg/L		0.004	41	5.25	3	3	6	3	5	6	4	5	4	5
Sodium	mg/L		1.8	120	11	12	21	21	20	13	17	9	19	10	21
Nickel	mg/L	0.025	0.0005	5.2	0.0067	<0.005	<0.005	<0.005	0.006	0.004	0.007	0.024	0.006	0.005	0.013
Zinc	mg/L	0.02	0.00	0.78	0.01	0.008	<0.005	<0.005	<0.01	<0.01	0.01	**0.06**	0.01	<0.01	0.02
pH	(pH units)	6.5-8.5	6.7	8.7	7.8						7.42	7.84	7.73	7.48	7.49
Total Organic Carbon	mg/L		5.80	33.30	10.79						13.3		9.4	5.8	11.2
Aluminum	mg/L	0.075*	0.23	40	2.93						**0.73**				**2.56**
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020						0.001				0.003
Barium	mg/L		0.03	0.23	0.057						0.03				0.04
Beryllium	mg/L	1.100	0.000	0.002	0.000						<0.001				<0.001
Bismuth	mg/L		0.0005	0.0025	0.00069						<0.005				<0.005
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071						<0.0001				0.0002
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018						0.0009				**0.0034**
Copper	mg/L		0.003	0.055	0.0077										
Lead	mg/L	0.005	0.00025	0.029	0.0017						<0.001				0.001
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012						0.013				0.012
Selenium	mg/L	0.100	0.001	0.025	0.002						0.003				0.004
Silver	mg/L	0.0001	0.00005	0.0002	0.000077						<0.0001				<0.0001
Strontium	mg/L		0.086	0.627	0.34						0.491				0.627
Tin	mg/L		0.0005	0.005	0.0012						<0.01				<0.01
Titanium	mg/L		0.005	0.75	0.056						0.03				<0.01
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18						1.35				0.74
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17						**0.20**				**2.68**
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067						0.004				0.006
Ion Percentage	%		0.015	47.39	2.46	2.8	3.4	35.8	1.1	2.0	0.0	8.2	2.0	2.3	1.6
Benzene	ug/L		0.05	0.25	0.088										
Toluene	ug/L		0.05	0.5	0.13										
Ethylbenzene	ug/L		0.05	0.25	0.090										
o-Xylene	ug/L		0.05	0.25	0.11										
p+m-Xylene	ug/L		0.05	0.3	0.16										
Total Xylenes	ug/L		0.05	0.3	0.11										
Total Oil & Grease	mg/L		0.25	0.5	0.27										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14 / SS14A									
Date						5-Oct-06	17-Nov-06	2-Mar-07	9-Jan-08	19-Mar-08	14-Jun-08	17-Jul-08	9-Sep-08	4-Nov-08	12-Feb-09
Routine/Storm Monitoring						Routine	Storm	Routine	Routine	Routine	Storm	Storm	Storm	Storm	Routine
Laboratory						Accutest	Accutest	Accutest	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125	117	56	121	239	129		78	98	145	139
Chloride	mg/L		3	210	13	52	19	9	26	10	23	27	17	24	5
Sulphate	mg/L		14	443	126	108	25	72	242	70		257	216	251	69
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.02	0.07	0.66		0.41	0.075	0.075	0.075	0.17	0.11
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate	mg/L		0.02	53.2	0.38	53.2	7.24	1.72	0.05	0.6	0.05	0.1	0.2	1.8	1.3
Nitrite	mg/L		0.005	0.3	0.021	<0.10	<0.10			0.02	<0.01	0.04	0.02	0.03	0.03
Phenols	mg/L	0.001	0.0005	0.015	0.00074	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.200	0.030	1.500	0.145	**0.23**	0.09	0.11	**0.51**	**0.23**	**0.25**	0.15	0.16	**0.24**	0.13
Calcium	mg/L		25	670	82	130	32	56	130	58	130	100	100	98	66
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	0.002	<0.001	<0.001	**0.010**	**0.010**	**0.020**	0.008	**0.015**	**0.009**	**0.013**
Iron	mg/L	0.300	0.050	260.000	2.505	0.16	**0.47**	0.27	**4.6**	**5.6**	**20**	**7.8**	**10**	**4.7**	**13**
Magnesium	mg/L		6.9	160	25	38	10	17	39	19	45	37	36	35	20
Potassium	mg/L		0.004	41	5.25	7	4	4	5	5.2	6.9	5	8.5	8.4	4.8
Sodium	mg/L		1.8	120	11	20	7	10	20	11	22	21	16	15	6.6
Nickel	mg/L	0.025	0.0005	5.2	0.0067	<0.005	<0.005	<0.005	0.008	0.008	**0.032**	0.012	0.015	0.006	0.017
Zinc	mg/L	0.02	0.00	0.78	0.01	<0.01	<0.01	<0.01	0.02	0.02	**0.07**	**0.025**	**0.03**	0.02	**0.036**
pH	(pH units)	6.5-8.5	6.7	8.7	7.8	7.89	7.33	7.79	7.83	6.87	8.32	7.82	7.32	7.98	6.77
Total Organic Carbon	mg/L		5.80	33.30	10.79	8.9	7.7	7.1	10.0	7.4	13.5	9.7	6.1	12.5	9.4
Aluminum	mg/L	0.075*	0.23	40	2.93		**1.77**				**11**	**4.5**	**9.4**	**7.9**	
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020		<0.001				0.007	0.004	0.004	0.002	
Barium	mg/L		0.03	0.23	0.057		0.05				0.098	0.05	0.085	0.063	
Beryllium	mg/L	1.100	0.000	0.002	0.000		<0.001				0.0007	<0.0006	<0.0006	<0.0006	
Bismuth	mg/L		0.0005	0.0025	0.00069		<0.005					<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071		<0.0001				0.0002	<0.0001	<0.0001	<0.0001	
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018		0.0008				**0.0088**	**0.0033**	**0.0044**	**0.0019**	
Copper	mg/L		0.003	0.055	0.0077		0.004				**0.020**	**0.009**	**0.009**	**0.006**	
Lead	mg/L	0.005	0.00025	0.029	0.0017		0.002				**0.011**	0.0038	0.0044	0.0018	
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012		<0.005				0.025	0.027	0.023	0.011	
Selenium	mg/L	0.100	0.001	0.025	0.002		<0.001				<0.002	<0.05	<0.005	<0.005	
Silver	mg/L	0.0001	0.00005	0.0002	0.000077		<0.0001				**0.0002**		<0.0001	<0.0001	
Strontium	mg/L		0.086	0.627	0.34		0.086				0.52	0.44	0.50	0.43	
Tin	mg/L		0.0005	0.005	0.0012		<0.01				<0.001	<0.002	<0.002	<0.002	
Titanium	mg/L		0.005	0.75	0.056		<0.01				0.22		0.27	0.25	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18	0.92	1.91				3	1	0.8	1.5	
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17	**0.11**	**0.87**				**0.33**	**0.21**	**<0.15**	**0.15**	
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067		0.002				**0.025**	**0.009**	**0.022**	**0.016**	
Ion Percentage	%		0.015	47.39	2.46	15.6	9.1	6.1	2.6	7.1		5.1	7.4	1.1	8.4
Benzene	ug/L		0.05	0.25	0.088						<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L		0.05	0.5	0.13						<0.2	<0.2	<0.3	<0.2	<0.3
Ethylbenzene	ug/L		0.05	0.25	0.090						<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	ug/L		0.05	0.25	0.11						<0.2	<0.2	<0.3	<0.2	<0.3
p+m-Xylene	ug/L		0.05	0.3	0.16						<0.4	<0.4	<0.6	<0.4	<0.6
Total Xylenes	ug/L		0.05	0.3	0.11						<0.4	<0.4	<0.6	<0.4	<0.6
Total Oil & Grease	mg/L		0.25	0.5	0.27						<0.5	<0.5	<0.5	<0.5	

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14 / SS14A									
Date						6-Apr-09	9-Aug-09	10-Oct-09	24-Oct-09	25-Jan-10	6-Apr-10	6-Jun-10	14-Oct-10	28-Feb-11	20-Apr-11
Routine/Storm Monitoring						Routine	Routine	Storm	Routine	Routine	Routine	Storm	Storm	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125	153	80		120	126	91		95	122	179
Chloride	mg/L		3	210	13	13	22	32	31	8	8	9	18	11	17
Sulphate	mg/L		14	443	126	180	210		350	99	150		220	89	210
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.075	0.075	0.075	0.075	0.075	0.270	0.230	0.075	0.570	0.075
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037	<0.02	<0.02		<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
Nitrate	mg/L		0.02	53.2	0.38	1.1	0.5	0.9	0.3	1.3	0.7	0.7	0.05	2.3	0.3
Nitrite	mg/L		0.005	0.3	0.021			0.03					0.01		
Phenols	mg/L	0.001	0.0005	0.015	0.00074	<0.001	<0.001		<0.001	<0.001	<0.001		<0.001	<0.001	<0.001
Boron	mg/L	0.200	0.030	1.500	0.145	0.16	0.08	0.14	0.10	0.12	**0.4**	0.14	0.09	0.17	**0.31**
Calcium	mg/L		25	670	82	130	66	120	130	64	670	180	95	60	100
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	**0.030**	<0.005	<0.005	<0.005	0.006	**0.26**	**0.073**	<0.005	<0.005	<0.005
Iron	mg/L	0.300	0.050	260.000	2.505	**29**	**1.8**	**1.0**	**1.4**	**3.0**	**260**	**76**	**2.5**	**1.5**	**3.6**
Magnesium	mg/L		6.9	160	25	43	22	40	44	19	160	48	23	20	34
Potassium	mg/L		0.004	41	5.25	7.2	3.9	4.3	7.1	5.0	41	11	7.7	4.6	4.2
Sodium	mg/L		1.8	120	11	13	12	19	20	7.3	16	9.1	11	8.3	15
Nickel	mg/L	0.025	0.0005	5.2	0.0067	**0.045**	0.004	<0.001	0.003	0.004	**0.36**	**0.11**	0.003	0.002	0.006
Zinc	mg/L	0.02	0.00	0.78	0.01	**0.097**	0.009	<0.01	**0.031**	0.012	**0.78**	**0.16**	0.010	0.012	0.019
pH	(pH units)	6.5-8.5	6.7	8.7	7.8	8.44	7.48	8.24	7.88	8.65	7.94	7.94	7.85	7.85	7.91
Total Organic Carbon	mg/L		5.80	33.30	10.79	17	6.9		8.2	5.8	14.8		10.7	6.0	13.2
Aluminum	mg/L	0.075*	0.23	40	2.93			**0.91**				**40**	**4.1**		
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020			<0.001				0.019	0.001		
Barium	mg/L		0.03	0.23	0.057			0.039				0.23	0.048		
Beryllium	mg/L	1.100	0.000	0.002	0.000			<0.0006				0.0024	<0.0006		
Bismuth	mg/L		0.0005	0.0025	0.00069			<0.001				<0.001	<0.001		
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071			<0.0001				**0.0003**	<0.0001		
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018			0.0005				**0.032**	0.0008		
Copper	mg/L		0.003	0.055	0.0077			0.003				**0.055**	0.003		
Lead	mg/L	0.005	0.00025	0.029	0.0017			<0.0005				**0.029**	0.0012		
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012			0.014				0.022	0.008		
Selenium	mg/L	0.100	0.001	0.025	0.002			<0.005				<0.005	<0.005		
Silver	mg/L	0.0001	0.00005	0.0002	0.000077			<0.0001				<0.0001	<0.0001		
Strontium	mg/L		0.086	0.627	0.34			0.52				0.46	0.33		
Tin	mg/L		0.0005	0.005	0.0012			<0.002				<0.002	<0.002		
Titanium	mg/L		0.005	0.75	0.056			0.026				0.75	0.16		
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18			0.9				5	1.2		
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17			**0.05**				**1.3**	**0.11**		
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067			0.002				**0.079**	**0.009**		
Ion Percentage	%		0.015	47.39	2.46	12.0	2.4		2.4	4.6	40.9		2.4	2.7	0.2
Benzene	ug/L		0.05	0.25	0.088	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L		0.05	0.5	0.13	<0.3	<0.3	<0.2	<0.3	<0.3	<0.3	<0.2	<0.2	<0.3	<0.3
Ethylbenzene	ug/L		0.05	0.25	0.090	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	ug/L		0.05	0.25	0.11	<0.3	<0.3	<0.2	<0.3	<0.3	<0.3	<0.2	<0.2	<0.3	<0.3
p+m-Xylene	ug/L		0.05	0.3	0.16	<0.6	<0.6	<0.4	<0.6	<0.6	<0.6	<0.4	<0.4	<0.6	<0.6
Total Xylenes	ug/L		0.05	0.3	0.11	<0.6	<0.6	<0.4				<0.4	<0.4		
Total Oil & Grease	mg/L		0.25	0.5	0.27			<0.5				<0.5	<1		

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14A									
Date						7-Jun-11	8-Aug-11	13-Oct-11	13-Mar-12	4-May-12	28-Jul-12	30-Oct-12	13-Jan-13	10-Apr-13	29-May-13
Routine/Storm Monitoring						Storm	Storm	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Storm
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125		132	176	140	92	92	74	150	130	
Chloride	mg/L		3	210	13	3	13	20	12	12	12	6	7	9	7
Sulphate	mg/L		14	443	126		290	210	170	250	190	94	120	120	
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.150	0.075	0.075	0.075	0.075	0.075	0.200	0.075	0.075	0.150
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Nitrate	mg/L		0.02	53.2	0.38	0.02	0.05	0.7	1.6	1.8	0.99	2.4	0.56	1.0	0.17
Nitrite	mg/L		0.005	0.3	0.021	0.3	<0.01								0.032
Phenols	mg/L	0.001	0.0005	0.015	0.00074			**0.015**	**0.0013**	<0.0010	**0.0035**	<0.0010	<0.0010	<0.0010	
Boron	mg/L	0.200	0.030	1.500	0.145	0.13	**0.25**	0.20	0.19	0.18	**0.22**	0.093	0.14	0.14	**0.23**
Calcium	mg/L		25	670	82	51	120	120	88	100	95	51	79	80	87
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	**0.045**	<0.005	0.007	**0.013**	0.0051	**0.0094**	**0.026**	0.0064	0.0063	<0.005
Iron	mg/L	0.300	0.050	260.000	2.505	**45**	**0.8**	**5.6**	**11**	**3.2**	**9.0**	**25**	**6.1**	**3.3**	**1.2**
Magnesium	mg/L		6.9	160	25	18	27	28	26	26	24	18	23	21	22
Potassium	mg/L		0.004	41	5.25	7.5	6.7	13	6.6	4.7	5.1	8.2	5.0	5.8	5.1
Sodium	mg/L		1.8	120	11	4.3	14	14	10	12	12	5.9	8.7	8.5	9.4
Nickel	mg/L	0.025	0.0005	5.2	0.0067	**0.056**	0.002	0.011	0.015	0.005	0.013	**0.029**	0.0081	0.0051	0.004
Zinc	mg/L	0.02	0.00	0.78	0.01	**0.12**	<0.005	**0.044**	**0.032**	0.019	**0.030**	**0.061**	0.018	0.012	0.02
pH	(pH units)	6.5-8.5	6.7	8.7	7.8	7.23	7.35	7.10	7.92	8.12	7.22	7.69	7.82	7.00	
Total Organic Carbon	mg/L		5.80	33.30	10.79		11.1	33.3	16	23	14	9.4	10	9.5	
Aluminum	mg/L	0.075*	0.23	40	2.93	**28**	**0.72**								**0.80**
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020	0.011	0.003								0.001
Barium	mg/L		0.03	0.23	0.057	0.17	0.053								0.035
Beryllium	mg/L	1.100	0.000	0.002	0.000	0.0014	<0.0005								<0.0006
Bismuth	mg/L		0.0005	0.0025	0.00069	<0.001	0.001								<0.0010
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071	**0.0003**	<0.0001								<0.0001
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018	**0.016**	0.0007								0.0007
Copper	mg/L		0.003	0.055	0.0077	**0.028**	0.004								**0.007**
Lead	mg/L	0.005	0.00025	0.029	0.0017	**0.019**	<0.0005								0.001
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012	0.010	0.019								0.011
Selenium	mg/L	0.100	0.001	0.025	0.002	<0.005	<0.002								<0.005
Silver	mg/L	0.0001	0.00005	0.0002	0.000077	<0.0001									<0.00010
Strontium	mg/L		0.086	0.627	0.34	0.16	0.44								0.29
Tin	mg/L		0.0005	0.005	0.0012	<0.002	<0.001								<0.002
Titanium	mg/L		0.005	0.75	0.056	0.51	0.021								0.017
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18	11	1								1.3
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17	**0.10**	**0.10**								**0.093**
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067	**0.053**	0.002								0.002
Ion Percentage	%		0.015	47.39	2.46		0.3	2.2	1.6	1.2	4.6	5.6	2.7	3.9	
Benzene	ug/L		0.05	0.25	0.088	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20
Toluene	ug/L		0.05	0.5	0.13	<0.2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.20
Ethylbenzene	ug/L		0.05	0.25	0.090	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20
o-Xylene	ug/L		0.05	0.25	0.11	<0.2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.20
p+m-Xylene	ug/L		0.05	0.3	0.16	<0.4	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.40
Total Xylenes	ug/L		0.05	0.3	0.11	<0.4	<0.6								
Total Oil & Grease	mg/L		0.25	0.5	0.27	<0.5									

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14A									
Date						5-Jul-13	28-Aug-13	7-Oct-13	11-Jan-14	8-Apr-14	7-Jul-14	15-Oct-14	4-Jan-15	10-Apr-15	25-Oct-15
Routine/Storm Monitoring						Routine	Storm	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125	81		160	64		52	200	70	220	180
Chloride	mg/L		3	210	13	6	5	15	7	140	5	24	10	15	35
Sulphate	mg/L		14	443	126	130		110	37	190	23	96	37	110	250
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.075	0.075	0.075	0.58	0.075	0.08	0.075	0.45	0.075	0.075
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037	<0.021		<0.0076	0.009	<0.0013	<0.0073	<0.0028	0.0051	<0.009	<0.00076
Nitrate	mg/L		0.02	53.2	0.38	0.05	0.05	0.05	1.4	0.05	0.31	0.05	1.22	0.05	0.1
Nitrite	mg/L		0.005	0.3	0.021		<0.010								
Phenols	mg/L	0.001	0.0005	0.015	0.00074	<0.0010		0.0012	**0.002**	**0.005**	**0.002**	**0.0097**	**0.0077**	<0.0010	<0.0010
Boron	mg/L	0.200	0.030	1.500	0.145	**1.5**	**0.49**	**0.39**	0.06	**1.5**	0.10	0.18	0.063	0.10	**0.54**
Calcium	mg/L		25	670	82	92	58	80	30	100	25	85	33	91	110
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	<0.005	0.006	<0.0050	<0.0050	<0.0050	**0.027**	<0.0050	<0.0050	<0.0050	<0.005
Iron	mg/L	0.300	0.050	260.000	2.505	**3.8**	**4.1**	**2.2**	**0.33**	0.21	**24.0**	**3.3**	**2.2**	**0.58**	**0.60**
Magnesium	mg/L		6.9	160	25	32	15	22	7.8	36	9	29	8.7	26	24
Potassium	mg/L		0.004	41	5.25	9	7.7	9.1	7.3	8.4	7.8	13	8.3	5.2	5.9
Sodium	mg/L		1.8	120	11	68	10	13	3.4	110	2	9.5	3.3	8.9	31
Nickel	mg/L	0.025	0.0005	5.2	0.0067	0.013	0.006	0.0041	<0.0010	0.01	**0.031**	0.0056	0.0033	0.002	0.002
Zinc	mg/L	0.02	0.00	0.78	0.01	0.016	0.01	0.01	0.0089	0.0059	**0.065**	**0.023**	0.013	0.006	<0.01
pH	(pH units)	6.5-8.5	6.7	8.7	7.8	8.37	8.33	8.21	8.07	7.73	7.97	7.85	7.99	8.45	7.46
Total Organic Carbon	mg/L		5.80	33.30	10.79	8.1		14	7.5	12	16	33	9.2	9.7	10
Aluminum	mg/L	0.075*	0.23	40	2.93		**6.1**								
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020		0.003								
Barium	mg/L		0.03	0.23	0.057		0.061								
Beryllium	mg/L	1.100	0.000	0.002	0.000		<0.0006								
Bismuth	mg/L		0.0005	0.0025	0.00069		<0.0010								
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071		<0.0001								
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018		**0.0017**								
Copper	mg/L		0.003	0.055	0.0077		**0.008**								
Lead	mg/L	0.005	0.00025	0.029	0.0017		0.0019								
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012		0.017								
Selenium	mg/L	0.100	0.001	0.025	0.002		<0.005								
Silver	mg/L	0.0001	0.00005	0.0002	0.000077		<0.00010								
Strontium	mg/L		0.086	0.627	0.34		0.25								
Tin	mg/L		0.0005	0.005	0.0012		<0.002								
Titanium	mg/L		0.005	0.75	0.056		0.26								
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18		1.3								
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17		**0.10**								
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067		0.014								
Ion Percentage	%		0.015	47.39	2.46	20.1		2.8	2.5		8.0	2.6	2.7	0.3	2.4
Benzene	ug/L		0.05	0.25	0.088	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L		0.05	0.5	0.13	<0.3	<0.20	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Ethylbenzene	ug/L		0.05	0.25	0.090	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	ug/L		0.05	0.25	0.11	<0.3	<0.20	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
p+m-Xylene	ug/L		0.05	0.3	0.16	<0.6	<0.40	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Total Xylenes	ug/L		0.05	0.3	0.11										
Total Oil & Grease	mg/L		0.25	0.5	0.27										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14A									
Date						25-Feb-16	7-Apr-16	21-Oct-16	12-Jan-17	6-Apr-17	13-Jul-17	28-Oct-17	23-Jan-18	4-Apr-18	8-Aug-18
Routine/Storm Monitoring						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125	180	180	91	120	220	98	120	160	170	84
Chloride	mg/L		3	210	13	11	7.4	33	21	33	4.4	17	13	13	4.6
Sulphate	mg/L		14	443	126	160	93	290	56	160	26	200	150	110	97
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.075	0.24	0.075	0.49	0.075	0.075	0.03	0.22	0.13	0.025
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037	<0.0021	0.0019	<0.0048	0.0014	<0.0005	<0.013	<0.0005	0.0061	<0.0005	<0.0005
Nitrate	mg/L		0.02	53.2	0.38	0.37	0.12	4.64	1.81	0.55	0.05	1.28	1.84	1.22	0.05
Nitrite	mg/L		0.005	0.3	0.021										
Phenols	mg/L	0.001	0.0005	0.015	0.00074	<0.0010	<0.0010	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	0.200	0.030	1.500	0.145	0.16	0.10	0.07	0.13	0.19	0.1	0.09	0.11	**0.29**	0.07
Calcium	mg/L		25	670	82	89	73	120	120	110	53	86	79	83	57
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	<0.0050	**0.011**	<0.005	0.061	<0.005	0.016	<0.005	<0.005	**0.013**	**0.011**
Iron	mg/L	0.300	0.050	260.000	2.505	**0.32**	**6.2**	**0.90**	**58**	**1.8**	**18**	**1.8**	**3.3**	**13**	**9.2**
Magnesium	mg/L		6.9	160	25	26	22	27	34	34	11	23	27	26	14
Potassium	mg/L		0.004	41	5.25	4.1	5.8	3.7	17	7.5	6.2	6.3	4.4	5.9	0.014
Sodium	mg/L		1.8	120	11	11	8.2	16	7.1	18	7	10	9.6	12	6.1
Nickel	mg/L	0.025	0.0005	5.2	0.0067	0.0013	0.0078	0.006	0.077	0.004	0.028	0.003	0.006	0.016	**5.2**
Zinc	mg/L	0.02	0.00	0.78	0.01	0.0077	**0.027**	<0.01	0.15	0.02	0.14	0.02	<0.01	0.04	0.02
pH	(pH units)	6.5-8.5	6.7	8.7	7.8	8.21	7.72	8.24	7.40	7.19	8.17	7.25	8.4	7.21	7.06
Total Organic Carbon	mg/L		5.80	33.30	10.79	5.9	9.5	10	8.6	11	12	10	6.2	12	11
Aluminum	mg/L	0.075*	0.23	40	2.93										
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020										
Barium	mg/L		0.03	0.23	0.057										
Beryllium	mg/L	1.100	0.000	0.002	0.000										
Bismuth	mg/L		0.0005	0.0025	0.00069										
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071										
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018										
Copper	mg/L		0.003	0.055	0.0077										
Lead	mg/L	0.005	0.00025	0.029	0.0017										
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012										
Selenium	mg/L	0.100	0.001	0.025	0.002										
Silver	mg/L	0.0001	0.00005	0.0002	0.000077										
Strontium	mg/L		0.086	0.627	0.34										
Tin	mg/L		0.0005	0.005	0.0012										
Titanium	mg/L		0.005	0.75	0.056										
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18										
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17										
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067										
Ion Percentage	%		0.015	47.39	2.46	0.4	0.9	0.5	20.3	1.7	11.1	1.1	0.1	3.6	2.7
Benzene	ug/L		0.05	0.25	0.088	<0.2	<0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.20
Toluene	ug/L		0.05	0.5	0.13	<0.3	<0.3	<0.10	<0.20	<0.20	<0.20	<0.10	<0.20	<0.50	<0.20
Ethylbenzene	ug/L		0.05	0.25	0.090	<0.2	<0.2	<0.20	<0.10	<0.10	<0.10	<0.20	<0.10	<0.25	<0.20
o-Xylene	ug/L		0.05	0.25	0.11	<0.3	<0.3	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.20
p+m-Xylene	ug/L		0.05	0.3	0.16	<0.6	<0.6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.20
Total Xylenes	ug/L		0.05	0.3	0.11			<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.20
Total Oil & Grease	mg/L		0.25	0.5	0.27										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14A									
Date						8-Aug-18	31-Oct-18	7-Feb-19	17-Apr-19	2-Oct-19	2-Oct-19	11-Jan-20	18-May-20	15-Nov-20	26-Mar-21
Routine/Storm Monitoring						Storm	Routine	Routine	Routine	Routine	Storm	Routine	Routine	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125		140	190	230	150		120	170	170	150
Chloride	mg/L		3	210	13	4.7	13	13	15	6.3	6.9	8.6	5.6	210	14
Sulphate	mg/L		14	443	126		72	95	210	180		74	140	200	150
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.025	0.057	0.025	0.025	0.025	0.025	0.025	0.078	0.064	0.025
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037		<0.00061	<0.00061	<0.0079	<0.0015		0.00048	0.0035	0.00083	<0.00055
Nitrate	mg/L		0.02	53.2	0.38	0.1	0.9	1.5	0.05	0.11	0.16	0.49	0.22	23.7	1.88
Nitrite	mg/L		0.005	0.3	0.021	<0.010					0.019				
Phenols	mg/L	0.001	0.0005	0.015	0.00074		<0.0010	<0.0010	<0.0010	0.001		0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	0.200	0.030	1.500	0.145	0.07	0.06	0.06	0.1	0.16	0.15	0.03	0.06	**1.30**	0.05
Calcium	mg/L		25	670	82	58	60	74	110	87	86	55	72	130	83
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	**0.01**	<0.005	<0.005	<0.005	<0.005	0.0025	0.0025	<0.005	<0.005	<0.005
Iron	mg/L	0.300	0.050	260.000	2.505	**8.4**	**4.4**	<0.1	0.1	**1.6**	**1.6**	**2.5**	**1.9**	**1.8**	**1.2**
Magnesium	mg/L		6.9	160	25	14	18	26	43	28	29	17	22	42	26
Potassium	mg/L		0.004	41	5.25	6	11	5.5	4.9	4.4	4.4	0.004	3.5	18	7.4
Sodium	mg/L		1.8	120	11	5.2	4.3	7.5	13	10	10	4.4	6.8	120	8.7
Nickel	mg/L	0.025	0.0005	5.2	0.0067	0.012	0.007	0.001	0.001	0.004	0.004	0.004	0.004	0.017	0.003
Zinc	mg/L	0.02	0.00	0.78	0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01
pH	(pH units)	6.5-8.5	6.7	8.7	7.8	7.06	6.72	7.85	**8.53**	7.86	8.0	8.2	8.2	7.8	7.8
Total Organic Carbon	mg/L		5.80	33.30	10.79		15	9.9	9.7	10		7.5	18.0	23	18
Aluminum	mg/L	0.075*	0.23	40	2.93	**5.3**					**1**				
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020	0.003					0.001				
Barium	mg/L		0.03	0.23	0.057	0.045					0.043				
Beryllium	mg/L	1.100	0.000	0.002	0.000	<0.0006					<0.0006				
Bismuth	mg/L		0.0005	0.0025	0.00069	<0.001					<0.001				
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071	<0.0001					<0.0001				
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018	**0.0034**					0.0008				
Copper	mg/L		0.003	0.055	0.0077	**0.01**					0.005				
Lead	mg/L	0.005	0.00025	0.029	0.0017	0.0035					0.001				
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012	0.007					0.012				
Selenium	mg/L	0.100	0.001	0.025	0.002	<0.005					<0.005				
Silver	mg/L	0.0001	0.00005	0.0002	0.000077	*<0.0004*					*<0.0004*				
Strontium	mg/L		0.086	0.627	0.34	0.18					0.4				
Tin	mg/L		0.0005	0.005	0.0012	<0.002					<0.002				
Titanium	mg/L		0.005	0.75	0.056	0.075					0.021				
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18	<0.7					<0.7				
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17	**0.18**					**0.088**				
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067	**0.011**					0.003				
Ion Percentage	%		0.015	47.39	2.46	47.1	1.5	0.6	0.8	0.9	47.4	0.9	3.0	3.7	1.2
Benzene	ug/L		0.05	0.25	0.088	<0.20	<0.25	<0.20	<0.25	<0.50	<0.20	<0.10	<0.25	<0.25	<0.25
Toluene	ug/L		0.05	0.5	0.13	<0.20	<0.50	<0.40	<0.50	<1.0	<0.20	<0.20	<0.50	<0.50	<0.50
Ethylbenzene	ug/L		0.05	0.25	0.090	<0.20	<0.25	<0.20	<0.25	<0.50	<0.20	<0.10	<0.25	<0.25	<0.25
o-Xylene	ug/L		0.05	0.25	0.11	<0.20	<0.25	<0.20	<0.25	<0.50	<0.20	<0.10	<0.25	<0.25	<0.25
p+m-Xylene	ug/L		0.05	0.3	0.16	<0.20	<0.25	<0.20	<0.25	<0.50	<0.20	<0.10	<0.25	<0.25	<0.25
Total Xylenes	ug/L		0.05	0.3	0.11	<0.20	<0.25	<0.20	<0.25	<0.50	<0.20	<0.10	<0.25	<0.25	<0.25
Total Oil & Grease	mg/L		0.25	0.5	0.27										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	East Ditch Line (Poplar System) - SS14A									
Date						23-Sep-21	23-Sep-21	26-Oct-21	17-Feb-22	4-May-22	28-Sep-22	28-Sep-22	19-Oct-22		
Routine/Storm Monitoring						Routine	Storm	Routine	Routine	Routine	Routine	Storm	Routine		
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas		
Alkalinity (as $CaCO_3$)	mg/L	<25%***	42	290	125	170		290	84	270	130		120		
Chloride	mg/L		3	210	13	9.4	9.3	12	4.8	11	22	24	8.7		
Sulphate	mg/L		14	443	126	130		140	14	93	66		89		
Ammonia (as N)	mg/L		0.01	2.1	0.093	0.025	0.075	0.11	2.1	0.025	0.025	0.075	0.2		
Ammonia Unionized	mg/L	0.02	0.00025	0.02	0.0037	<0.0012		0.0008	0.0060	<0.0039	<0.0011		0.0027		
Nitrate	mg/L		0.02	53.2	0.38	0.05	0.05	0.22	0.35	0.05	0.05	0.05	<0.10		
Nitrite	mg/L		0.005	0.3	0.021		<0.010					<0.010			
Phenols	mg/L	0.001	0.0005	0.015	0.00074	<0.0010		<0.0010	<0.0010	<0.0010	<0.0010		**0.0018**		
Boron	mg/L	0.200	0.030	1.500	0.145	0.07	0.07	0.07	0.03	0.09	0.08	0.07	0.04		
Calcium	mg/L		25	670	82	80	79	110	26	94	70	64	55		
Chromium	mg/L	0.0089	0.0005	0.2600	0.0047	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005		
Iron	mg/L	0.300	0.050	260.000	2.505	**0.4**	**0.4**	**0.4**	**4.3**	**0.6**	**1.0**	**1.3**	**4.6**		
Magnesium	mg/L		6.9	160	25	24	23	35	6.9	32	21	17	16		
Potassium	mg/L		0.004	41	5.25	8.5	8.4	6.8	8.4	4.2	4.1	3.9	7.2		
Sodium	mg/L		1.8	120	11	7.4	7.1	8.9	2.3	9.2	9.7	8.5	5.8		
Nickel	mg/L	0.025	0.0005	5.2	0.0067	0.002	0.002	0.002	0.007	0.002	0.003	0.003	0.007		
Zinc	mg/L	0.02	0.00	0.78	0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01	0.01		
pH	(pH units)	6.5-8.5	6.7	8.7	7.8	7.9	7.9	7.6	7.4	8.3	7.8	7.8	7.8		
Total Organic Carbon	mg/L		5.80	33.30	10.79	12		10	14	11	9.9		10		
Aluminum	mg/L	0.075*	0.23	40	2.93		**0.23**					**1.2**			
Arsenic	mg/L	0.100*	0.0005	0.019	0.0020		<0.001					<0.001			
Barium	mg/L		0.03	0.23	0.057		0.044					0.042			
Beryllium	mg/L	1.100	0.000	0.002	0.000		<0.0006					<0.0006			
Bismuth	mg/L		0.0005	0.0025	0.00069		<0.001					<0.001			
Cadmium	mg/L	0.0002	0.00005	0.0003	0.000071		<0.0001					<0.0001			
Cobalt	mg/L	0.0009	0.00025	0.032	0.0018		<0.0005					0.0007			
Copper	mg/L		0.003	0.055	0.0077		0.005					0.005			
Lead	mg/L	0.005	0.00025	0.029	0.0017		<0.0005					0.001			
Molybdenum	mg/L	0.040*	0.0025	0.027	0.012		0.008					0.009			
Selenium	mg/L	0.100	0.001	0.025	0.002		<0.005					<0.005			
Silver	mg/L	0.0001	0.00005	0.0002	0.000077		*<0.0004*					*<0.0004*			
Strontium	mg/L		0.086	0.627	0.34		0.32					0.24			
Tin	mg/L		0.0005	0.005	0.0012		<0.002					<0.002			
Titanium	mg/L		0.005	0.75	0.056		0.007					0.026			
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	11	1.18		0.8					<0.7			
Total Phosphorus	mg/L	0.02*	0.05	2.68	0.17		**0.091**					**0.067**			
Vanadium	mg/L	0.006*	0.0005	0.079	0.0067		<0.001					0.003			
Ion Percentage	%		0.015	47.39	2.46	0.5	46.1	0.4	1.0	0.6	5.8	38.3	0.1		
Benzene	ug/L		0.05	0.25	0.088	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
Toluene	ug/L		0.05	0.5	0.13	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20		
Ethylbenzene	ug/L		0.05	0.25	0.090	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
o-Xylene	ug/L		0.05	0.25	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
p+m-Xylene	ug/L		0.05	0.3	0.16	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
Total Xylenes	ug/L		0.05	0.3	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
Total Oil & Grease	mg/L		0.25	0.5	0.27										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	West Ditch Line (Poplar System) - SS15 / SS14B									
Date						4-Apr-03	13-Jun-03	15-Sep-03	3-May-04	31-Jul-04	23-Sep-05	9-Nov-05	18-Jan-06	9-Mar-06	3-Aug-06
Routine/Storm Monitoring						Routine	Routine	Routine	Routine	Routine	Storm	Routine	Routine	Routine	Storm
Laboratory						Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest	Accutest
Alkalinity (as $CaCO_3$)	mg/L	<25%***	49	330	120	89	148	76	166	84	131	75	141	97	102
Chloride	mg/L		6	150	30	13	16	20	8	10	48	26	14	11	32
Sulphate	mg/L		24	400	128	183	322	277	226	163	241	132	120	60	364
Ammonia (as N)	mg/L		0.025	2.4	0.119	0.07	0.06	0.03	0.35	0.08	0.05	0.11	0.39	0.60	0.03
Ammonia Unionized	mg/L	0.02	0.00025	0.081	0.0047	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Nitrate	mg/L		0.02	26.3	0.81	6.01	7.19	0.39	3.01	0.34	7.56	5.63	1.81	0.89	2.38
Nitrite	mg/L		0.005	0.915	0.035						0.14				<0.10
Phenols	mg/L	0.001	0.0005	0.0084	0.00074	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.200	0.020	2.000	0.258	**0.21**	**0.51**	**0.35**	**0.37**	0.20	**0.63**	**0.26**	**0.37**	0.15	**0.26**
Calcium	mg/L		0.2	250	76	78	126	122	93	57	107	71	67	39	119
Chromium	mg/L	0.0089	0.0005	0.1100	0.0056	<0.005	<0.005	<0.005	<0.005	**0.012**	0.002	**0.074**	0.002	0.001	0.002
Iron	mg/L	0.300	0.100	110.000	3.495	**1.33**	**1.28**	**0.52**	**0.75**	**8.42**	**0.51**	**59.0**	**0.47**	**0.65**	0.21
Magnesium	mg/L		0.05	57	23	26	47	28	28	21	31	22	21	12	37
Potassium	mg/L		0.2	26	6.62	3	3	10	4	4	6	4	3	4	7
Sodium	mg/L		0.1	110	19	12	19	18	15	11	26	16	12	8	26
Nickel	mg/L	0.025	0.001	0.15	0.0100	<0.005	<0.005	<0.005	<0.005	**0.037**	0.009	**0.083**	<0.005	<0.005	0.005
Zinc	mg/L	0.020	0.00	0.45	0.02	0.012	**0.027**	<0.005	**0.03**	**0.34**	<0.01	**0.15**	0.01	<0.01	<0.01
pH	(pH units)	6.5-8.5	6.7	8.8	7.8						7.31	7.89	7.68	7.84	7.45
Total Organic Carbon	mg/L		0.40	27.00	9.62						12.4		7.7	5.5	8.3
Aluminum	mg/L	0.075*	0.2	18	2.77						**0.68**				**0.20**
Arsenic	mg/L	0.100*	0.0005	0.008	0.0021						0.001				0.001
Barium	mg/L		0.026	0.14	0.054						0.04				0.04
Beryllium	mg/L	1.100	0.000	0.001	0.000						<0.001				<0.001
Bismuth	mg/L		0.0005	0.0025	0.00071						<0.005				<0.005
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000073						<0.0001				<0.0001
Cobalt	mg/L	0.0009	0.0005	0.011	0.0022						0.0009				0.0005
Copper			0.003	0.021	0.0084										
Lead	mg/L	0.005	0.0005	0.015	0.0023						<0.001				**0.006**
Molybdenum	mg/L	0.040*	0.0025	0.025	0.014						0.012				0.025
Selenium	mg/L	0.100	0.001	0.004	0.002						0.003				0.003
Silver	mg/L	0.0001	0.00005	0.0002	0.000085						<0.0001				<0.0001
Strontium	mg/L		0.16	0.57	0.35						0.461				0.533
Tin	mg/L		0.0005	0.005	0.0013						<0.01				<0.01
Titanium	mg/L		0.005	0.39	0.057						0.02				<0.01
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	5	1.13						1.29				0.73
Total Phosphorus	mg/L	0.02*	0.048	0.8	0.17						**0.19**				**0.07**
Vanadium	mg/L	0.006*	0.001	0.035	0.0062						0.003				0.001
Ion Percentage	%		0.115	54.13	3.67	4.1	3.6	4.7	0.1	0.5	1.9	6.7	2.3	2.0	0.3
Benzene	ug/L		0.05	0.25	0.082										
Toluene	ug/L		0.05	0.5	0.13										
Ethylbenzene	ug/L		0.05	0.25	0.085										
o-Xylene	ug/L		0.05	0.25	0.09										
p+m-Xylene	ug/L		0.05	0.3	0.12										
Total Xylenes	ug/L		0.05	0.3	0.09										
Total Oil & Grease	mg/L		0.25	0.25	0.25										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Downstream station SS15 redesignated as background station SS14B as a result of grading modifications in September 2009, and was further redesignated as a station
13) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
14) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	West Ditch Line (Poplar System) - SS15 / SS14B									
Date						5-Oct-06	17-Nov-06	2-Mar-07	9-Jan-08	19-Mar-08	14-Jun-08	17-Jul-08	9-Sep-08	4-Nov-08	12-Feb-09
Routine/Storm Monitoring						Routine	Storm	Routine	Routine	Routine	Storm	Storm	Storm	Storm	Routine
Laboratory						Accutest	Accutest	Accutest	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	49	330	120	140	169	101	123	99		100	85	118	101
Chloride	mg/L		6	150	30	51	28	16	33	12	21	27	17	25	10
Sulphate	mg/L		24	400	128	111	139	68	145	59		216	192	173	48
Ammonia (as N)	mg/L		0.025	2.4	0.119	0.04	0.20	0.76		0.33	0.075	0.075	0.075	0.23	0.1
Ammonia Unionized	mg/L	0.02	0.00025	0.081	0.0047	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate	mg/L		0.02	26.3	0.81	26.3	2.88	1.92	3.5	0.8	1.0	0.8	0.5	1.4	1.5
Nitrite	mg/L		0.005	0.915	0.035	<0.10	<0.10			0.02	0.03	0.04	0.03	0.03	0.02
Phenols	mg/L	0.001	0.0005	0.0084	0.00074	0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.200	0.020	2.000	0.258	**0.36**	**0.43**	0.16	**0.33**	0.18	0.19	0.19	0.14	**0.23**	0.16
Calcium	mg/L		0.2	250	76	110	80	48	73	45	79	95	88	79	48
Chromium	mg/L	0.0089	0.0005	0.1100	0.0056	0.002	0.001	<0.001	**0.017**	<0.005	**0.009**	<0.005	**0.017**	0.008	**0.02**
Iron	mg/L	0.300	0.100	110.000	3.495	**0.37**	**0.35**	0.27	**7.8**	**2.1**	**9.2**	**1.4**	**11**	**8.6**	**22**
Magnesium	mg/L		0.05	57	23	30	25	14	22	14	23	29	31	26	16
Potassium	mg/L		0.2	26	6.62	7	5	5	5	3.8	5.2	4.3	8.9	7.8	6
Sodium	mg/L		0.1	110	19	20	19	14	19	10	16	19	15	14	8.2
Nickel	mg/L	0.025	0.001	0.15	0.0100	<0.005	<0.005	<0.005	0.014	0.003	0.015	0.003	0.017	0.011	**0.026**
Zinc	mg/L	0.020	0.00	0.45	0.02	<0.01	<0.01	<0.01	**0.03**	0.01	**0.03**	0.008	**0.04**	**0.04**	**0.058**
pH	(pH units)	6.5-8.5	6.7	8.8	7.8	7.86	7.96	7.75	7.83	6.84	7.66	7.41	7.32	8.08	6.70
Total Organic Carbon	mg/L		0.40	27.00	9.62	10.5	9.8	7.7	10.6	7.1	8.2	7.6	6.9	11.1	12.7
Aluminum	mg/L	0.075*	0.2	18	2.77		**0.80**				**5.9**	**0.93**	**11**	**5.5**	
Arsenic	mg/L	0.100*	0.0005	0.008	0.0021		<0.001				0.004	0.001	0.004	0.003	
Barium	mg/L		0.026	0.14	0.054		0.04				0.058	0.04	0.088	0.055	
Beryllium	mg/L	1.100	0.000	0.001	0.000		<0.001				<0.0006	<0.0006	<0.0006	<0.0006	
Bismuth	mg/L		0.0005	0.0025	0.00071		<0.005					<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000073		<0.0001				**0.0005**	<0.0001	<0.0001	<0.0001	
Cobalt	mg/L	0.0009	0.0005	0.011	0.0022		0.0005				**0.0038**	0.0006	**0.0047**	**0.0033**	
Copper			0.003	0.021	0.0084		0.003				**0.010**	0.004	**0.010**	**0.008**	
Lead	mg/L	0.005	0.0005	0.015	0.0023		<0.001				0.0044	0.0007	0.005	0.0034	
Molybdenum	mg/L	0.040*	0.0025	0.025	0.014		<0.005				0.015	0.02	0.023	0.009	
Selenium	mg/L	0.100	0.001	0.004	0.002		<0.001				<0.002	<0.005	<0.005	<0.005	
Silver	mg/L	0.0001	0.00005	0.0002	0.000085		<0.0001				<0.0001		<0.0001	<0.0001	
Strontium	mg/L		0.16	0.57	0.35		0.291				0.30	0.39	0.42	0.31	
Tin	mg/L		0.0005	0.005	0.0013		<0.01				<0.001	<0.002	<0.002	<0.002	
Titanium	mg/L		0.005	0.39	0.057		0.01				0.10		0.39	0.096	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	5	1.13	1.18	1.28				2	0.7	1	1.8	
Total Phosphorus	mg/L	0.02*	0.048	0.8	0.17	**0.13**	**0.20**				**0.21**	**0.07**	**0.23**	**0.78**	
Vanadium	mg/L	0.006*	0.001	0.035	0.0062		0.001				**0.012**	0.002	**0.025**	**0.011**	
Ion Percentage	%		0.115	54.13	3.67	10.0	2.2	5.1	1.9	5.4		3.9	7.1	2.5	9.2
Benzene	ug/L		0.05	0.25	0.082						<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L		0.05	0.5	0.13						<0.2	<0.2	<0.3	<0.2	<0.3
Ethylbenzene	ug/L		0.05	0.25	0.085						<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	ug/L		0.05	0.25	0.09						<0.2	<0.2	<0.3	<0.2	<0.3
p+m-Xylene	ug/L		0.05	0.3	0.12						<0.4	<0.4	<0.6	<0.4	<0.6
Total Xylenes	ug/L		0.05	0.3	0.09						<0.4	<0.4	<0.6	<0.4	
Total Oil & Grease	mg/L		0.25	0.25	0.25						<0.5	<0.5	<0.5	<0.5	

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Downstream station SS15 redesignated as background station SS14B as a result of grading modifications in September 2009, and was further redesignated as a station
13) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
14) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	West Ditch Line (Poplar System) - SS14B									
Date						6-Apr-09	7-Jun-11	9-Aug-11	29-Nov-11	13-Jan-13	10-Apr-13	5-Jul-13	28-Aug-13	7-Oct-13	11-Jan-14
Routine/Storm Monitoring						Routine	Storm	Storm	Routine	Routine	Routine	Routine	Storm	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	49	330	120	111		56	98	200	110	130		250	60
Chloride	mg/L		6	150	30	16	6	28	28	110	48	85	21	130	7
Sulphate	mg/L		24	400	128	120		220	46	210	95	150		170	24
Ammonia (as N)	mg/L		0.025	2.4	0.119	0.075	0.15	0.075	0.075	0.075	0.21	0.075	0.075	0.075	0.83
Ammonia Unionized	mg/L	0.02	0.00025	0.081	0.0047	<0.02		<0.02	<0.02	<0.02	<0.02	<0.014		<0.0079	0.0075
Nitrate	mg/L		0.02	26.3	0.81	2.0	0.02	1.2	0.2	0.37	0.58	0.05	0.05	0.05	0.99
Nitrite	mg/L		0.005	0.915	0.035		0.3	<0.01					<0.010		
Phenols	mg/L	0.001	0.0005	0.0084	0.00074	<0.001		0.001	<0.001	<0.0010	<0.0010	<0.0010		<0.0010	**0.0024**
Boron	mg/L	0.200	0.020	2.000	0.258	0.20	0.16	**0.41**	**0.67**	**1.4**	**0.75**	**1.5**	**0.3**	**2.0**	0.042
Calcium	mg/L		0.2	250	76	86	52	74	30	110	250	92	77	120	26
Chromium	mg/L	0.0089	0.0005	0.1100	0.0056	**0.014**	**0.029**	<0.005	<0.005	<0.0050	**0.092**	<0.0050	**0.01**	<0.0050	<0.0050
Iron	mg/L	0.300	0.100	110.000	3.495	**14**	**30**	**3.2**	**4.3**	**0.86**	**94**	**3.8**	**7**	**1.8**	**3.3**
Magnesium	mg/L		0.05	57	23	27	16	23	11	35	57	21	19	36	6.2
Potassium	mg/L		0.2	26	6.62	4.9	6.3	5.4	6.2	8.3	13	9	9.8	10	8.4
Sodium	mg/L		0.1	110	19	13	4.7	31	34	100	45	68	18	110	2.3
Nickel	mg/L	0.025	0.001	0.15	0.0100	0.022	**0.039**	0.006	0.007	0.0080	**0.13**	0.013	0.011	0.012	0.005
Zinc	mg/L	0.020	0.00	0.45	0.02	**0.10**	**0.08**	0.008	**0.022**	0.0067	**0.45**	0.016	0.02	0.0077	0.018
pH	(pH units)	6.5-8.5	6.7	8.8	7.8	8.45	7.21	6.92	7.10	7.47	7.09	8.19	8.22	8.11	7.84
Total Organic Carbon	mg/L		0.40	27.00	9.62	17		7.8	8.2	11	7.9	16		17	9.3
Aluminum	mg/L	0.075*	0.2	18	2.77		**18**	**1.9**					**8.4**		
Arsenic	mg/L	0.100*	0.0005	0.008	0.0021		0.008	0.002					0.004		
Barium	mg/L		0.026	0.14	0.054		0.14	0.031					0.078		
Beryllium	mg/L	1.100	0.000	0.001	0.000		0.0010	<0.0005					<0.0006		
Bismuth	mg/L		0.0005	0.0025	0.00071		<0.001	<0.001					<0.0010		
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000073		0.0002	<0.0001					<0.0001		
Cobalt	mg/L	0.0009	0.0005	0.011	0.0022		**0.011**	**0.0015**					**0.0039**		
Copper			0.003	0.021	0.0084		**0.021**	0.005					**0.01**		
Lead	mg/L	0.005	0.0005	0.015	0.0023		**0.015**	0.0013					0.0037		
Molybdenum	mg/L	0.040*	0.0025	0.025	0.014		0.009	0.02					0.016		
Selenium	mg/L	0.100	0.001	0.004	0.002		<0.005	0.004					<0.005		
Silver	mg/L	0.0001	0.00005	0.0002	0.000085		<0.0001						<0.00010		
Strontium	mg/L		0.16	0.57	0.35		0.16	0.36					0.39		
Tin	mg/L		0.0005	0.005	0.0013		<0.002	<0.001					<0.002		
Titanium	mg/L		0.005	0.39	0.057		0.34	0.047					0.2		
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	5	1.13		5	2					1.5		
Total Phosphorus	mg/L	0.02*	0.048	0.8	0.17		**0.8**	**0.092**					**0.18**		
Vanadium	mg/L	0.006*	0.001	0.035	0.0062		**0.035**	0.004					**0.017**		
Ion Percentage	%		0.115	54.13	3.67	10.3		2.0	2.2	3.0	28.3	4.0	41.6	3.5	3.0
Benzene	ug/L		0.05	0.25	0.082	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L		0.05	0.5	0.13	<0.3	<0.2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.2	<0.3	<0.3
Ethylbenzene	ug/L		0.05	0.25	0.085	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	ug/L		0.05	0.25	0.09	<0.3	<0.2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.2	<0.3	<0.3
p+m-Xylene	ug/L		0.05	0.3	0.12	<0.6	<0.4	<0.6	<0.6	<0.6	<0.6	<0.6	<0.4	<0.6	<0.6
Total Xylenes	ug/L		0.05	0.3	0.09		<0.4	<0.6							
Total Oil & Grease	mg/L		0.25	0.25	0.25		<0.5								

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Downstream station SS15 redesignated as background station SS14B as a result of grading modifications in September 2009, and was further redesignated as a station
13) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
14) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	West Ditch Line (Poplar System) - SS14B									
Date						8-Apr-14	7-Jul-14	4-Jan-15	10-Apr-15	25-Oct-15	7-Apr-16	14-Jul-16	21-Oct-16	12-Jan-17	6-Apr-17
Routine/Storm Monitoring						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	49	330	120		64	70	250	77	210	100	97	120	220
Chloride	mg/L		6	150	30	130	12	10	48	30	21	22	33	21	33
Sulphate	mg/L		24	400	128	180	120	38	250	150	130	110	310	62	160
Ammonia (as N)	mg/L		0.025	2.4	0.119	0.075	0.075	0.44	0.075	0.075	0.075	0.075	0.075	0.51	0.075
Ammonia Unionized	mg/L	0.02	0.00025	0.081	0.0047	<0.0034	<0.0013	0.0076	<0.0061	<0.0014	<0.0019	<0.0068	<0.0037	0.0013	<0.0014
Nitrate	mg/L		0.02	26.3	0.81	0.05	0.05	1.19	1.15	0.57	0.65	0.05	4.28	1.89	0.54
Nitrite	mg/L		0.005	0.915	0.035										
Phenols	mg/L	0.001	0.0005	0.0084	0.00074	**0.005**	**0.003**	**0.0084**	<0.0010	<0.0010	<0.0010	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*
Boron	mg/L	0.200	0.020	2.000	0.258	**1.4**	**0.23**	0.064	**0.28**	0.10	0.15	0.13	0.08	0.14	0.20
Calcium	mg/L		0.2	250	76	100	80	33	150	62	94	64	130	110	120
Chromium	mg/L	0.0089	0.0005	0.1100	0.0056	<0.0050	**0.013**	<0.0050	0.0057	<0.005	<0.0050	0.007	<0.005	0.052	<0.005
Iron	mg/L	0.300	0.100	110.000	3.495	0.14	**12**	**2.2**	**5.2**	**1.4**	**1.6**	**3.5**	**1.7**	**52**	**2.4**
Magnesium	mg/L		0.05	57	23	33	19	9	48	15	27	16	28	31	35
Potassium	mg/L		0.2	26	6.62	8.1	5.9	8.3	5.5	11	4.2	9.9	4.7	15	6.7
Sodium	mg/L		0.1	110	19	100	13	3.3	29	16	14	12	16	6.7	18
Nickel	mg/L	0.025	0.001	0.15	0.0100	0.0096	0.018	0.0035	0.014	0.004	0.0029	0.006	0.004	0.072	0.005
Zinc	mg/L	0.020	0.00	0.45	0.02	<0.0050	**0.03**	0.012	**0.032**	0.020	0.011	0.010	<0.01	**0.14**	0.020
pH	(pH units)	6.5-8.5	6.7	8.8	7.8	8.12	7.16	8.14	8.27	7.71	8.02	7.93	8.09	7.36	7.81
Total Organic Carbon	mg/L		0.40	27.00	9.62	12	10	11	11	6.9	9.2	9.5	12	8.6	11
Aluminum	mg/L	0.075*	0.2	18	2.77										
Arsenic	mg/L	0.100*	0.0005	0.008	0.0021										
Barium	mg/L		0.026	0.14	0.054										
Beryllium	mg/L	1.100	0.000	0.001	0.000										
Bismuth	mg/L		0.0005	0.0025	0.00071										
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000073										
Cobalt	mg/L	0.0009	0.0005	0.011	0.0022										
Copper			0.003	0.021	0.0084										
Lead	mg/L	0.005	0.0005	0.015	0.0023										
Molybdenum	mg/L	0.040*	0.0025	0.025	0.014										
Selenium	mg/L	0.100	0.001	0.004	0.002										
Silver	mg/L	0.0001	0.00005	0.0002	0.000085										
Strontium	mg/L		0.16	0.57	0.35										
Tin	mg/L		0.0005	0.005	0.0013										
Titanium	mg/L		0.005	0.39	0.057										
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	5	1.13										
Total Phosphorus	mg/L	0.02*	0.048	0.8	0.17										
Vanadium	mg/L	0.006*	0.001	0.035	0.0062										
Ion Percentage	%		0.115	54.13	3.67	12.2	10.5	2.7	2.6	1.1	0.4	1.8	0.6	17.7	3.2
Benzene	ug/L		0.05	0.25	0.082	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.10	<0.10	<0.10	<0.10
Toluene	ug/L		0.05	0.5	0.13	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.10	<0.10	<0.20	<0.20
Ethylbenzene	ug/L		0.05	0.25	0.085	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.10	<0.10
o-Xylene	ug/L		0.05	0.25	0.09	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.10	<0.10	<0.10	<0.10
p+m-Xylene	ug/L		0.05	0.3	0.12	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.10	<0.10	<0.10	<0.10
Total Xylenes	ug/L		0.05	0.3	0.09							<0.10	<0.10	<0.10	<0.10
Total Oil & Grease	mg/L		0.25	0.25	0.25										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Downstream station SS15 redesignated as background station SS14B as a result of grading modifications in September 2009, and was further redesignated as a station
13) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
14) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	West Ditch Line (Poplar System) - SS14B									
Date						13-Jul-17	28-Oct-17	23-Jan-18	4-Apr-18	8-Aug-18	8-Aug-18	2-Oct-18	7-Feb-19	19-Apr-19	2-Oct-19
Routine/Storm Monitoring						Routine	Routine	Routine	Routine	Routine	Storm	Routine	Routine	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas
Alkalinity (as $CaCO_3$)	mg/L	<25%***	49	330	120	65	130	180	170	49		240	180	180	140
Chloride	mg/L		6	150	30	13	33	39	13	7.7	9.5	120	45	33	150
Sulphate	mg/L		24	400	128	98	240	70	120	63		180	84	93	240
Ammonia (as N)	mg/L		0.025	2.4	0.119	0.075	0.056	0.089	0.13	0.13	0.086	0.092	0.19	0.025	0.76
Ammonia Unionized	mg/L	0.02	0.00025	0.081	0.0047	<0.013	<0.0005	0.0021	0.0009	0.0025		0.0018	0.0019	<0.0024	**0.081**
Nitrate	mg/L		0.02	26.3	0.81	1.46	0.75	1.26	1.19	1.07	1.07	8.63	2.23	0.99	5.16
Nitrite	mg/L		0.005	0.915	0.035						0.026				
Phenols	mg/L	0.001	0.0005	0.0084	0.00074	*<0.0040*	<0.0010	0.0015	<0.0010	<0.0010		<0.0010	<0.0010	<0.0010	0.001
Boron	mg/L	0.200	0.020	2.000	0.258	0.1	0.09	0.46	**0.24**	0.06	0.06	0.02	0.16	0.11	**0.77**
Calcium	mg/L		0.2	250	76	200	100	66	83	45	44	0.2	80	160	130
Chromium	mg/L	0.0089	0.0005	0.1100	0.0056	0.11	<0.005	<0.005	**0.013**	0.008	0.007	0.005	<0.005	**0.052**	<0.005
Iron	mg/L	0.300	0.100	110.000	3.495	**110**	**0.7**	**1.5**	**12**	**6.6**	**6.2**	0.1	**0.8**	**51**	**1.4**
Magnesium	mg/L		0.05	57	23	51	27	16	26	16	16	0.05	24	41	40
Potassium	mg/L		0.2	26	6.62	26	5.5	6.9	5.7	4.1	3.9	0.2	5.5	10	10
Sodium	mg/L		0.1	110	19	9	19	30	12	7.6	7.6	0.1	21	17	63
Nickel	mg/L	0.025	0.001	0.15	0.0100	0.15	0.003	0.005	0.015	0.01	0.009	0.001	0.003	**0.072**	0.014
Zinc	mg/L	0.020	0.00	0.45	0.02	**0.4**	<0.01	0.01	**0.04**	0.01	0.01	0.01	<0.01	**0.14**	0.01
pH	(pH units)	6.5-8.5	6.7	8.8	7.8	8.16	7.35	8.32	7.71	7.5	7.5	7.67	7.96	8.43	8.43
Total Organic Carbon	mg/L		0.40	27.00	9.62	8.2	8.6	9.8	12	4.9		16	7.3	18	18
Aluminum	mg/L	0.075*	0.2	18	2.77						**4.4**				
Arsenic	mg/L	0.100*	0.0005	0.008	0.0021						0.002				
Barium	mg/L		0.026	0.14	0.054						0.038				
Beryllium	mg/L	1.100	0.000	0.001	0.000						<0.0006				
Bismuth	mg/L		0.0005	0.0025	0.00071						<0.001				
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000073						<0.0001				
Cobalt	mg/L	0.0009	0.0005	0.011	0.0022						**0.0026**				
Copper			0.003	0.021	0.0084						**0.007**				
Lead	mg/L	0.005	0.0005	0.015	0.0023						0.0021				
Molybdenum	mg/L	0.040*	0.0025	0.025	0.014						0.018				
Selenium	mg/L	0.100	0.001	0.004	0.002						<0.005				
Silver	mg/L	0.0001	0.00005	0.0002	0.000085						*<0.0004*				
Strontium	mg/L		0.16	0.57	0.35						0.16				
Tin	mg/L		0.0005	0.005	0.0013						<0.002				
Titanium	mg/L		0.005	0.39	0.057						0.054				
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	5	1.13						<0.7				
Total Phosphorus	mg/L	0.02*	0.048	0.8	0.17						**0.087**				
Vanadium	mg/L	0.006*	0.001	0.035	0.0062						**0.009**				
Ion Percentage	%		0.115	54.13	3.67	30.8	1.2	0.3	2.7	11.7	43.7	54.1	1.5	16.2	1.5
Benzene	ug/L		0.05	0.25	0.082	<0.10	<0.10	<0.10	<0.25	<0.20	<0.20	<0.25	<0.10	<0.25	<0.50
Toluene	ug/L		0.05	0.5	0.13	<0.20	<0.10	<0.20	<0.50	<0.20	<0.20	<0.50	<0.20	<0.50	<1.0
Ethylbenzene	ug/L		0.05	0.25	0.085	<0.10	<0.20	<0.10	<0.25	<0.20	<0.20	<0.25	<0.10	<0.25	<0.50
o-Xylene	ug/L		0.05	0.25	0.09	<0.10	<0.10	<0.10	<0.25	<0.20	<0.20	<0.25	<0.10	<0.25	<0.50
p+m-Xylene	ug/L		0.05	0.3	0.12	<0.10	<0.10	<0.10	<0.25	<0.20	<0.20	<0.25	<0.10	<0.25	<0.50
Total Xylenes	ug/L		0.05	0.3	0.09	<0.10	<0.10	<0.10	<0.25	<0.20	<0.20	<0.25	<0.10	<0.25	<0.50
Total Oil & Grease	mg/L		0.25	0.25	0.25										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Downstream station SS15 redesignated as background station SS14B as a result of grading modifications in September 2009, and was further redesignated as a station
13) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
14) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	West Ditch Line (Poplar System) - SS14B									
Date						2-Oct-19	11-Jan-20	18-May-20	15-Nov-20	26-Mar-21	3-Jun-21	9-Jul-21	8-Sep-21	23-Sep-21	26-Oct-21
Routine/Storm Monitoring						Storm	Routine	Routine	Routine	Routine	Routine	Routine	Storm	Storm	Routine
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (as $CaCO_3$)	mg/L	<25%***	49	330	120		150	200	130	160	72	120			330
Chloride	mg/L		6	150	30	150	49	94	140	130	41	94	33	130	120
Sulphate	mg/L		24	400	128		48	150	190	160	400	170			150
Ammonia (as N)	mg/L		0.025	2.4	0.119	0.93	0.11	0.62	0.17	0.19	0.09	0.025	0.075	0.075	0.025
Ammonia Unionized	mg/L	0.02	0.00025	0.081	0.0047		0.0026	**0.034**	0.0046	0.0020	0.0019	<0.0068			<0.0015
Nitrate	mg/L		0.02	26.3	0.81	5.15	6.15	6.00	12	9.91	0.48	0.05	0.30	2.64	0.15
Nitrite	mg/L		0.005	0.915	0.035	0.915							0.031	0.027	
Phenols	mg/L	0.001	0.0005	0.0084	0.00074		0.0005	<0.0010	<0.0010	<0.0010	**0.0011**	<0.0010			<0.0010
Boron	mg/L	0.200	0.020	2.000	0.258	**0.78**	**0.43**	**0.77**	**1**	**0.71**	0.14	**0.82**	0.13	**0.89**	**0.92**
Calcium	mg/L		0.2	250	76	130	120	100	110	110	120	75	85	160	130
Chromium	mg/L	0.0089	0.0005	0.1100	0.0056	<0.005	**0.041**	**0.012**	**0.009**	0.007	<0.005	0.005	<0.005	**0.017**	<0.005
Iron	mg/L	0.300	0.100	110.000	3.495	**1.3**	**41**	**11**	**6.2**	**6.4**	**2.1**	**4.2**	**2.0**	**16**	**0.9**
Magnesium	mg/L		0.05	57	23	40	32	33	35	34	43	27	31	46	38
Potassium	mg/L		0.2	26	6.62	10	14	10	21	13	4.4	8	5.7	11	9.3
Sodium	mg/L		0.1	110	19	62	37	63	86	72	28	58	21	76	74
Nickel	mg/L	0.025	0.001	0.15	0.0100	0.014	**0.06**	0.022	0.02	0.018	0.004	0.012	0.004	**0.030**	0.009
Zinc	mg/L	0.020	0.00	0.45	0.02	0.01	**0.14**	**0.04**	0.02	0.02	<0.01	0.01	<0.01	**0.04**	<0.01
pH	(pH units)	6.5-8.5	6.7	8.8	7.8	8.43	8.23	8.30	8.1	7.8	7.6	8.5	8.1	8.2	8.2
Total Organic Carbon	mg/L		0.40	27.00	9.62		7.1	0.4	27	22	5	13			13
Aluminum	mg/L	0.075*	0.2	18	2.77	**0.77**							**1.5**	**9.1**	
Arsenic	mg/L	0.100*	0.0005	0.008	0.0021	0.001							0.001	0.005	
Barium	mg/L		0.026	0.14	0.054	0.063							0.026	0.11	
Beryllium	mg/L	1.100	0.000	0.001	0.000	<0.0006							<0.0006	<0.0006	
Bismuth	mg/L		0.0005	0.0025	0.00071	<0.001							<0.001	<0.001	
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000073	0.0002							<0.0001	0.0001	
Cobalt	mg/L	0.0009	0.0005	0.011	0.0022	**0.0022**							**0.0011**	**0.0074**	
Copper			0.003	0.021	0.0084	**0.01**							**0.006**	**0.019**	
Lead	mg/L	0.005	0.0005	0.015	0.0023	0.0009							0.0009	**0.0061**	
Molybdenum	mg/L	0.040*	0.0025	0.025	0.014	0.021							0.023	0.011	
Selenium	mg/L	0.100	0.001	0.004	0.002	<0.005							<0.005	<0.005	
Silver	mg/L	0.0001	0.00005	0.0002	0.000085	*<0.0004*							*<0.0004*	*<0.0004*	
Strontium	mg/L		0.16	0.57	0.35	0.56							0.43	0.57	
Tin	mg/L		0.0005	0.005	0.0013	<0.002							<0.002	<0.002	
Titanium	mg/L		0.005	0.39	0.057	0.018							0.025	0.13	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	5	1.13	2.4							<0.7	1.3	
Total Phosphorus	mg/L	0.02*	0.048	0.8	0.17	**0.11**							**0.048**	**0.33**	
Vanadium	mg/L	0.006*	0.001	0.035	0.0062	0.002							0.003	**0.018**	
Ion Percentage	%		0.115	54.13	3.67	25.2	16.9	2.3	4.7	3.6	0.3	0.2	39.5	30.8	0.1
Benzene	ug/L		0.05	0.25	0.082	<0.20	<0.10	<0.25	<0.50	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
Toluene	ug/L		0.05	0.5	0.13	<0.20	<0.20	<0.50	<1.0	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	ug/L		0.05	0.25	0.085	<0.20	<0.10	<0.25	<0.50	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	ug/L		0.05	0.25	0.09	<0.20	<0.10	<0.25	<0.50	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
p+m-Xylene	ug/L		0.05	0.3	0.12	<0.20	<0.10	<0.25	<0.50	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
Total Xylenes	ug/L		0.05	0.3	0.09	<0.20	<0.10	<0.25	<0.50	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10
Total Oil & Grease	mg/L		0.25	0.25	0.25										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Downstream station SS15 redesignated as background station SS14B as a result of grading modifications in September 2009, and was further redesignated as a station
13) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
14) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	West Ditch Line (Poplar System) - SS14B									
Date						17-Feb-22	4-May-22	30-Aug-22	28-Sep-22	18-Oct-22					
Routine/Storm Monitoring						Routine	Routine	Routine	Storm	Routine					
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas					
Alkalinity (as $CaCO_3$)	mg/L	<25%***	49	330	120	120	300	68		58					
Chloride	mg/L		6	150	30	18	84	31	7.0	14					
Sulphate	mg/L		24	400	128	24	120	270		170					
Ammonia (as N)	mg/L		0.025	2.4	0.119	2.4	0.13	0.15	0.075	<0.050					
Ammonia Unionized	mg/L	0.02	0.00025	0.081	0.0047	0.0084	**0.03**	0.01		<0.0011					
Nitrate	mg/L		0.02	26.3	0.81	0.63	0.05	0.05	0.24	0.27					
Nitrite	mg/L		0.005	0.915	0.035				<0.010						
Phenols	mg/L	0.001	0.0005	0.0084	0.00074	**0.0012**	<0.0010	**0.0020**		<0.0010					
Boron	mg/L	0.200	0.020	2.000	0.258	**0.29**	**0.98**	0.20	0.05	0.09					
Calcium	mg/L		0.2	250	76	42	100	130	52	87					
Chromium	mg/L	0.0089	0.0005	0.1100	0.0056	<0.005	<0.005	**0.010**	**0.016**	**0.027**					
Iron	mg/L	0.300	0.100	110.000	3.495	**4.2**	**2.5**	**9.3**	**16**	**25**					
Magnesium	mg/L		0.05	57	23	11	32	38	19	28					
Potassium	mg/L		0.2	26	6.62	10	6.5	7.2	4.6	8					
Sodium	mg/L		0.1	110	19	13	61	19	5.9	10					
Nickel	mg/L	0.025	0.001	0.15	0.0100	0.008	0.011	0.015	0.022	**0.038**					
Zinc	mg/L	0.020	0.00	0.45	0.02	**0.03**	<0.01	0.02	**0.04**	**0.07**					
pH	(pH units)	6.5-8.5	6.7	8.8	7.8	7.5	**8.8**	8.1	8.1	8.1					
Total Organic Carbon	mg/L		0.40	27.00	9.62	16	13	10		7.7					
Aluminum	mg/L	0.075*	0.2	18	2.77				**9.1**						
Arsenic	mg/L	0.100*	0.0005	0.008	0.0021				0.005						
Barium	mg/L		0.026	0.14	0.054				0.056						
Beryllium	mg/L	1.100	0.000	0.001	0.000				<0.0006						
Bismuth	mg/L		0.0005	0.0025	0.00071				<0.001						
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000073				<0.0001						
Cobalt	mg/L	0.0009	0.0005	0.011	0.0022				**0.006**						
Copper			0.003	0.021	0.0084				**0.013**						
Lead	mg/L	0.005	0.0005	0.015	0.0023				**0.0053**						
Molybdenum	mg/L	0.040*	0.0025	0.025	0.014				0.016						
Selenium	mg/L	0.100	0.001	0.004	0.002				<0.005						
Silver	mg/L	0.0001	0.00005	0.0002	0.000085				<0.0004						
Strontium	mg/L		0.16	0.57	0.35				0.22						
Tin	mg/L		0.0005	0.005	0.0013				<0.002						
Titanium	mg/L		0.005	0.39	0.057				0.1						
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	5	1.13				<0.7						
Total Phosphorus	mg/L	0.02*	0.048	0.8	0.17				**0.17**						
Vanadium	mg/L	0.006*	0.001	0.035	0.0062				**0.018**						
Ion Percentage	%		0.115	54.13	3.67	3.1	1.1	7.5	45.9	8.9					
Benzene	ug/L		0.05	0.25	0.082	<0.10	<0.10	<0.10	<0.10	<0.10					
Toluene	ug/L		0.05	0.5	0.13	<0.20	<0.20	<0.20	<0.20	<0.20					
Ethylbenzene	ug/L		0.05	0.25	0.085	<0.10	<0.10	<0.10	<0.10	<0.10					
o-Xylene	ug/L		0.05	0.25	0.09	<0.10	<0.10	<0.10	<0.10	<0.10					
p+m-Xylene	ug/L		0.05	0.3	0.12	<0.10	<0.10	<0.10	<0.10	<0.10					
Total Xylenes	ug/L		0.05	0.3	0.09	<0.10	<0.10	<0.10	<0.10	<0.10					
Total Oil & Grease	mg/L		0.25	0.25	0.25										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Downstream station SS15 redesignated as background station SS14B as a result of grading modifications in September 2009, and was further redesignated as a station
13) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
14) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Inlet Point to Sedimentation Pond 1 (Poplar System) - SS15A									
Date						3-Oct-09	10-Oct-09	25-Jan-10	6-Apr-10	6-Jun-10	5-Aug-10	14-Oct-10	28-Feb-11	20-Apr-11	7-Jun-11
Routine/Storm Monitoring						Routine	Storm	Routine	Routine	Storm	Routine	Storm	Routine	Routine	Storm
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	51	220	115	118		101	116		167	88	115	160	
Chloride	mg/L		2.9	94	16	24	39	15	18	8	18	14	19	20	5
Sulphate	mg/L		23	900	105	260		73	180		230	180	91	140	
Ammonia (as N)	mg/L		0.0025	1.69	0.107	0.075	0.075	0.075	0.870	0.240	0.075	0.075	0.640	0.075	0.075
Ammonia Unionized	mg/L	0.02	0.00025	0.12	0.0033	<0.02		<0.02	<0.02		<0.02	<0.02	<0.02	<0.02	
Nitrate	mg/L		0.02	7.61	0.92	0.4	1.8	1.7	2.4	0.9	0.05	0.4	1.9	0.8	0.02
Nitrite	mg/L		0.005	0.3	0.041		0.02					0.01			0.3
Phenols	mg/L	0.001	0.0005	0.013	0.00092	<0.001		<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	
Boron	mg/L	0.200	0.060	0.910	0.226	0.11	**0.21**	0.17	**0.5**	0.15	**0.31**	0.16	**0.26**	**0.38**	0.14
Calcium	mg/L		26	530	75	100	94	50	530	150	120	250	56	88	48
Chromium	mg/L	0.0089	0.0025	0.3100	0.0070	<0.005	<0.005	<0.005	**0.31**	**0.057**	<0.005	**0.080**	<0.005	0.007	**0.030**
Iron	mg/L	0.300	0.200	310.000	5.413	**2.2**	**2.7**	**2.5**	**310**	**59**	**1.0**	**84**	**1.4**	**3.6**	**31**
Magnesium	mg/L		7.1	150	22	32	28	15	150	40	29	61	19	29	16
Potassium	mg/L		2.6	41	7.41	5.4	5.8	5.2	41	10	6.8	16	4.5	5.5	6.9
Sodium	mg/L		4	41	11	17	19	12	22	8.9	16	9.2	16	21	4.5
Nickel	mg/L	0.025	0.001	0.42	0.0100	0.004	0.004	0.004	**0.42**	**0.083**	0.002	**0.11**	0.003	0.011	**0.041**
Zinc	mg/L	0.020	0.00	0.76	0.02	0.006	<0.01	0.013	**0.76**	**0.13**	<0.005	**0.20**	0.012	**0.025**	**0.08**
pH	(pH units)	6.5-8.5	6.9	8.8	7.7	7.72	8.26	**8.83**	7.94	7.98	7.73	8.10	7.70	8.01	7.23
Total Organic Carbon	mg/L		6.40	42.00	12.36	6.6		6.5	16.7		13.2	9.3	6.5	14.0	
Aluminum	mg/L	0.075*	0.45	45	4.24		**2.0**			**32**		**45**			**19**
Arsenic	mg/L	0.100*	0.001	0.019	0.0029		0.001			0.015		0.019			0.009
Barium	mg/L		0.028	0.26	0.059		0.043			0.18		0.26			0.12
Beryllium	mg/L	1.100	0.000	0.002	0.000		<0.0006			0.0017		0.0022			0.0011
Bismuth	mg/L		0.0005	0.0005	0.00050		<0.001			<0.001		<0.001			<0.001
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000076		<0.001			0.0002		**0.0005**			0.0002
Cobalt	mg/L	0.0009	0.00025	0.033	0.0026		**0.0010**			**0.025**		**0.033**			**0.012**
Copper	mg/L	0.005	0.004	0.054	0.0098		0.005			**0.044**		**0.054**			**0.021**
Lead	mg/L	0.005	0.00025	0.033	0.0024		0.0011			**0.022**		**0.033**			**0.014**
Molybdenum	mg/L	0.040*	0.006	0.02	0.010		0.009			0.020		0.017			0.008
Selenium	mg/L	0.100	0.001	0.003	0.002		<0.005			<0.005		<0.005			<0.005
Silver	mg/L	0.0001	0.00005	0.0002	0.000113		<0.0001			<0.0001		0.0001			<0.0001
Strontium	mg/L		0.15	0.47	0.27		0.39			0.39		0.47			0.15
Tin	mg/L		0.0005	0.001	0.0009		<0.002			<0.002		<0.002			<0.002
Titanium	mg/L		0.015	0.72	0.083		0.037			0.66		0.72			0.35
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	7	1.20		1.5			4		5			7
Total Phosphorus	mg/L	0.02*	0.066	1.6	0.21		**0.12**			**1.0**		**1.6**			**1.0**
Vanadium	mg/L	0.006*	0.0014	0.085	0.0091		0.004			**0.063**		**0.085**			**0.037**
Ion Percentage	%		0.195	46.63	3.77	1.4		5.1	36.9		3.6	26.6	2.2	4.1	
Benzene	ug/L		0.05	0.25	0.091	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L		0.05	0.5	0.14	<0.3	<0.2	<0.3	<0.3	<0.2	<0.3	<0.2	<0.3	<0.3	<0.2
Ethylbenzene	ug/L		0.05	0.25	0.095	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	ug/L		0.05	0.3	0.11	<0.3	<0.2	<0.3	<0.3	<0.2	<0.6	<0.2	<0.3	<0.3	<0.2
p+m-Xylene	ug/L		0.05	0.3	0.15	<0.6	<0.4	<0.6	<0.6	<0.4	<0.3	<0.4	<0.6	<0.6	<0.4
Total Xylenes	ug/L		0.05	0.3	0.09	<0.6	<0.4			<0.4		<0.4			<0.4
Total Oil & Grease	mg/L		0.25	0.5	0.31		<0.5			<0.5		<1			<0.5

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Inlet Point to Sedimentation Pond 1 (Poplar System) - SS15A									
Date						9-Aug-11	13-Oct-11	13-Mar-12	4-May-12	28-Jul-12	30-Oct-12	13-Jan-13	10-Apr-13	29-May-13	5-Jul-13
Routine/Storm Monitoring						Storm	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Storm	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	51	220	115	123	191	140	95	82	81	120	100		82
Chloride	mg/L		2.9	94	16	12	20	15	28	11	19	14	11	10	13
Sulphate	mg/L		23	900	105	310	140	130	200	120	84	87	79		110
Ammonia (as N)	mg/L		0.0025	1.69	0.107	0.075	0.075	0.075	0.075	0.075	0.20	0.075	0.075	0.70	0.075
Ammonia Unionized	mg/L	0.02	0.00025	0.12	0.0033	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		<0.015
Nitrate	mg/L		0.02	7.61	0.92	0.1	0.5	1.2	4.9	1.1	2.3	0.62	0.82	1.6	0.34
Nitrite	mg/L		0.005	0.3	0.041	0.03								0.11	
Phenols	mg/L	0.001	0.0005	0.013	0.00092		**0.012**	**0.0023**	<0.0010	**0.0041**	<0.0010	<0.0010	<0.0010		<0.0010
Boron	mg/L	0.200	0.060	0.910	0.226	**0.32**	**0.26**	**0.29**	**0.38**	**0.21**	0.18	0.20	**0.26**	**0.32**	**0.29**
Calcium	mg/L		26	530	75	130	93	78	86	73	56	59	110	59	60
Chromium	mg/L	0.0089	0.0025	0.3100	0.0070	<0.005	0.005	**0.012**	<0.0050	**0.015**	**0.027**	0.0073	**0.042**	<0.005	<0.0050
Iron	mg/L	0.300	0.200	310.000	5.413	**0.4**	**4.0**	**12**	**2.7**	**15**	**27**	**6.8**	**43**	**3.6**	**3.9**
Magnesium	mg/L		7.1	150	22	27	24	24	24	19	19	18	30	15	16
Potassium	mg/L		2.6	41	7.41	6.6	13	6.5	5.7	6.2	8.7	5.5	8.9	5.7	6.5
Sodium	mg/L		4	41	11	16	14	14	15	11	13	13	12	11	13
Nickel	mg/L	0.025	0.001	0.42	0.0100	0.002	0.016	0.016	0.005	0.021	**0.033**	0.0090	**0.059**	0.007	0.0065
Zinc	mg/L	0.020	0.00	0.76	0.02	<0.005	**0.021**	**0.031**	0.010	**0.039**	**0.070**	**0.021**	**0.11**	0.02	0.015
pH	(pH units)	6.5-8.5	6.9	8.8	7.7	8.16	6.87	8.28	7.39	7.36	7.65	7.88	7.16		8.2
Total Organic Carbon	mg/L		6.40	42.00	12.36	10.4	29.5	17	14.0	12.0	17	11	8.8		8.7
Aluminum	mg/L	0.075*	0.45	45	4.24	**0.45**								**2.6**	
Arsenic	mg/L	0.100*	0.001	0.019	0.0029	0.001								0.002	
Barium	mg/L		0.028	0.26	0.059	0.05								0.036	
Beryllium	mg/L	1.100	0.000	0.002	0.000	<0.0005								<0.0006	
Bismuth	mg/L		0.0005	0.0005	0.00050	<0.001								<0.0010	
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000076	<0.0001								<0.0001	
Cobalt	mg/L	0.0009	0.00025	0.033	0.0026	<0.0005								**0.0015**	
Copper	mg/L	0.005	0.004	0.054	0.0098	0.005								**0.007**	
Lead	mg/L	0.005	0.00025	0.033	0.0024	<0.0005								0.0017	
Molybdenum	mg/L	0.040*	0.006	0.02	0.010	0.014								0.007	
Selenium	mg/L	0.100	0.001	0.003	0.002	<0.002								<0.005	
Silver	mg/L	0.0001	0.00005	0.0002	0.000113									<0.00010	
Strontium	mg/L		0.15	0.47	0.27	0.43								0.18	
Tin	mg/L		0.0005	0.001	0.0009	<0.001								<0.002	
Titanium	mg/L		0.015	0.72	0.083	0.015								0.045	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	7	1.20	1.5								1.9	
Total Phosphorus	mg/L	0.02*	0.066	1.6	0.21	**0.086**								**0.10**	
Vanadium	mg/L	0.006*	0.0014	0.085	0.0091	0.0014								0.005	
Ion Percentage	%		0.195	46.63	3.77	0.7	0.9	2.9	0.7	6.9	7.0	2.8	19.3		4.0
Benzene	ug/L		0.05	0.25	0.091	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2
Toluene	ug/L		0.05	0.5	0.14	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.20	<0.3
Ethylbenzene	ug/L		0.05	0.25	0.095	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2
o-Xylene	ug/L		0.05	0.3	0.11	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.20	<0.3
p+m-Xylene	ug/L		0.05	0.3	0.15	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.40	<0.6
Total Xylenes	ug/L		0.05	0.3	0.09	<0.6									
Total Oil & Grease	mg/L		0.25	0.5	0.31										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Inlet Point to Sedimentation Pond 1 (Poplar System) - SS15A									
Date						28-Aug-13	7-Oct-13	11-Jan-14	8-Apr-14	7-Jul-14	15-Oct-14	4-Jan-15	10-Apr-15	25-Oct-15	25-Feb-16
Routine/Storm Monitoring						Storm	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	51	220	115		180	60		61	150	71	170	51	130
Chloride	mg/L		2.9	94	16	21	44	11	26	6	28	9	11	8.2	6.9
Sulphate	mg/L		23	900	105		110	46	120	68	56	33	60	900	92
Ammonia (as N)	mg/L		0.0025	1.69	0.107	0.075	1.69	0.58	0.075	0.19	0.075	0.27	0.075	0.35	0.08
Ammonia Unionized	mg/L	0.02	0.00025	0.12	0.0033		**0.12**	0.0055	<0.0019	0.0085	<0.0021	0.0031	<0.0057	0.0051	<0.0013
Nitrate	mg/L		0.02	7.61	0.92	0.05	0.42	1.60	0.79	0.47	0.05	1.02	0.35	1.67	1.00
Nitrite	mg/L		0.005	0.3	0.041	<0.010									
Phenols	mg/L	0.001	0.0005	0.013	0.00092		**0.0011**	**0.002**	**0.006**	**0.002**	**0.013**	**0.0083**	<0.0010	<0.0010	<0.0010
Boron	mg/L	0.200	0.060	0.910	0.226	**0.39**	**0.91**	0.095	**0.28**	0.19	0.19	0.099	0.12	0.13	0.11
Calcium	mg/L		26	530	75	63	78	30	80	41	67	32	63	250	63
Chromium	mg/L	0.0089	0.0025	0.3100	0.0070	<0.005	<0.0050	<0.0050	0.005	**0.033**	0.0057	<0.0050	<0.0050	<0.005	<0.0050
Iron	mg/L	0.300	0.200	310.000	5.413	**2.8**	**2.1**	**0.36**	**2.90**	**30**	**4.7**	**2.0**	**3.2**	0.20	**2.4**
Magnesium	mg/L		7.1	150	22	22	23	8.3	24	14	27	8.4	17	88	18
Potassium	mg/L		2.6	41	7.41	5.2	11	7.8	6.2	8.4	17	9.3	5.2	2.6	4.8
Sodium	mg/L		4	41	11	12	41	6.3	17	4.9	8.0	4	5.8	14	6.6
Nickel	mg/L	0.025	0.001	0.42	0.0100	0.005	0.0065	0.001	0.0078	**0.038**	0.0079	0.003	0.0047	0.002	0.0038
Zinc	mg/L	0.020	0.00	0.76	0.02	<0.01	0.011	0.012	0.011	**0.077**	**0.021**	0.014	0.010	<0.02	0.0069
pH	(pH units)	6.5-8.5	6.9	8.8	7.7	7.9	8.13	7.82	7.87	7.88	7.74	8.02	8.27	7.84	7.99
Total Organic Carbon	mg/L		6.40	42.00	12.36		15	7.4	10	18.0	42	11	9.9	7.6	6.4
Aluminum	mg/L	0.075*	0.45	45	4.24	**4.5**									
Arsenic	mg/L	0.100*	0.001	0.019	0.0029	0.002									
Barium	mg/L		0.028	0.26	0.059	0.054									
Beryllium	mg/L	1.100	0.000	0.002	0.000	<0.0006									
Bismuth	mg/L		0.0005	0.0005	0.00050	<0.0010									
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000076	<0.0001									
Cobalt	mg/L	0.0009	0.00025	0.033	0.0026	**0.0012**									
Copper	mg/L	0.005	0.004	0.054	0.0098	**0.007**									
Lead	mg/L	0.005	0.00025	0.033	0.0024	0.0011									
Molybdenum	mg/L	0.040*	0.006	0.02	0.010	0.014									
Selenium	mg/L	0.100	0.001	0.003	0.002	<0.005									
Silver	mg/L	0.0001	0.00005	0.0002	0.000113	<0.00010									
Strontium	mg/L		0.15	0.47	0.27	0.33									
Tin	mg/L		0.0005	0.001	0.0009	<0.002									
Titanium	mg/L		0.015	0.72	0.083	0.16									
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	7	1.20	1.5									
Total Phosphorus	mg/L	0.02*	0.066	1.6	0.21	**0.2**									
Vanadium	mg/L	0.006*	0.0014	0.085	0.0091	0.01									
Ion Percentage	%		0.195	46.63	3.77		2.4	1.9		6.6	6.5	3.5	0.2	0.3	1.7
Benzene	ug/L		0.05	0.25	0.091	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	ug/L		0.05	0.5	0.14	<0.20	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Ethylbenzene	ug/L		0.05	0.25	0.095	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-Xylene	ug/L		0.05	0.3	0.11	<0.20	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
p+m-Xylene	ug/L		0.05	0.3	0.15	<0.40	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Total Xylenes	ug/L		0.05	0.3	0.09										
Total Oil & Grease	mg/L		0.25	0.5	0.31										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Inlet Point to Sedimentation Pond 1 (Poplar System) - SS15A									
Date						7-Apr-16	14-Jul-16	12-Jan-17	6-Apr-17	13-Jul-17	28-Oct-17	23-Jan-18	4-Apr-18	8-Aug-18	8-Aug-18
Routine/Storm Monitoring						Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Routine	Storm
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (as $CaCO_3$)	mg/L	<25%***	51	220	115	150	77	110	220	84	100	120	170	80	
Chloride	mg/L		2.9	94	16	5.8	8.4	13	33	2.9	15	10	12	7.6	7.4
Sulphate	mg/L		23	900	105	70	120	40	160	77	160	110	120	150	
Ammonia (as N)	mg/L		0.0025	1.69	0.107	0.075	0.075	0.42	0.075	0.55	0.03	0.13	0.16	0.025	0.025
Ammonia Unionized	mg/L	0.02	0.00025	0.12	0.0033	<0.0018	<0.0044	0.0009	<0.0016	0.04	<0.0005	0.0032	0.0006	<0.0005	
Nitrate	mg/L		0.02	7.61	0.92	0.37	1.15	1.23	0.52	1.04	2.73	3.14	1.22	5.28	4.83
Nitrite	mg/L		0.005	0.3	0.041										0.196
Phenols	mg/L	0.001	0.0005	0.013	0.00092	<0.0010	*<0.0040*	*<0.0040*	*<0.0040*	*<0.0040*	<0.0010	0.001	<0.0010	<0.0010	
Boron	mg/L	0.200	0.060	0.910	0.226	0.12	0.18	0.13	0.19	0.25	0.15	0.12	**0.26**	**0.33**	**0.34**
Calcium	mg/L		26	530	75	64	62	50	110	76	81	64	86	79	78
Chromium	mg/L	0.0089	0.0025	0.3100	0.0070	**0.013**	**0.009**	**0.027**	<0.005	0.037	0.008	0.008	**0.012**	0.008	**0.009**
Iron	mg/L	0.300	0.200	310.000	5.413	**6.6**	**7.9**	**23**	**2.00**	**38**	**5.5**	**7.7**	**12**	**7.3**	**7.3**
Magnesium	mg/L		7.1	150	22	19	14	16	33	21	22	21	27	19	18
Potassium	mg/L		2.6	41	7.41	6.3	4.6	12	6.8	7.6	5.6	4.5	5.6	6	6.4
Sodium	mg/L		4	41	11	6.7	8.0	4.8	18	5.8	10	7.8	12	9.9	9.4
Nickel	mg/L	0.025	0.001	0.42	0.0100	0.0086	0.012	**0.030**	0.004	**0.051**	0.008	0.01	0.015	0.0110	0.011
Zinc	mg/L	0.020	0.00	0.76	0.02	0.019	0.020	**0.060**	0.020	**0.10**	0.02	0.02	**0.04**	0.020	0.02
pH	(pH units)	6.5-8.5	6.9	8.8	7.7	7.98	7.76	7.29	7.81	8.1	7.05	8.31	7.49	7.1	7.1
Total Organic Carbon	mg/L		6.40	42.00	12.36	10	6.7	15	11	14	10	8.4	12	11	
Aluminum	mg/L	0.075*	0.45	45	4.24										**5.8**
Arsenic	mg/L	0.100*	0.001	0.019	0.0029										0.003
Barium	mg/L		0.028	0.26	0.059										0.052
Beryllium	mg/L	1.100	0.000	0.002	0.000										<0.0006
Bismuth	mg/L		0.0005	0.0005	0.00050										<0.001
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000076										<0.0001
Cobalt	mg/L	0.0009	0.00025	0.033	0.0026										**0.0028**
Copper	mg/L	0.005	0.004	0.054	0.0098										**0.008**
Lead	mg/L	0.005	0.00025	0.033	0.0024										0.0029
Molybdenum	mg/L	0.040*	0.006	0.02	0.010										0.009
Selenium	mg/L	0.100	0.001	0.003	0.002										<0.005
Silver	mg/L	0.0001	0.00005	0.0002	0.000113										*<0.0004*
Strontium	mg/L		0.15	0.47	0.27										0.26
Tin	mg/L		0.0005	0.001	0.0009										<0.002
Titanium	mg/L		0.015	0.72	0.083										0.15
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	7	1.20										<0.7
Total Phosphorus	mg/L	0.02*	0.066	1.6	0.21										**0.18**
Vanadium	mg/L	0.006*	0.0014	0.085	0.0091										**0.012**
Ion Percentage	%		0.195	46.63	3.77	3.1	2.4	6.4	1.4	14.4	2.8	2.0	3.6	5.3	46.6
Benzene	ug/L		0.05	0.25	0.091	<0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Toluene	ug/L		0.05	0.5	0.14	<0.3	<0.20	<0.20	<0.20	<0.10	<0.10	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	ug/L		0.05	0.25	0.095	<0.2	<0.10	<0.10	<0.10	<0.20	<0.20	<0.10	<0.20	<0.20	<0.20
o-Xylene	ug/L		0.05	0.3	0.11	<0.3	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
p+m-Xylene	ug/L		0.05	0.3	0.15	<0.6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Total Xylenes	ug/L		0.05	0.3	0.09		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.20
Total Oil & Grease	mg/L		0.25	0.5	0.31										

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Inlet Point to Sedimentation Pond 1 (Poplar System) - SS15A									
Date						26-Sep-18	2-Oct-18	24-Jan-19	17-Apr-19	2-Oct-19	2-Oct-19	11-Jan-20	18-May-20	15-Nov-20	26-Mar-21
Routine/Storm Monitoring						Storm	Routine	Routine	Routine	Routine	Storm	Routine	Routine	Routine	Routine
Laboratory						Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (as $CaCO_3$)	mg/L	<25%***	51	220	115		180	77	210	120		120	170	100	130
Chloride	mg/L		2.9	94	16	7.9	28	12	28	24	24	24	41	35	48
Sulphate	mg/L		23	900	105		110	26	160	90		50	110	63	120
Ammonia (as N)	mg/L		0.0025	1.69	0.107	0.025	0.025	0.9	0.025	0.12	0.03	0.099	0.39	0.42	0.089
Ammonia Unionized	mg/L	0.02	0.00025	0.12	0.0033		<0.00061	0.00087	<0.008	0.01		0.003	0.014	0.008	<0.00061
Nitrate	mg/L		0.02	7.61	0.92	0.05	2.75	0.88	0.90	1.21	1.13	1.95	4.36	7.61	5.22
Nitrite	mg/L		0.005	0.3	0.041	<0.010					0.28				
Phenols	mg/L	0.001	0.0005	0.013	0.00092		<0.0010	**0.0014**	<0.0010	<0.0010		0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	0.200	0.060	0.910	0.226	0.16	0.26	0.06	**0.29**	**0.34**	**0.33**	**0.21**	**0.56**	0.17	**0.42**
Calcium	mg/L		26	530	75	59	78	26	92	61	61	62	64	57	74
Chromium	mg/L	0.0089	0.0025	0.3100	0.0070	<0.005	<0.005	<0.005	<0.005	<0.0050	<0.0050	**0.037**	0.006	0.007	**0.016**
Iron	mg/L	0.300	0.200	310.000	5.413	**1.60**	3.8	**0.6**	**0.7**	**2.30**	**2.30**	**36.0**	**5.3**	**6.1**	**14**
Magnesium	mg/L		7.1	150	22	16	23	7.1	32	17	17	22	20	16	26
Potassium	mg/L		2.6	41	7.41	5.5	6.5	10	4.6	8.1	8.3	12.0	6.6	19	9.9
Sodium	mg/L		4	41	11	7.1	14	4.2	16	15	14	14.0	33	9.3	34
Nickel	mg/L	0.025	0.001	0.42	0.0100	0.003	0.007	0.001	0.003	0.005	0.005	**0.044**	0.012	0.01	0.023
Zinc	mg/L	0.020	0.00	0.76	0.02	<0.01	0.01	0.01	<0.01	0.010	0.010	**0.1**	**0.030**	**0.040**	**0.04**
pH	(pH units)	6.5-8.5	6.9	8.8	7.7	7.14	7.15	6.98	**8.63**	8.0	7.9	8.3	8.1	7.9	7.5
Total Organic Carbon	mg/L		6.40	42.00	12.36		13	12	10	11		9.7	20	34	25
Aluminum	mg/L	0.075*	0.45	45	4.24	**1**					**1.40**				
Arsenic	mg/L	0.100*	0.001	0.019	0.0029	0.001					0.002				
Barium	mg/L		0.028	0.26	0.059	0.028					0.035				
Beryllium	mg/L	1.100	0.000	0.002	0.000	<0.0006					<0.0006				
Bismuth	mg/L		0.0005	0.0005	0.00050	<0.001					<0.001				
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000076	<0.0001					<0.0001				
Cobalt	mg/L	0.0009	0.00025	0.033	0.0026	0.0006					**0.0011**				
Copper	mg/L	0.005	0.004	0.054	0.0098	0.004					0.005				
Lead	mg/L	0.005	0.00025	0.033	0.0024	0.0007					0.001				
Molybdenum	mg/L	0.040*	0.006	0.02	0.010	0.007					0.009				
Selenium	mg/L	0.100	0.001	0.003	0.002	<0.005					<0.005				
Silver	mg/L	0.0001	0.00005	0.0002	0.000113	*<0.0004*					*<0.0004*				
Strontium	mg/L		0.15	0.47	0.27	0.22					0.22				
Tin	mg/L		0.0005	0.001	0.0009	<0.002					<0.002				
Titanium	mg/L		0.015	0.72	0.083	0.016					0.027				
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	7	1.20	<0.7					0.8				
Total Phosphorus	mg/L	0.02*	0.066	1.6	0.21	**0.066**					**0.11**				
Vanadium	mg/L	0.006*	0.0014	0.085	0.0091	0.003					0.003				
Ion Percentage	%		0.195	46.63	3.77	45.5	0.5	1.1	1.0	1.7	38.7	9.0	1.7	4.2	4.0
Benzene	ug/L		0.05	0.25	0.091	<0.20	<0.25	<0.25	<0.25	<0.50	<0.20	<0.10	<0.25	<0.50	<0.25
Toluene	ug/L		0.05	0.5	0.14	<0.20	<0.50	<0.50	<0.50	<1.0	<0.20	<0.20	<0.50	<1.0	<0.50
Ethylbenzene	ug/L		0.05	0.25	0.095	<0.20	<0.25	<0.25	<0.25	<0.50	<0.20	<0.10	<0.25	<0.50	<0.25
o-Xylene	ug/L		0.05	0.3	0.11	<0.20	<0.25	<0.25	<0.25	<0.50	<0.20	<0.10	<0.25	<0.50	<0.25
p+m-Xylene	ug/L		0.05	0.3	0.15	<0.20	<0.25	<0.25	<0.25	<0.50	<0.20	<0.10	<0.25	<0.50	<0.25
Total Xylenes	ug/L		0.05	0.3	0.09	<0.20	<0.25	<0.25	<0.25	<0.50	<0.20	<0.10	<0.25	<0.50	<0.25
Total Oil & Grease	mg/L		0.25	0.5	0.31										

NOTES:

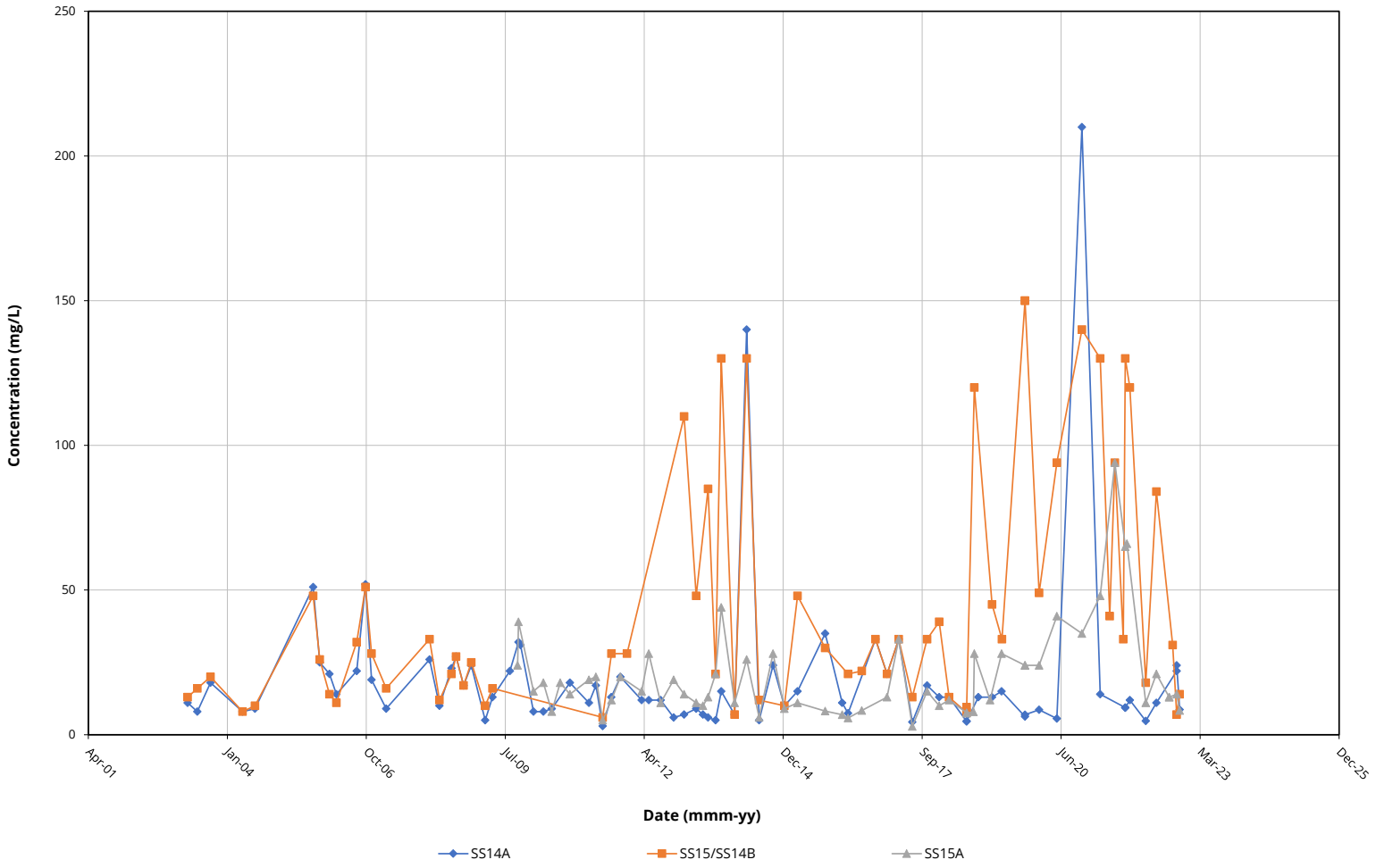
1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.

Table B-3
Precipitation Event Surface Water Quality - Poplar System
Twin Creeks Environmental Centre

Parameter	Units	PWQO	Min	Max	Geomean	Inlet Point to Sedimentation Pond 1 (Poplar System) - SS15A								
Date						9-Jul-21	23-Sep-21	4-Oct-21	17-Feb-22	4-May-22	4-Aug-22	4-Aug-22	28-Sep-22	18-Oct-22
Routine/Storm Monitoring						Routine	Storm	Routine	Routine	Routine	Routine	Storm	Storm	Routine
Laboratory						Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (as $CaCO_3$)	mg/L	<25%***	51	220	115	160		190	85	200	88			76
Chloride	mg/L		2.9	94	16	94	65	66	11	21	13	13	14	8.4
Sulphate	mg/L		23	900	105	110		140	23	79	220			240
Ammonia (as N)	mg/L		0.0025	1.69	0.107	0.025	0.075	0.0025	1.3	0.12	0.074	0.075	0.075	<0.050
Ammonia Unionized	mg/L	0.02	0.00025	0.12	0.0033	<0.0011		<0.0013	0.0043	0.0052	0.002			<0.0011
Nitrate	mg/L		0.02	7.61	0.92	5.82	4.55	1.48	0.97	1.18	2.19	2.34	0.38	0.29
Nitrite	mg/L		0.005	0.3	0.041		0.023					0.153	0.011	
Phenols	mg/L	0.001	0.0005	0.013	0.00092	<0.0010		<0.0010	0.0010	<0.0010	0.0012			<0.0010
Boron	mg/L	0.200	0.060	0.910	0.226	**0.26**	**0.64**	**0.77**	0.07	**0.39**	**0.24**	**0.23**	0.15	0.1
Calcium	mg/L		26	530	75	81	76	92	33	70	180	90	49	87
Chromium	mg/L	0.0089	0.0025	0.3100	0.0070	<0.005	<0.005	<0.005	**0.020**	0.006	**0.023**	<0.005	**0.010**	0.006
Iron	mg/L	0.300	0.200	310.000	5.413	**1.5**	**2.5**	**1.8**	**20**	**5.5**	**23**	**4.3**	**9.4**	**5.7**
Magnesium	mg/L		7.1	150	22	21	22	26	11	23	39	21	13	26
Potassium	mg/L		2.6	41	7.41	5.9	8.8	11	7.3	4.9	9.4	6.9	6.9	6.3
Sodium	mg/L		4	41	11	14	38	40	4.5	20	12	12	6.8	8.5
Nickel	mg/L	0.025	0.001	0.42	0.0100	0.004	0.008	0.007	**0.027**	0.009	**0.033**	0.008	0.014	0.009
Zinc	mg/L	0.020	0.00	0.76	0.02	0.005	0.01	<0.01	**0.05**	0.02	**0.05**	0.01	**0.03**	0.02
pH	(pH units)	6.5-8.5	6.9	8.8	7.7	7.7	7.8	7.7	7.4	8.1	7.5	7.5	7.8	8.1
Total Organic Carbon	mg/L		6.40	42.00	12.36	12		15	17	12	11			8.4
Aluminum	mg/L	0.075*	0.45	45	4.24		**1.8**					**2.8**	**5.7**	
Arsenic	mg/L	0.100*	0.001	0.019	0.0029		0.001					0.002	0.003	
Barium	mg/L		0.028	0.26	0.059		0.046					0.036	0.039	
Beryllium	mg/L	1.100	0.000	0.002	0.000		<0.0006					<0.0006	<0.0006	
Bismuth	mg/L		0.0005	0.0005	0.00050		<0.001					<0.001	<0.001	
Cadmium	mg/L	0.0002	0.00005	0.0005	0.000076		<0.0001					<0.0001	<0.0001	
Cobalt	mg/L	0.0009	0.00025	0.033	0.0026		**0.0011**					**0.0023**	**0.0044**	
Copper	mg/L	0.005	0.004	0.054	0.0098		**0.006**					**0.007**	**0.010**	
Lead	mg/L	0.005	0.00025	0.033	0.0024		0.0009					0.0019	0.0040	
Molybdenum	mg/L	0.040*	0.006	0.02	0.010		0.006					0.01	0.007	
Selenium	mg/L	0.100	0.001	0.003	0.002		<0.005					<0.005	<0.005	
Silver	mg/L	0.0001	0.00005	0.0002	0.000113		*<0.0004*					*<0.0004*	*<0.0004*	
Strontium	mg/L		0.15	0.47	0.27		0.27					0.33	0.18	
Tin	mg/L		0.0005	0.001	0.0009		<0.002					<0.002	<0.002	
Titanium	mg/L		0.015	0.72	0.083		0.027					0.045	0.08	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.35	7	1.20		1.2					<0.7	<0.7	
Total Phosphorus	mg/L	0.02*	0.066	1.6	0.21		**0.15**					**0.11**	**0.17**	
Vanadium	mg/L	0.006*	0.0014	0.085	0.0091		0.004					0.005	**0.011**	
Ion Percentage	%		0.195	46.63	3.77	5.7	30.4	0.5	4.4	0.6	16.1	45.0	41.0	0.8
Benzene	ug/L		0.05	0.25	0.091	<0.10	<0.10	<0.25	<0.10	<0.10	<0.25	<0.25	<0.10	<0.10
Toluene	ug/L		0.05	0.5	0.14	<0.20	<0.20	<0.50	<0.20	<0.20	<0.25	<0.25	<0.20	<0.20
Ethylbenzene	ug/L		0.05	0.25	0.095	<0.10	<0.10	<0.25	<0.10	<0.10	<0.50	<0.50	<0.10	<0.10
o-Xylene	ug/L		0.05	0.3	0.11	<0.10	<0.10	<0.25	<0.10	<0.10	<0.25	<0.25	<0.10	<0.10
p+m-Xylene	ug/L		0.05	0.3	0.15	<0.10	<0.10	<0.25	<0.10	<0.10	<0.25	<0.25	<0.10	<0.10
Total Xylenes	ug/L		0.05	0.3	0.09	<0.10	<0.10	<0.25	<0.10	<0.10	<0.25	<0.25	<0.10	<0.10
Total Oil & Grease	mg/L		0.25	0.5	0.31									

NOTES:

1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) *** denotes change from background concentrations.
4) Historic chemical anomalies retained in database.
5) Unionized ammonia values are calculated based on field determined pH and temperature values.
6) mg/L denotes milligrams per litre.
7) umho/cm denotes microsiemens per centimeter.
8) BOD denotes biological oxygen demand.
9) COD denotes chemical oxygen demand.
10) Blank denotes parameter not analyzed.
11) Bolded text and shading denotes concentration exceeds criterion.
12) Italics denotes parameter concentration was below the laboratory RDL, where the RDL exceeds the relevant PWQO.
13) The Geomean assumes that any value below the RDL is equal to half of the value of the RDL.



NOTES:

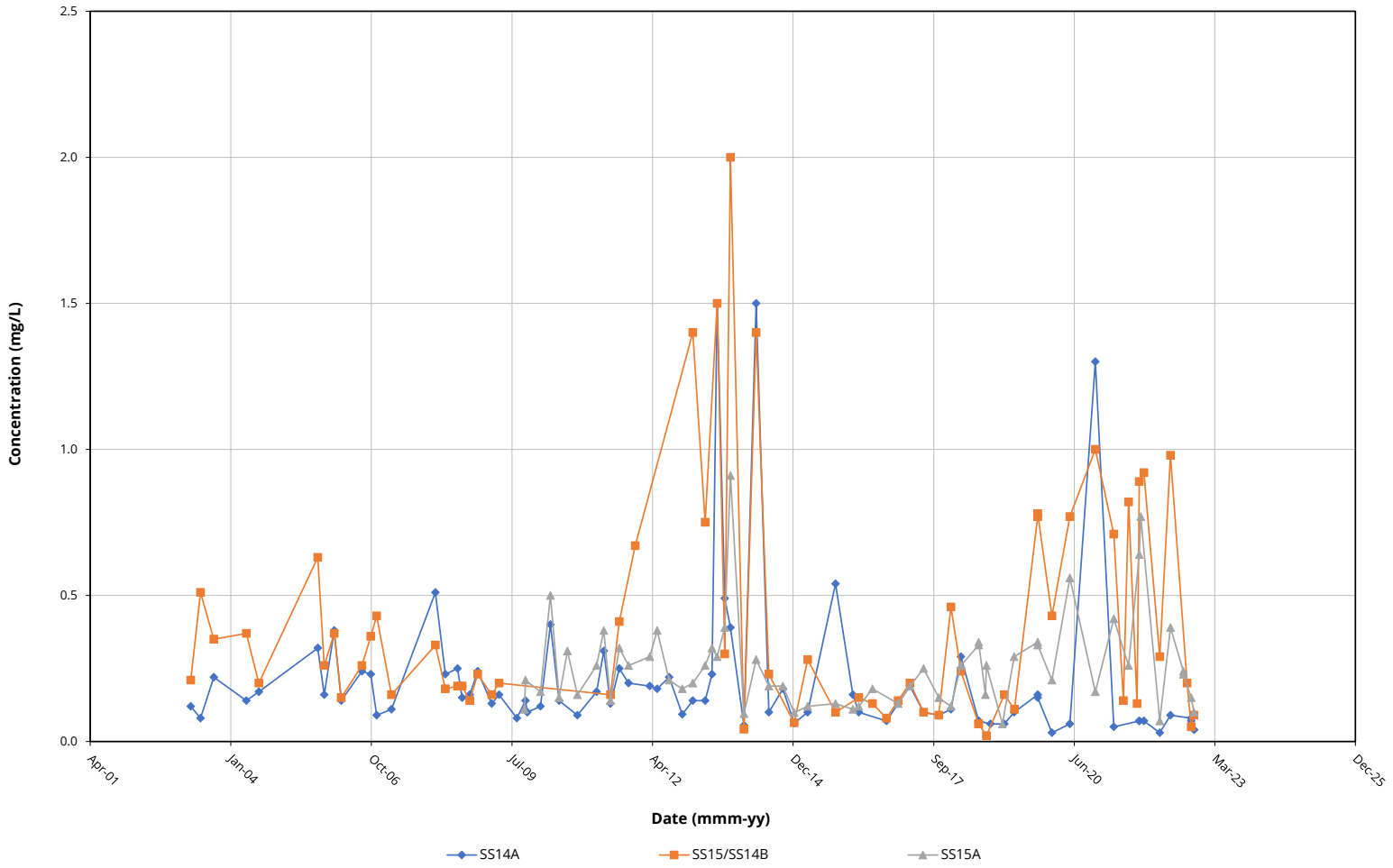
1. mg/L denotes milligrams per litre.
2. For datum plotted off of the graph, refer to data tables.

CONCENTRATION VS. TIME PLOT
Chloride

Landfill Optimization Environmental Assessment

TWIN CREEKS ENVIRONMENTAL CENTRE
WASTE MANAGEMENT OF CANADA CORPORATION

FIGURE NUMBER	PROJECT NUMBER
Figure B-9	2101750
DATE REVISED	**REVISED BY**
3-Nov-23	PEJ



NOTES:

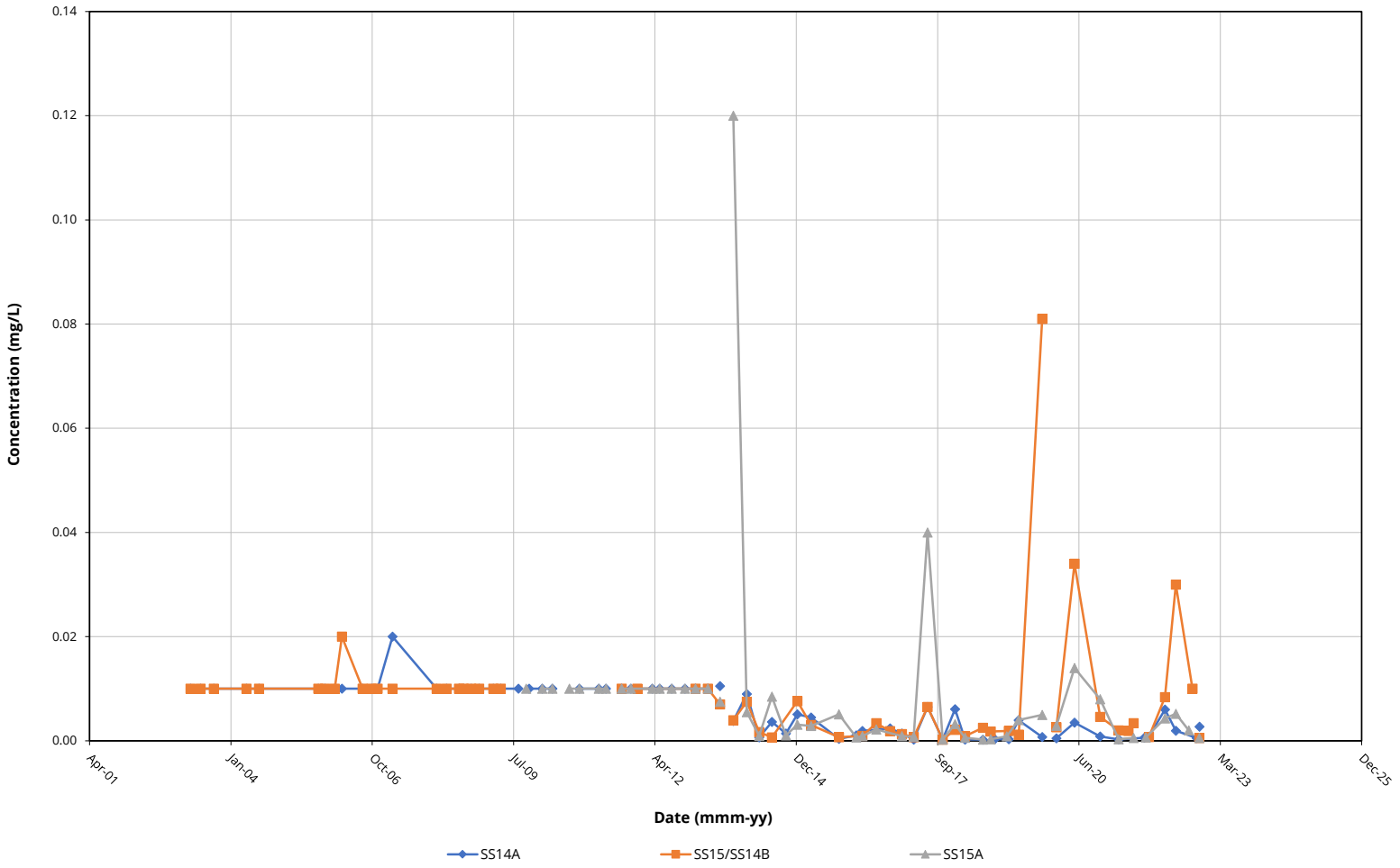
1. mg/L denotes milligrams per litre.
2. For datum plotted off of the graph, refer to data tables.

CONCENTRATION VS. TIME PLOT
Boron

Landfill Optimization Environmental Assessment

TWIN CREEKS ENVIRONMENTAL CENTRE
WASTE MANAGEMENT OF CANADA CORPORATION

FIGURE NUMBER	PROJECT NUMBER
Figure B-10	2101750
DATE REVISED	**REVISED BY**
3-Nov-23	PEJ



NOTES:

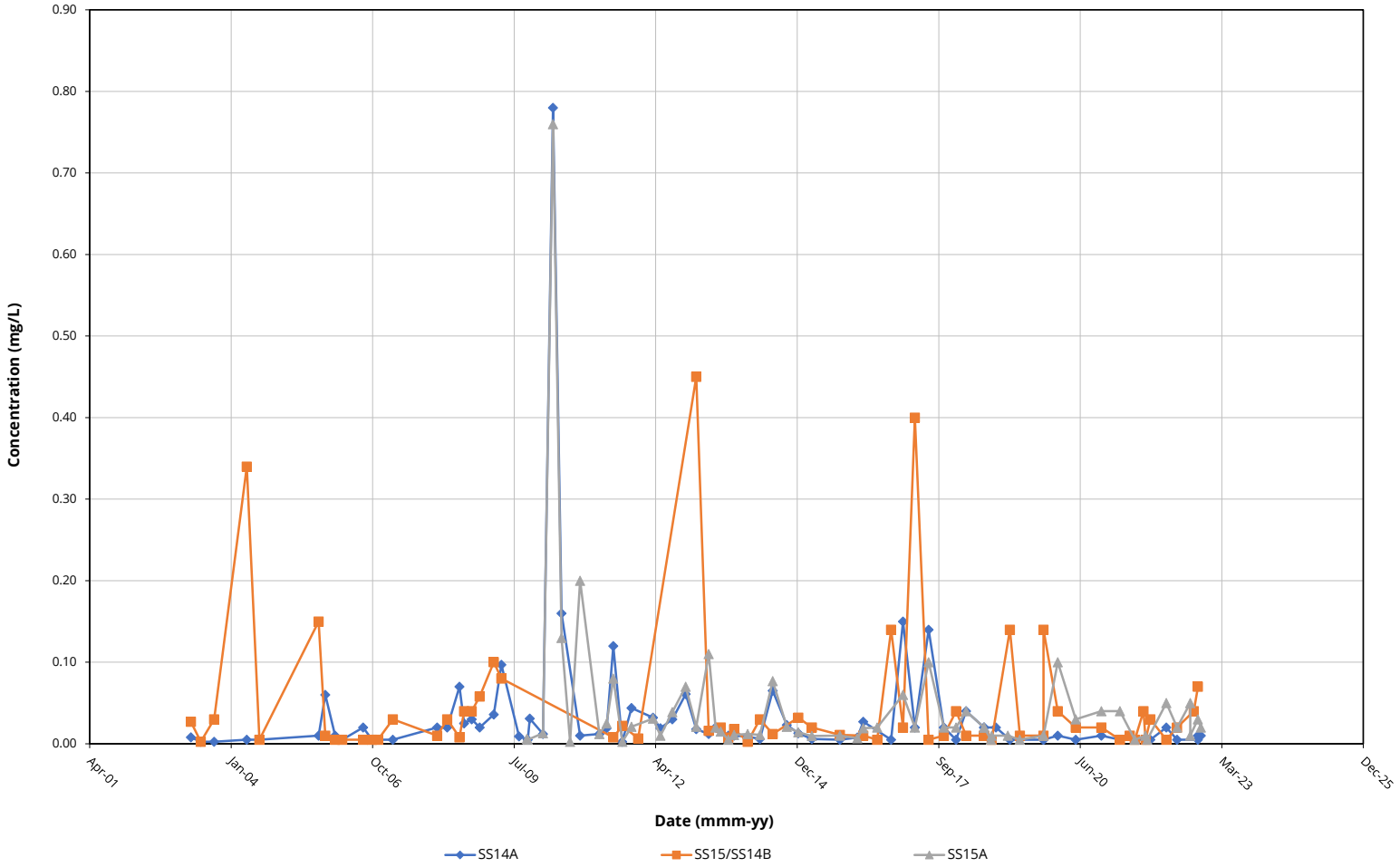
1. mg/L denotes milligrams per litre.
2. For datum plotted off of the graph, refer to data tables.

CONCENTRATION VS. TIME PLOT
Ammonia Un-ionized

Landfill Optimization Environmental Assessment

TWIN CREEKS ENVIRONMENTAL CENTRE
WASTE MANAGEMENT OF CANADA CORPORATION

FIGURE NUMBER	PROJECT NUMBER
Figure B-11	2101750
DATE REVISED	**REVISED BY**
3-Nov-23	PEJ



NOTES:

1. mg/L denotes milligrams per litre.
2. For datum plotted off of the graph, refer to data tables.

CONCENTRATION VS. TIME PLOT
Zinc

Landfill Optimization Environmental Assessment

TWIN CREEKS ENVIRONMENTAL CENTRE
WASTE MANAGEMENT OF CANADA CORPORATION

FIGURE NUMBER	PROJECT NUMBER
Figure B-12	2101750
DATE REVISED	**REVISED BY**
3-Nov-23	PEJ

Table B-4
MECP Approved Changes to Site EMP
Twin Creeks Environmental Centre - Surface Water Quality EA

Monitoring Station	Date	MECP Approved Change
Surface Water		
SS17A, SS17B, SS18A, SS18B	01-Jun-11 (Waste ECA) 20-Feb-13 (Sewage ECA)	Surface water 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.
SP1	18-May-12	Boron Trigger Concentration changed from 0.20 mg/L to 0.39 mg/L per MOE letter, dated May 18, 2012.
Offsite discharge points	18-May-12	Exceedance of a trigger concentration shall initiate verification testing, identification of any potential source of contamination, an alternate source evaluation, and an evaluation of remedial options. Verification sampling should include the collection of a grab sample of stormwater at the outlet to analyse for toxicity to rainbow trout and daphnia magna.
Offsite discharge points and internal monitoring point SP1	27-Feb-14	Annual surface water trigger concentrations are updated after each calendar year using the 90th percentile of results for both background monitoring stations SS10 and SS16. Acceptable Biological monitoring results, regardless of any chemical parameter results noted for the verification monitoring event deems the surface water as acceptable for continued discharge.

Table B-5
Precipitation Event Surface Water Quality - Polyaromatic Hydrocarbons
Twin Creeks Environmental Centre

Parameter	Units	PWQO	SW1											
Date			17-Feb-22	4-May-22	2-Aug-22	18-Oct-22								
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas								
Polyaromatic Hydrocarbons														
Biphenyl	ug/L	0.2*	<0.050	<0.050	<0.050	<0.050								
Acenaphthene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
Acenaphthylene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
Anthracene	ug/L	0.0008*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Benzo(a)anthracene	ug/L	0.0004*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Benzo(a)pyrene	ug/L	-	<0.0090	<0.0090	<0.0090	<0.0090								
Benzo(b/j)fluoranthene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
Benzo(g,h,i)perylene	ug/L	0.00002*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Benzo(k)fluoranthene	ug/L	0.0002*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Chrysene	ug/L	0.0001*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Dibenzo(a,h)anthracene	ug/L	0.002*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Fluoranthene	ug/L	0.0008*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Fluorene	ug/L	0.2*	<0.050	<0.050	<0.050	<0.050								
Indeno(1,2,3-cd)pyrene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
1-Methylnaphthalene	ug/L	2*	<0.050	<0.050	<0.050	<0.050								
2-Methylnaphthalene	ug/L	2*	<0.050	<0.050	<0.050	<0.050								
Naphthalene	ug/L	7*	<0.050	<0.050	<0.050	<0.050								
Phenanthrene	ug/L	0.03*	**0.044**	<0.030	<0.030	<0.030								
Pyrene	ug/L	-	<0.050	<0.050	<0.050	<0.050								

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** and Shaded indicates select parameter was detected at concentration greater than the PWQO.
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-5
Precipitation Event Surface Water Quality - Polyaromatic Hydrocarbons
Twin Creeks Environmental Centre

Parameter	Units	PWQO	SW2											
Date			17-Feb-22	4-May-22	2-Aug-22	18-Oct-22								
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas								
Polyaromatic Hydrocarbons														
Biphenyl	ug/L	0.2*	<0.050	<0.050	<0.050	<0.050								
Acenaphthene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
Acenaphthylene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
Anthracene	ug/L	0.0008*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Benzo(a)anthracene	ug/L	0.0004*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Benzo(a)pyrene	ug/L	-	<0.0090	<0.0090	<0.0090	<0.0090								
Benzo(b/j)fluoranthene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
Benzo(g,h,i)perylene	ug/L	0.00002*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Benzo(k)fluoranthene	ug/L	0.0002*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Chrysene	ug/L	0.0001*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Dibenzo(a,h)anthracene	ug/L	0.002*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Fluoranthene	ug/L	0.0008*	*<0.050*	*<0.050*	*<0.050*	*<0.050*								
Fluorene	ug/L	0.2*	<0.050	<0.050	<0.050	<0.050								
Indeno(1,2,3-cd)pyrene	ug/L	-	<0.050	<0.050	<0.050	<0.050								
1-Methylnaphthalene	ug/L	2*	<0.050	<0.050	<0.050	<0.050								
2-Methylnaphthalene	ug/L	2*	<0.050	<0.050	<0.050	<0.050								
Naphthalene	ug/L	7*	<0.050	<0.050	<0.050	<0.050								
Phenanthrene	ug/L	0.03*	**0.038**	<0.030	<0.030	<0.030								
Pyrene	ug/L	-	<0.050	<0.050	<0.050	<0.050								

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** and Shaded indicates select parameter was detected at concentration greater than the PWQO.
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-5
Precipitation Event Surface Water Quality - Polyaromatic Hydrocarbons
Twin Creeks Environmental Centre

Parameter	Units	PWQO	SW3											
Date			17-Feb-22	4-May-22	18-Oct-22									
Laboratory			Bureau Veritas	Bureau Veritas	Bureau Veritas									
Polyaromatic Hydrocarbons														
Biphenyl	ug/L	0.2*	<0.050	<0.050	<0.050									
Acenaphthene	ug/L	-	<0.050	<0.050	<0.050									
Acenaphthylene	ug/L	-	<0.050	<0.050	<0.050									
Anthracene	ug/L	0.0008*	*<0.050*	*<0.050*	*<0.050*									
Benzo(a)anthracene	ug/L	0.0004*	*<0.050*	*<0.050*	*<0.050*									
Benzo(a)pyrene	ug/L	-	<0.0090	<0.0090	<0.0090									
Benzo(b/j)fluoranthene	ug/L	-	<0.050	*<0.050*	*<0.050*									
Benzo(g,h,i)perylene	ug/L	0.00002*	*<0.050*	*<0.050*	*<0.050*									
Benzo(k)fluoranthene	ug/L	0.0002*	*<0.050*	*<0.050*	*<0.050*									
Chrysene	ug/L	0.0001*	*<0.050*	*<0.050*	*<0.050*									
Dibenzo(a,h)anthracene	ug/L	0.002*	*<0.050*	*<0.050*	*<0.050*									
Fluoranthene	ug/L	0.0008*	*<0.050*	*<0.050*	*<0.050*									
Fluorene	ug/L	0.2*	<0.050	<0.050	<0.050									
Indeno(1,2,3-cd)pyrene	ug/L	-	<0.050	<0.050	<0.050									
1-Methylnaphthalene	ug/L	2*	<0.050	<0.050	<0.050									
2-Methylnaphthalene	ug/L	2*	<0.050	<0.050	<0.050									
Naphthalene	ug/L	7*	<0.050	<0.050	<0.050									
Phenanthrene	ug/L	0.03*	<0.030	<0.030	<0.030									
Pyrene	ug/L	-	<0.050	<0.050	<0.050									

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** and Shaded indicates select parameter was detected at concentration greater than the PWQO.
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-5
Precipitation Event Surface Water Quality - Polyaromatic Hydrocarbons
Twin Creeks Environmental Centre

Parameter	Units	PWQO	SW4										
Date			17-Feb-22	4-May-22									
Laboratory			Bureau Veritas	Bureau Veritas									
Polyaromatic Hydrocarbons													
Biphenyl	ug/L	0.2*	<0.050	<0.050									
Acenaphthene	ug/L	-	<0.050	<0.050									
Acenaphthylene	ug/L	-	<0.050	<0.050									
Anthracene	ug/L	0.0008*	*<0.050*	*<0.050*									
Benzo(a)anthracene	ug/L	0.0004*	*<0.050*	*<0.050*									
Benzo(a)pyrene	ug/L	-	<0.0090	<0.0090									
Benzo(b/j)fluoranthene	ug/L	-	<0.050	*<0.050*									
Benzo(g,h,i)perylene	ug/L	0.00002*	*<0.050*	*<0.050*									
Benzo(k)fluoranthene	ug/L	0.0002*	*<0.050*	<0.050									
Chrysene	ug/L	0.0001*	*<0.050*	*<0.050*									
Dibenzo(a,h)anthracene	ug/L	0.002*	*<0.050*	*<0.050*									
Fluoranthene	ug/L	0.0008*	*<0.050*	*<0.050*									
Fluorene	ug/L	0.2*	<0.050	<0.050									
Indeno(1,2,3-cd)pyrene	ug/L	-	<0.050	<0.050									
1-Methylnaphthalene	ug/L	2*	<0.050	<0.050									
2-Methylnaphthalene	ug/L	2*	<0.050	<0.050									
Naphthalene	ug/L	7*	<0.050	<0.050									
Phenanthrene	ug/L	0.03*	<0.030	<0.030									
Pyrene	ug/L	-	<0.050	<0.050									

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** and Shaded indicates select parameter was detected at concentration greater than the PWQO.
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

Table B-5
Precipitation Event Surface Water Quality - Polyaromatic Hydrocarbons
Twin Creeks Environmental Centre

Parameter	Units	PWQO	SW5										
Date			17-Feb-22	4-May-22									
Laboratory			Bureau Veritas	Bureau Veritas									
Polyaromatic Hydrocarbons													
Biphenyl	ug/L	0.2*	<0.050	<0.050									
Acenaphthene	ug/L	-	<0.050	<0.050									
Acenaphthylene	ug/L	-	<0.050	<0.050									
Anthracene	ug/L	0.0008*	*<0.050*	*<0.050*									
Benzo(a)anthracene	ug/L	0.0004*	*<0.050*	*<0.050*									
Benzo(a)pyrene	ug/L	-	<0.0090	<0.0090									
Benzo(b/j)fluoranthene	ug/L	-	<0.050	<0.050									
Benzo(g,h,i)perylene	ug/L	0.00002*	*<0.050*	*<0.050*									
Benzo(k)fluoranthene	ug/L	0.0002*	*<0.050*	*<0.050*									
Chrysene	ug/L	0.0001*	*<0.050*	*<0.050*									
Dibenzo(a,h)anthracene	ug/L	0.002*	*<0.050*	*<0.050*									
Fluoranthene	ug/L	0.0008*	*<0.050*	*<0.050*									
Fluorene	ug/L	0.2*	<0.050	<0.050									
Indeno(1,2,3-cd)pyrene	ug/L	-	<0.050	<0.050									
1-Methylnaphthalene	ug/L	2*	<0.050	<0.050									
2-Methylnaphthalene	ug/L	2*	<0.050	<0.050									
Naphthalene	ug/L	7*	<0.050	<0.050									
Phenanthrene	ug/L	0.03*	<0.030	<0.030									
Pyrene	ug/L	-	<0.050	<0.050									

NOTE: 1) PWQO denotes Provincial Water Quality Objectives (1994) with updates.
2) * denotes interim PWQO.
3) µg/L denotes micrograms per litre.
4) Blank denotes parameter not analyzed.
5) **Bold** and Shaded indicates select parameter was detected at concentration greater than the PWQO.
6) *Italics* denotes parameter concentration was below the laboratory reportable detection limit (RDL), where the RDL exceeds the relevant PWQO.

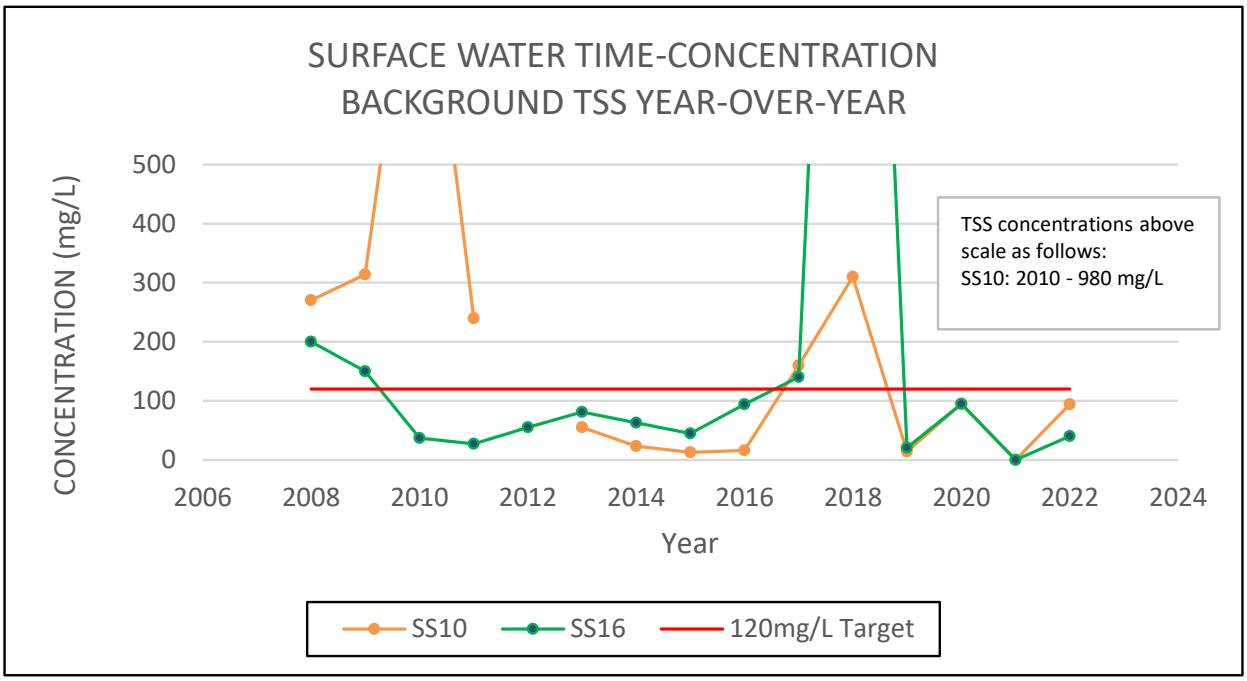


FIGURE B-13

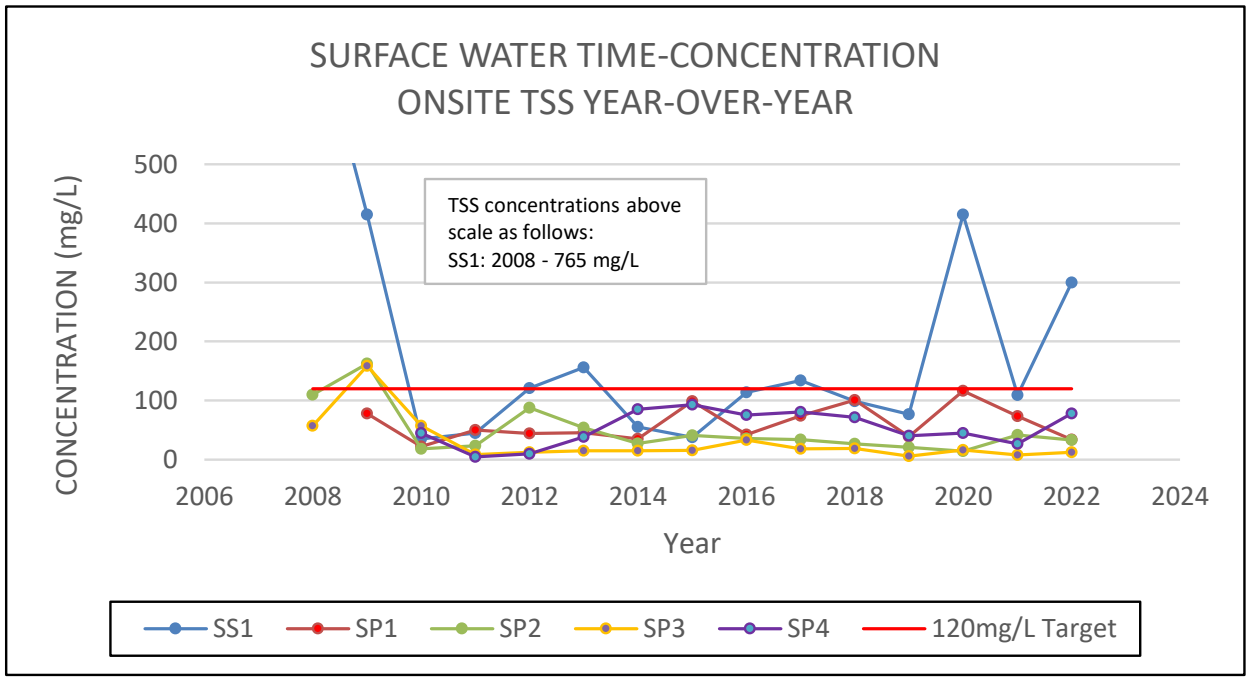


FIGURE B-14