FINAL REPORT

WASTE MANAGEMENT OF CANADA CORPORATION

WATFORD, ONTARIO

TWIN CREEKS ENVIRONMENTAL CENTRE: 2024 FOURTH QUARTER & ANNUAL MONITORING REPORT VOLUME 2A OF 5 – COMPLIANCE MONITORING

RWDI #2402553.01

February 25, 2025

SUBMITTED TO

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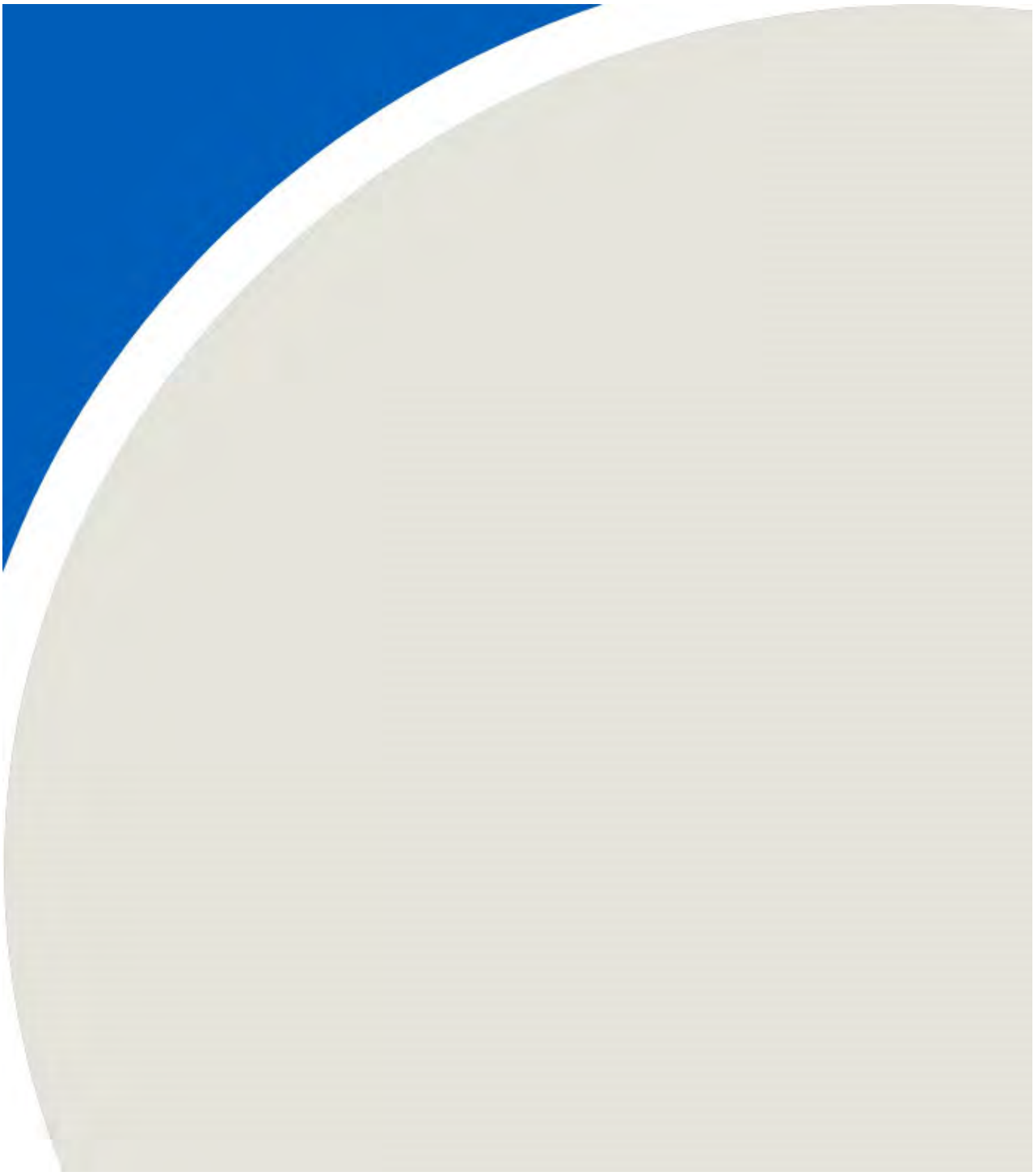
APPENDIX A:

Approval Documentation

APPENDIX A1:

Amended ECA [Waste] No. A032203, dated December 16, 2023



AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A032203
Issue Date: December 16, 2023

Waste Management of Canada Corporation
5768 Nauvoo Rd
Warwick, Ontario
N0M 2S0

Site Location: Twin Creeks Environmental Centre
5768 Nauvoo Rd Watford
Warwick Township, County of Lambton
N0M 2S0

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

the use and operation of a 101.8 hectare waste disposal site (landfill) within a total site area of 301 hectares.

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

"Agricultural Waste" for the purposes of this ECA, is defined as municipal yard waste, wood chips, food waste and minimal amounts of solid manure which would only be accepted or used for the purpose of seeding or operating an active aerobic compost pile and does not include liquid manure;

"AQMP " means an Air Quality Monitoring Program;

"Construction Phase " is defined as the period of time from the start of construction of Phase 1 of the expanded landfill to the date of first receipt of waste in Phase 1;

"Contaminating Lifespan" refers to the period of time, after closure until the site finally produces contaminants at concentrations below levels which have unacceptable health or environmental effects;

"Crown " means Her Majesty the Queen in the Right of Ontario;

"Director " means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part II.1 of the EPA;

“District Manager ” means the District Manager in the Ministry of the Environment, Conservation and Parks Sarnia District Office;

“District Office ” means the Ministry of the Environment, Conservation and Parks Sarnia District Office;

“EA” refers to the document titled “Warwick Landfill Expansion Environmental Assessment” , dated September 2005, which includes Discussion Papers 1 though 9 included in the Appendices A to F of the Environmental Assessment. EA also includes responses from the Owner dated:

1. March 10, 2006 “Waste Unit’s Final Comments Dated March 8, 2006”
2. February 14, 2006 “Leachate Recirculation”
3. February 14, 2006 “Response to February 1, 2006 Correspondence”
4. January 13, 2006 “Waste Management Response to Comments received from Warwick Landfill Expansion EA” including attachments entitled:

    i. Response to the Township of Warwick;
    ii. Response to Thomson Rogers;
    iii. Table of responses to various agencies, public and First Nations Submissions;
    iv. Landfill Gas Assessment, Warwick Landfill Baseline Conditions Report prepared by RWDI dated January 12, 2006;
    v. Memo dated March 10, 2006;
    vi. June 12, 2006 “Response to May 1, 2006 Ministry Review ”;

“EAA” refers to the Ontario Environmental Assessment Act, R.S.O. 1990, c.E.18, as amended;

"Environmental Compliance Approval" or "ECA" or "Approval" means this entire provisional Environmental Compliance Approval document, issued in accordance with Section 20.2 of the EPA , and includes any schedules to it, the application and the supporting documentation listed in schedule "A";

“Environmental Inspector” refers to the individual employed by the Ministry of the Environment, Conservation and Parks to inspect the Site;

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

“EPB” refers to the Environmental Permissions Branch of the Ministry of the Environment, Conservation and Parks;

"Hydraulic Trap" indicates a situation where hydraulic gradients from the surrounding soil are inward toward the landfill waste and associated leachate collection system;

"Mini-Transfer Area" means the mini-transfer public convenience drop-off area as described and identified in the June 2009 Development & Operations Report that is identified in Item 59 of Schedule "A" and whose location is identified as "Expansion Mini-Transfer" in figure MT2 that is contained in the 2009 Development & Operations Report;

“MECP” or “Ministry” refers to the Ontario Ministry of the Environment, Conservation and Parks;

"Operation Phase" is defined as the period of time from the date that Phase 1 of the expanded landfill area first receives waste until the landfill site reaches final capacity;

“Operator ” has the same meaning as “operator” as defined in s.25 of the EPA;

“Owner ” means Waste Management of Canada Corporation and its successors and assigns;

"O. Reg. 101/94" means Ontario Regulation 101/94 as amended;

"OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

“PA ” means the Pesticides Act , R.S.O. 1990, c.P.11, as amended;

"Preparation Report" refers to a report documenting that the subsequent stage of the landfill has been constructed in accordance with the approved design plans and specifications;

“Poplar System” is the irrigation area located on top of the cap of the Existing Site (old landfill) that is used for the phytoremediation of leachate that is generated at the Site per Items 63 through 65 of Schedule “A” and Figure 2 of Item 16 on Schedule "A";

“Poplar Plantation” is the irrigation area located on native soil to the south of the Site that is used for the phytoremediation of irrigation liquid that satisfies the Effluent Limit criteria per the OWRA Section Approval for the Site, Item 39 of Schedule “A”, and Appendix N11 of Item 30 on Schedule "A";

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

"PWQO" refers to the Provincial Water Quality Objectives;

"Recyclable Waste" means waste that are glass, plastic, aluminium or steel cans, gypsum wallboard, newspapers, cardboard and/or other materials for which there is a secured market;

“Regional Director” refers to the Director of the Ministry of the Environment’s Southwestern Regional Office;

"Regulation 232 " or "Reg. 232" or "O. Reg. 232/98" means Ontario Regulation 232/98 (Landfilling Sites) made under the EPA, as amended;

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

“Site” refers to the Twin Creeks Landfill Site and lands owned by the Owner described as:

Firstly, Part of Lots 19 and 20, Concession 3, S.E.R.,and Part of Lot 20, 21 and 22, Concession 4, S.E.R. and Part of the Road Allowance between Lots 21 and 22, Concession 4, S.E.R., shown as Parts 1, 2 and 3 on Plan 25R-9125 and Part 2 on Plan 25R-1903, Save and Except Part 1 on Plan 25R-6184, Township of Warwick, County of Lambton; and

Secondly, Part of Lot 20, Concession 3 S.E.R., shown as Part 1 on Plan 25R-6184, Township of Warwick, County of Lambton;

"Traditional agricultural crop production" means standard crop production, nursery and horticultural crops, agro-forestry, conservation uses but not greenhouses or any accessory agricultural buildings and structures;

“Undertaking” refers to the proposed undertaking as described in the Warwick Landfill Expansion Environmental Assessment;

“WIFN” refers to Walpole Island First Nation; and

“WPLC” refers to the Warwick Public Liaison Committee.

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

TERMS AND CONDITIONS

1.0 GENERAL

Compliance

1.1 This Approval revokes all previous Approvals and Notices of Amendment issued under Part V of the Environmental Protection Act for this Site. The approval given herein, including the terms and conditions set out, replaces all previously issued Approvals and related terms and conditions under Part V of the Act for this Site.

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

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

In Accordance

1.4 Except as otherwise provided by this Approval, the Site shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule "A".

1.5 (a) Construction and installation of aspects described in Schedule "A" must be completed within 5 years of the later of:

1. the date this Approval is issued; or
2. if there is a hearing or other litigation in respect of the issuance of this Approval, the date that this hearing or litigation is disposed of, including all appeals.

(b) Notwithstanding Condition 1.5(a), ongoing constructed aspects that are pertinent to the Major Works identified in Conditions 4.1 to 4.7 including the landfill liner, landfill capping, landfill gas management infrastructure, leachate collection and recirculation infrastructure shall be constructed in accordance with the documentation in the attached Schedule "A" that pertain to the final design of the Site.

(c) This Approval ceases to apply in respect of the aspects of the Site that have not been constructed or installed before the later of the dates identified in Conditions 1.5(a).

Interpretation

1.6 Where there is a conflict between a provision of any document listed in Schedule "A" in this Approval, and the conditions of this Approval, the conditions in this Approval shall take precedence.

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

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

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

Other Legal Obligations

1.10 The issuance of, and compliance with, this Approval does not:

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

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

(c) The Owner shall ensure that:
  (i) all equipment discharging to atmosphere are approved under Section 9 of the ECA where applicable; and
  (ii) all effluent is discharged in accordance with the OWRA where applicable.

Adverse Effect

1.11 The Owner and Operator shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the present, past and historical operations at the Site. Such steps may include accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

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

1.13 At no time shall the Owner or Operator allow the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

Change of Ownership

1.14 The Owner shall notify the Director, in writing, and forward a copy of the notification to the District Manager, within 30 days of the occurrence of any changes in the following information:
(a) the ownership of the Site;
(b) the Operator of the Site;
(c) the address of the Owner or Operator; and
(d) the partners, where the Owner or Operator is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R. S. O. 1990, c. B.17, shall be included in the notification.

1.15 No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out.

1.16 In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Approval, and the Owner shall provide a copy of the notification to the District Manager and the Director.

Registration on Title Requirement

1.17 Prior to dealing with the property in any way, the Owner shall provide a copy of this Approval and any amendments, to any person who acquires an interest in the property as a result of the dealing.

1.18 (a) If not already completed, within ninety (90) calendar days from the date of issuance of this

Approval, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:

(i) a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the Site where waste has been and is to be deposited at the Site;
(ii) proof of ownership of the Site;
(iii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director, verifying the legal description provided in the Certificate of Requirement;
(iv) the legal abstract of the property; and
(v) any supporting documents including a registerable description of the Site.

(b) If not already completed, within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the Director, the Owner shall:
(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and the District Manager, written verification that the Certificate of Requirement has been registered on title.

Registration on Title Requirement - Contaminant Attenuation Zone (CAZ)

1.19 If not already completed, or if required at any time, within thirty (30) calendar days from the date of establishing a contaminant attenuation zone (CAZ) (overburden and/or bedrock aquifers) in either fee simple or by way of a groundwater easement, the Owner shall submit to the Director a completed Certificate of Requirement which shall include:

(a) If rights are obtained in fee simple, the Owner shall provide:
(i) documentation evidencing ownership of the CAZ obtained in compliance with Regulation 232, as amended;
(ii) a completed Certificate of Requirement and supporting documents containing a registerable description of the CAZ; and
(iii) a letter signed by a member of the Law Society of Upper Canada; or other qualified legal practitioner acceptable to the Director, verifying the legal description of the CAZ.
(b) within fifteen (15) calendar days of receiving a Certificate of Requirement signed or authorized by the Director,the Owner shall:
(i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
(ii) submit to the Director and the District Manager, a written verification that the Certificate of Requirement has been registered on title.
(c) If rights are obtained by way of a groundwater easement, the Applicant shall:
(i) provide a copy of the agreement for the easement;
(ii) provide a plan of survey signed and sealed by an Ontario Land Surveyor for the CAZ; and
(iii) submit proof of registration on title of the groundwater easement to the Director and District Manager;
(d) The Owner shall not amend, or remove, or consent to the removal of the easement or CAZ from title without the prior written consent of the Director.

Certificate of Withdrawal of Requirement

1.20 If the Applicant wants to withdraw the Certificate of Requirement, the Applicant shall:

(a) submit to the Director, a request for a Certificate of Withdrawal of Requirement; and its supporting documents, outlining the reasons for the Withdrawal of the Requirement.
(b) submit to the Director:
    (i) a plan of survey of the area where waste was deposited signed and sealed by an Ontario Land Surveyor and for the Site or CAZ;
    (ii) the legal abstract of the Site or CAZ – or area where waste was deposited;
    (iii) completed Certificate of Withdrawal of Requirement containing a registerable description of the Site or CAZ or area where waste was deposited; and
    (iv) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the Director verifying the legal description of the Certificate of Withdrawal of Requirement.
(c) within fifteen (15) calendar days of receiving a Certificate of Withdrawal of Requirement authorized by the Director, the Applicant shall:
    (i) register the Certificate of Withdrawal of Requirement in the appropriate Land Registry Office on the title to the Site or CAZ or area where waste was deposited; and
    (ii) submit to the Director and District Manager a copy of the registered document together with a copy of the PIN Abstract confirming the registration.

Inspections by the Ministry

1.21 No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the OWRA, the EPA, the PA, the SDWA or the NMA, of any place to which this Approval relates, and without limiting the foregoing:
(a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this Approval are kept;
(b) to have access to, inspect, and copy any records required to be kept by the conditions of this Approval;
(c) to inspect the Site, related equipment and appurtenances;
(d) to inspect the practices, procedures, or operations required by the conditions of this Approval; and
(e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Approval or the EPA, the OWRA, the PA, the SDWA or the NMA.

Information and Record Retention

1.22 (a) Except as authorized in writing by the Director, all records required by this Approval shall be retained at the Site for a minimum of two (2) years from their date of creation.
(b) The Owner shall retain all documentation listed in Schedule "A" for as long as this Approval is valid.
(c) All information and logs required in Condition 9.1 shall be kept at the Site until they are included in the Annual Report.

(d) The Owner shall retain employee training records as long as the employee is working at the Site.
(e) The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

1.23 The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action under this Approval or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
(a) an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this Approval or any statute, regulation or other legal requirement; and
(b) acceptance by the Ministry of the information's completeness or accuracy.

1.24 The Owner shall ensure that a copy of this Approval, in its entirety and including all its Notices of Amendment, and documentation listed in Item #1 of Schedule "A", are retained at the Site or the Owner's office at all times.

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

2.0 FINANCIAL ASSURANCE

2.1 a. The Financial Assurance shall be submitted as required to the Director, Financial Assurance as defined in Section 131 of the Environmental Protection Act. The Financial Assurance shall be in a form acceptable to the Director and shall provide sufficient funds for the analysis, closure, ongoing and long-term monitoring and reporting, post-closure maintenance and care of the Site.

1. On the following dates, the Owner shall ensure the maximum amount of financial assurance has been submitted to the Director in a form acceptable to the Director as follows:

Payment Date	**Amount**
By March 31, 2021	$32,459,985.00
By March 31, 2022	$35,256,829.00
By March 31, 2023	$37,164,501.00
By March 31, 2024	$39,434,722.00

b. Commencing on March 31, 2024 and on a four year basis thereafter, the Owner shall provide to the Director a re-evaluation of the amount of the Financial Assurance to facilitate the actions required under Condition 2.1.a. The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of alternative measures required by the Director upon review of the annual reports. The Financial Assurance must be submitted to the Director within thirty (30) days of written acceptance of the re-evaluation by the Director; and

c. The amount of Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is

received, indicating Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial Assurance at least sixty (60) days before the Financial Assurance terminates, the Owner shall forthwith replace the Financial Assurance with cash.

3.0 WARWICK PUBLIC LIAISON COMMITTEE and FIRST NATIONS

WPLC

3.1 The Owner shall continue and maintain the WPLC. The WPLC shall serve as a focal point for dissemination, review and exchange of information and monitoring results relevant to the operation of the undertaking. In addition, the purpose of the WPLC will be to provide community review of the development, operation (current and proposed) and ongoing monitoring, closure and post-closure care related to the landfill Site.

3.2 The general mandate of the WPLC shall include:

a. Review operations and provide regular input to the Owner with respect to all matters pertaining to landfill Site operation, including issues pertaining to ongoing operations, monitoring, the need for contingency plans or remedial measures, response to community complaints, the need for changes to the ECA , post-closure monitoring and maintenance, and development of the proposed end use for the landfill Site;
b. Review operational and monitoring reports;
c. Consider and make recommendations to the Owner regarding outside consulting advice in respect of the landfill Site;
d. Facilitate ongoing dialogue between the Owner, the Environmental Inspector and the community, including residents and businesses in the immediate vicinity of the landfill Site;
e. Provide reports regularly to the community on the activities of the WPLC, the landfill operations and landfill related issues and seek public input on these activities and issues;
f. Monitor the Owner's complaint response program and make recommendations to the Owner with respect to this program; and
g. Provide recommendations to the Owner with respect to unresolved complaints.

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

3.4 The Owner shall provide for the administrative costs of operating the WPLC, including the cost of meeting places and clerical services.

3.5 The WPLC shall operate under a Terms of Reference of the committee. Suggestions to revise the WPLC Terms of Reference may be made at any meeting that a quorum is present. No changes to the Terms of Reference can be made until the committee members mutually agree to changes. Any changes shall be provided to the Ministry for information purposes.

3.6 The Community members shall be appointed by the WPLC. The community member positions are intended to be available to individuals that are not members of groups already represented on the

WPLC and have an interest in the operation of the landfill. The WPLC shall encourage individuals who reside in close proximity to the landfill to participate. A community member is defined as a taxpayer and/or resident of Warwick Township.

3.7 The function of the Ministry member will be to provide advice, information and input to other members as required.

3.8 The WPLC shall determine the appropriate meeting frequency and review it on an annual basis.

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

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

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

3.12 Unless disclosure would be contrary to the Freedom of Information and Protection of Privacy Act ,the WPLC, the Township of Warwick and Walpole Island First Nation are to be provided all formal submissions and correspondence related to the site operations by the Owner at the same time as these items are submitted to the Ministry, the Township of Warwick Council or any other body.

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

3.14 All recommendations made to the Owner with respect to ongoing landfill operations, monitoring and the implementation of contingency measures shall be discussed at joint meetings between representatives of the Owner and the WPLC. The purpose of these meetings will be to arrive at an agreement between the Owner and WPLC with respect to implementation of the recommendations.

3.15 The Owner will disclose all monitoring results to the WPLC and deliver to the WPLC all documents and information (except as may be privileged) relevant to the operation of the landfill.

First Nation and Township of Warwick Consultation

3.16 During the process of submission of an application to amend any approvals for the Site, the Owner shall:

a. discuss with WIFN and the Township of Warwick (Township) the proposed application prior to submission of the WIFN application to the Director;

b. provide the same documents to WIFN and Township that are provided to the Director in respect of the amendments; and
c. provide the Director, either prior to or at the same time of application submission, with a statement how WIFN and Township comments were considered by the Owner.

4.0 CONSTRUCTION, INSTALLATION and PLANNING

Major Works

4.1 For the purposes of this ECA the following are Major Works:

a. gas management system;
b. leachate collection system; and
c. liner.

4.2 a. A final detailed design shall be prepared for each Major Work to be constructed at the Site consistent with the conceptual design of the Site as presented in the Supporting Documentation, specifically Items 66, 67, and 68 of Schedule "A".

b. Geonet may substitute a component of the 0.3 metres of granular in the secondary drainage layer in accordance with Items 54 to 57 inclusive on Schedule "A". The Owner shall ensure that the Quality Assurance/Quality Control procedure detailed in Item 57 of Schedule "A" is followed during installation of the geonet material.

4.3 The final detailed design of each Major Work shall include the following:

a. design drawings and specifications;
b. a detailed quality assurance / quality control (QA/QC) program for construction of the major work, including necessary precautions to avoid disturbance to the underlying soils; and
c. details on the monitoring, maintenance, repair and replacement of the engineered components of the major work, if any.

4.4 Any design optimization or modification that is inconsistent with the conceptual design shall be clearly identified, along with an explanation of the reasons for the change.

4.5 The final detailed design of each Major Work shall be submitted to the Director and copied to the District Manager.

4.6 Each major work shall be constructed in accordance with the approved final detailed design and the QA/QC procedures shall be implemented as proposed by the Owner. Any significant variances from the conceptual design for the Site as detailed in Items 66, 67 and 68 of Schedule "A" shall be subject to approval by the Director.

4.7 As-built drawings for all Major Works shall be retained on Site and made available to Ministry staff for inspection.

Subsequent Stages

4.8 At least six (6) months prior to the anticipated completion of landfilling in each stage of the Site , a final detailed design for the subsequent stage shall be submitted to the Director. Any significant variances from the conceptual design for the Site as detailed in Items 66, 67 and 68 of Schedule "A" shall be subject to approval by the Director.

4.9 No person shall deposit any waste at the subsequent stage until a written Preparation Report in accordance with O. Reg. 232/98, Section 19 has been submitted to the Director and District Manager documenting that:

a. all construction;
b. QA/QC activities;
c. Site conditions; and,
d. all details of the construction of the Site;

are in accordance with the approved design plans and specifications.

4.10 Approval to proceed with landfilling or construction of each subsequent stage shall be dependent on groundwater, air quality and surface water monitoring results acceptable to the Director. If monitoring results are not acceptable to the Director then remedial action must be taken and completed before landfilling may proceed in the subsequent stage.

Geotechnical Engineer

4.11 A qualified professional geotechnical engineer shall inspect the excavation and construction underlying the Site and provide a report addressing whether the construction proceeded in accordance with approved detailed design plans, specifications and QA/QC procedures. The report shall be included in the Preparation Reports for each stage of the landfill.

Environmental Inspector

4.12 In accordance with conditions 18 and 19 of the EA approval dated January 15, 2007 known as Item 1 on Schedule “A”, the Owner shall provide funding to the Ministry for the provision of an Environmental Inspector to inspect the Site, at any reasonable time on such terms and conditions, as deemed appropriate by the District Manager of the District Office and outlined in a written agreement with the Owner. Within the agreement, the Owner shall commit to providing, as a minimum, the following:

a. Adequate office facilities, communication equipment, and means of transportation for the Environmental Inspector; and,
b. Reimbursement to the MECP semi-annually for the costs and associated expenses of the

Environmental Inspector.

4.13 The Owner shall provide funding for an Environmental Inspector on Site based on the following:

a. Construction Phase/Operations Phase- Full-time, on-Site inspector with the inspector being on Site a full day each day for five (5) days per calendar week for the first two years of the operation phase.

4.14 a. Every two (2) years commencing on February 1, 2012, the Owner shall prepare and submit a report to the District Manager detailing the status and need for a Environmental Inspector based on discussions with the Township of Warwick, WIFN and the WPLC regarding the inspection frequency for the Environmental Inspector. The inspection frequency of the Environmental Inspector shall remain as per the requirements outlined in Condition 4.13 during the operation phase until a decision is made by the District Manager on the appropriate inspection frequency.

b. Notwithstanding Conditions 4.12 to 4.14 (1) and 15.3, inclusive, the Environmental Inspector's duties may, in consultation with the Owner, be increased, reduced, suspended or terminated on such terms and conditions as deemed appropriate by the District Manager and, for greater certainty, the District Manager may require an Environmental Inspector to be on-Site for up to seven days per week in cases of apparent significant non-compliance with the conditions of the EA approval or any approval issued for the Site under the EPA until such non-compliance is resolved.

5.0 OTHER WORKS

Berm Construction

5.1 All berm slopes associated with this approval shall be no greater than 3:1.

Diversion Area

5.2 The diversion area will be located to the east of the treated leachate storage lagoons.

Cell 12

5.3 a. Cell 12 will be used as a monofil of contaminated soils until redeveloped and incorporated into the Expansion Site in accordance with Items 66 through 68 of Schedule "A".

b. The management of the Cell 12 monofill shall be in accordance with the procedures and practices consistent with other previous monofill operations at the Site.

Landscape

5.4 The Owner shall ensure the landscape plan is carried out in accordance with Item 72 and 80 of Schedule "A", as amended from time to time.

6.0 GENERAL OPERATIONS

Proper Operation

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

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

6.3 a. Landfilling operations shall be conducted in accordance with Items 66 through 71 of Schedule "A" attached to this ECA.

b. The Owner shall ensure the operations and procedures manual for the the Site includes discussions on the following items:

a. Health and safety;
b. Operation and maintenance of the Site;
c. Waste disposal area and development;
d. Nuisance management;
e. Leachate management;
f. Landfill gas management;
g. Surface water/Storm water management;
h. Inspections and monitoring;
i. Contingency plans and emergency procedures;
j. Complaints; and,
k. Reporting and record keeping.

c. The operations and procedures manual shall be:

a. retained at the Site;
b. reviewed on an annual basis and updated by the Owner as required; and
c. be available for inspection by Ministry staff.

Waste Type

6.4 Only the following types of waste shall be accepted at the Site:

a. municipal, industrial, commercial and institutional solid non-hazardous waste generated within the Province of Ontario, including non-hazardous contaminated soil.

Capacity

6.5 The Owner shall only accept and deposit waste at the Site as long as there is available capacity as defined by the final contours for the Site approved by this ECA . The approval permits disposal of waste at the Site to fill an air space of 26,508,000 cubic metres (including waste, daily and interim cover material). This capacity includes the capacity of the existing and expansion landfill areas.

Yearly Waste Limit

6.6 a. The Owner can receive up to a maximum of 1,400,000 tonnes per year of waste including contaminated soil for disposal at the Site.

b. The amount of tire shred that may be received to process is 7,160 tonnes/year.

c. Up to a maximum of 100 tonnes per day of solid non-hazardous waste, white goods and metals, recyclable waste, wood waste, and leaf and yard waste that are deposited by the public using small vehicles at the Mini-Transfer Area of the Site may be transferred from the Site by a waste hauler or waste haulers that has an ECA to another waste disposal site.

Service Area

6.7 Only waste that is generated in the Province of Ontario shall be accepted at the Site.

Landfilling of Sludge

6.8 A thickness of at least 2 metres of compacted waste and cover material shall be maintained between any landfilled sludge (solid non-hazardous as per Reg. 347) and the granular leachate collection layer.

Asbestos Waste

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

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

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

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

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

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

Waste Limits

6.15 No waste, including daily cover, intermediate cover or final cover layer, shall be landfilled outside the limits of the base and final cover contours presented in Items 66 through 71 of Schedule "A"**(**the Development and Operations Plan) attached to this ECA .

Site Use

6.16 The area inside the fencing indicated in Appendix N18 of Item 30 of Schedule "A" shall be used for waste disposal purposes only. The remainder of the Site outside the fenced area shall be used for traditional agricultural crop production only.

Waste Inspection

6.17 All loads of waste must be properly inspected by trained Site personnel prior to disposal at the Site and waste vehicles must be diverted to appropriate areas for waste disposal.

Waste Deposit

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

Burning Waste Prohibited

6.19 Burning of waste at the Site is prohibited.

Signage

6.20 A sign shall be maintained at the main entrance/exit to the Site on which is legibly displayed the following information:

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

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

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

Hours of Operation

6.23 Waste shall only be accepted at the Site during the following time periods:

a. 7 AM to 7 PM - Monday to Saturday.

6.24 On-site equipment used for daily Site preparation and closing activities shall only be used during:

a. 6 AM to 8 PM - Monday to Saturday.

6.25 With prior written approval of the District Manager, the time periods may be extended to accommodate seasonal or unusual quantities of waste or such factors as determined to be reasonable to the District Manager.

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

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

Site Security

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

Fencing

6.29 The entire area as shown in Figure 12 in Item 66 of Schedule "A" shall be fenced by the Owner with a 6 foot high wire woven highway-type paige fence.

Site Access

6.30 Access to and exit from the Site for the transportation of waste shall under normal circumstances be permitted from County Road 79.

Access Roads

6.31 a. On-Site roads shall be provided and maintained in a manner that vehicles hauling waste to and on the Site may travel readily and safely on any operating day. During winter months, when the Site is in operation, roads must be maintained to ensure safe access to the landfill working face.

b. Access roads must be clear of mud, ice and debris which may create hazardous conditions.

Vermin, Dust, Litter, Odour, Noise, Traffic

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

Scavenging

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

Dust

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

6.35 Dust shall be managed as per the Best Management Practices Plan (Dust) prepared by RWDI listed as Item 83 in Schedule "A".

Litter Control

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

6.37 Litter pickup will occur at least weekly on the Owner's property during all weather conditions.

6.38 The Owner will respond to litter complaints within one (1) business day of the complaint being received.

6.39 Litter shall be managed in accordance with the Best Management Practices plan prepared by RWDI listed as Item 25 on Schedule "A".

Odour

6.40 Odour shall be managed in accordance with the Best Management Practices Plan (Odour) prepared by RWDI listed as Item 84 in Schedule "A".

Noise

6.41 The Owner shall comply with noise criteria in MECP Guideline entitled “Noise Guidelines for Landfill Sites" dated October 1998 as amended from time to time and the Site shall comply with the limits set in Publication NPC205. Bird bangers may be used at the Site for gull control provided that they produce

reference impulsive sound not exceeding 125 dBAI at 5 metres from the bird banger.

6.42 Noise monitoring at the Site shall be undertaken by the Owner as per the document entitled "Environmental Noise Monitoring Program for the Warwick Landfill", dated June 15, 2007 prepared by Aercoustics Engineering Limited listed as Item 73 on Schedule "A".

Alteration of Best Management Plans for Odour, Dust and Litter

6.43 The Owner shall use the Best Management Plans (BMP's) for dust, odour and litter at the Site in accordance with the applicable Conditions approved by this ECA. The Owner may submit changes in writing to the Director for approval to amend the BMP(s). At the same time any changes to the BMP's are submitted to the Director, the Owner shall provide the proposed changes to the BMP's to the Township of Warwick, WPLC and WIFN.

Surface Water

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

6.45 The Owner shall not discharge surface water to receiving water bodies without an approval under the EPA.

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

Application of Cover Material

6.47 Cover material shall be applied as follows:

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

b. Intermediate Cover - In areas where landfilling has been temporarily discontinued for six (6) months or more, a minimum thickness of 300 mm of soil cover or an approved alternative cover material shall be placed;

c. Final Cover - In areas where landfilling has been completed to final contours, a minimum 1.85 metre thick layer of final cover soil shall be placed. Fill areas shall be progressively completed and rehabilitated as landfill development reaches final contours; and

d. Topsoil - In areas where landfilling has been completed to final contours and where final cover has been placed, a minimum 0.15 metres thick layer of topsoil shall be placed.

Cover Materials Allowed

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

a. Contaminated soil that satisfies the Schedule IV Toxicity Characteristic Leaching Procedure (TCLP) criteria as outlined in O. Reg. 347 as amended from time to time;
b. Wood chips (daily);
c. Automobile Shredder Residue (ASR) (daily); or
d. Tarps (daily).

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

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

Automobile Shredder Residue as Daily Cover

6.51 a. Automobile Shredder Residue (ASR) may be used as a daily cover at the Site on an on-going basis from the issuance of this Approval.

b. The Owner shall cease the use of ASR if written notification is received from the District Manager indicating that there are environmental concerns due to the use of ASR as daily cover based on the testing of the ASR required by Condition 6.52.

c. The Owner may re-commence the use of ASR upon the Owner submitting an action plan that is acceptable to the District Manager that can address the environmental concerns which were raised due to the the use of ASR as daily cover.

6.52 Automobile Shredder Residue samples of the daily cover material are to be taken on semi-annual basis (Spring and Fall) and submitted for analysis of O. Reg. 347 Schedule IV Inorganics, VOC's, and PAH's. Automobile Shredder Residue is to conform with the specifications of a non-hazardous waste under O. Reg. 347 as amended from time to time. Semi-Annually testing results are to be submitted to the District Manager upon receipt. The frequency of O. Reg. 347 testing of the daily cover material can be reduced subject to approval of the District Manager.

Contaminated Soil as Daily or Intermediate Cover

6.53 Contaminated soil equal to or below 10% of the TCLP value and/or 0.4 mg/L benzene may be landfilled in Cells 8, 10 and/or 12.

6.54 If confirmatory testing of the contaminated soil to be landfilled in Cells 8, 10 and/or 12 indicates an

exceedance of 10% of the TCLP value and/or 0.4 mg/L of benzene, but satisfies the TCLP criteria as in O.Reg. 347, the soil may be used as daily and/or intermediate cover, and or landfilled as waste.

6.55 If the contaminated soil received at the Site does not meet the TCLP value, the contaminated soil shall be classified as a hazardous waste and shall be disposed of at a site that is approved to receive and dispose of hazardous waste.

6.56 Contaminated soil that satisfies the TCLP criteria may be used as daily and/or intermediate cover in the Expansion Site of the landfill. Contaminated soils may not be used on outside slopes which drain into the surface water system.

6.57 Contaminated soil used for daily and/or intermediate cover shall be sampled on a quarterly basis and submitted for analysis of O.Reg. 347 Schedule IV Inorganics, VOCs, PAHs and PCBs. Quarterly testing results shall be included in the annual report. The frequency of O. Reg. 347 testing of the cover material may be reduced subject to agreement of the District Manager.

6.58 Contaminated soil for use as daily cover and/or intermediate cover shall be stockpiled in areas of the Site that have a leachate collection system installed below.

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

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

6.61 Prior to receipt at the Site, each source of contaminated soils which are to be used as daily or intermediate cover shall be tested to determine if the soils meet the criteria in this ECA and a copy of the test results shall be kept in the daily records for the Site as required.

7.0 SITE OPERATIONS

Landfill Reclamation

7.1 The Owner shall restrict stockpiling of contaminated soil from Cells 8, 10 and 12 to sections of the landfill footprint that have a liner and leachate collection system.

Waste Processing and Composting

7.2 Waste Processing and composting is allowed at the location outlined in Item 49 on Schedule "A" subject to the following conditions:

a. Prior to the commencement of any waste processing or composting operations at the Site, the Owner shall ensure that air (Section 9 EPA) and noise approvals are obtained;
b. Prior to the start of composting operations at the Site, the Owner shall submit to the District

Manager a contingency plan for any odour problems that may occur;

c. The total combined amount of waste that may be received at the Site for processing and composting shall not exceed 36,000 tonnes per year and the maximum daily amount to be received at the Site shall not exceed 700 tonnes per day;
d. The amount of waste that may be received at the Site for composting shall not exceed 7,500 tonnes per year;
e. Material acceptable for processing and composting at the site shall include leaf, yard, agricultural waste, concrete, asphalt, wood and tires;
f. The bins for diversion shall be emptied on an as needed basis to prevent odours and operational problems. The Ministry may at any time instruct that a bin be emptied;
g. The Owner shall ensure that waste processing and composting is undertaken in a safe manner, and that all waste is properly handled, processed and contained so as not to pose any threat to the general public and site personnel;
h. All noise generating processing activities in the waste diversion area including concrete/asphalt/crushing, wood chipping and tire shredding shall only occur between 07:00 to 19:00; and
i. Any runoff that comes into contact with waste in the waste processing/composting area shall be managed in such a fashion to ensure compliance with Condition 8.5 of this ECA.

7.3 The Owner shall ensure that composting at the Site is undertaken in accordance with O.Reg 101/94 as amended from time to time and the Ministry document entitled "Interim Guidelines for the Production and Use of Aerobic Compost in Ontario " dated November 2004 as amended from time to time and the following requirements:

a. Only leaf and yard waste, Agricultural Waste as defined in Item 3 in Schedule "A" and wood (not including painted or treated wood or laminated wood) may be accepted at the compost area.
b. Leaf and yard waste is defined as waste consisting of natural Christmas trees and other plant materials but not tree limbs or other woody materials in excess of seven (7) centimetres in diameter.
c. The composting site shall only receive material for composting from May 1st to November 1st each year.
d. Leaf and yard waste, Agricultural Waste and wood may not be stored for more than four (4) days before it is composted.
e. During composting, the Owner shall provide the composting mass with adequate ventilation to ensure that aerobic conditions are maintained.
f. Cured compost must be analyzed for the parameters listed in Table 1 of O.Reg. 101/94 and shall not be removed from the Site unless it has been sampled and analyzed.
g. Cured compost is defined as meeting the specifications in Sections 7.2 to 7.5 inclusive of the Interim Guidelines for the Production and Use of Aerobic Compost in Ontario" dated November 2004 as amended from time to time and can be used on an unrestricted basis.
h. Compost is designated a waste if the compost contains a substance listed in Table 1 of O. Reg. 101/94 that has a concentration greater than the concentration listed in Column 2.
i. Controlled compost is defined as compost that is designated a waste under the previous condition but has concentrations less than the concentrations listed in Column 3 of Table 1

in O. Reg. 101/94.

j. Controlled compost may not be removed from the site except for direct shipment to the intended user.

k. Material from the composting process that fails to meet the "Interim Guidelines for the Production and Use of Aerobic Compost in Ontario" dated November 2004 shall be deemed to be a waste under O. Reg. 347 and shall be disposed of accordingly.

l. The person to whom controlled compost is shipped shall be given a copy of the chemical analysis of the compost and a notice that states that the compost is controlled compost and that sets out the terms and conditions of the compost's exemption from Part V of the EPA. A copy of this notice shall be kept on file at the Site.

m. The District Manager may at any time and at his absolute discretion instruct that any or all of the waste materials from the composting or processing operations or the processed waste from the composting or processing operations to be either landfilled or directed to be utilized for specific uses and in specific locations.

7.4 Record keeping for the composting operation shall be kept as follows:

a. Records about each composting mass shall be kept including temperatures of the mass, when the temperatures were measured, when the mass was turned, information about the curing process and details about significant problems that occurred during composting or curing. This information shall be kept at the Site for at least three years after the mass was cured;

b. Records shall be kept of the analyses of compost. Any laboratory records shall be kept as part of the record. A record of an analysis shall be kept for at least three years after the analysis is performed; and

c. A record shall be kept of the name, address and telephone number of each person to whom controlled compost is shipped. The record shall be kept for at least ten (10) years after the shipment.

Tire Shred

7.5 The management and placement of tire shreds at the Site shall be in accordance with the Fire Protection and Prevention Act as follows:

a. No individual tire shred pile shall be more than 3 metres in height and 100 square metres in area. Six (6) metres of space shall be provided between all piles. Fifteen (15) metres is to be provided from property lines and thirty (30) metres shall be provided from tree lines;

b. A buffer of 4.5 metres is to be provided for grass or weeds from the edge of the tire pile to the edge of the pad.

c. A firebreak of 22 metres shall be provided between the two areas of 16 piles each.

7.6 If the total stockpiled tire shreds exceeds 300 cubic metres, the storage period shall not exceed 90 (ninety) days.

7.7 The total amount of tire shreds stored on Site shall be recorded in a log book and made available to the Ministry for inspection.

Backup Power

7.8 The Owner shall maintain adequate backup power at the Site in order to ensure scale facility and landfill gas blower on site continue to operate and are not damaged due to an extended power outage. A power supply connection at each leachate collection pumping station shall be maintained by the Owner that will permit a portable generator to be connected during a power outage.

Landfill Gas

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

Landfill Gas Management

7.10 The Owner shall, manage landfill gas in accordance with Items 66 through 68, Items 75 through 77, and Item 81 of Schedule "A" and based on the landfill gas management system constructed under the authority of the EPA Approval issued which may be amended or replaced from time to time.

Cleaning of Leachate Collection System

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

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

Leachate Collection System

7.13 All leachate collection pipes for Cell 12 shall be sloped at a minimum of 0.5%.

7.14 The Owner shall install 250 mm diameter perforated leachate collection pipes with perforations located at the 10:30, 4:30, 1:30 and 7:30 positions.

7.15 The stone for the leachate collection system shall have the following specifications:

a. D85 shall be greater than 37 mm where D85 is described as the stone diameter such that,

when measured by weight, 85% of the stones in the layer have a smaller diameter;

b. D10 shall be greater than 19 mm where D10 is the stone diameter such that, when measured by weight, 10% of the stones in the layer have a smaller diameter;
c. D60/D10 shall be less than 2; and,
d. One per cent (1%) of the stones may pass a #200 sieve.

7.16 A minimum of 50 mm of stone shall be placed below the leachate collection pipes and a minimum of 250 mm of stone shall be placed above any leachate collection pipes.

7.17 The Owner shall ensure that the leachate collection system is constructed under the supervision of a qualified consultant.

Hydraulic Trap

7.18 The Owner shall ensure that a hydraulic trap is developed and maintained beneath the Expansion Area and shall ensure that a maximum leachate head of 300 mm on the landfill liner is not exceeded.

Renewable Natural Gas (RNG) Facility

7.19 The Renewable Natural Gas Facility shall be constructed and operated in accordance with Items 88 to 89 in Schedule A.

7.20 The Owner shall ensure that the flares of the RNG facility have adequate capacity to handle all the landfill gas collected, and the blowers shall be able to draw a vacuum of no less than 100 inches of water column.

7.21 The Owner shall ensure that the capacity of the landfill gas blower/flare facility and the RNG facility be assessed each time of the gas collection system expansion. The owner shall upgrade the landfill gas blower/flare facility or the RNG facility, if necessary, to ensure there is adequate capacity to handle the expected maximum landfill gas flow.

7.22 Prior to the operation of the RNG facility, the Owner shall ensure that the following documents are updated and training provided to employees involved in the RNG operation:

a. the Best Management Practices Plan for odour in accordance with Item 90 of Schedule A;
b. the Operation and Maintenance Manual for the RNG facility.

7.23 The Owner shall maintain daily operational record of the RNG facility at the site, and ensure the following information for the RNG facility are included in the annual report:

a. the total amount of landfill gas processed at the RNG facility;
b. the total amount of processed renewable natural gas sent to the off-site network;
c. the total amount of off-specification landfill gas that was flared;
d. a summary of the RNG facility operational disruptions and the response;
e. a summary of adverse effects such as odour, spills, fire emergency, etc., and the remediation

implemented; and

f. an assessment of the adequacy of the RNG facility treatment capacity and the need for system upgrade.

8.0 LEACHATE MANAGEMENT

Leachate Recirculation

8.1 Prior to implementing the leachate recirculation program , a report on the moisture content of the incoming waste and the actual field capacity of the waste in situ shall be submitted to the Director.

8.2 The Director may at any time, terminate leachate recirculation at the Site if, in the Ministry's opinion, adverse effects on the environment are observed.

8.3 Before starting leachate recirculation, the Owner shall provide to the Director a monitoring program to ascertain the effectiveness of the leachate recirculation process.

8.4 Leachate recirculation shall not occur in any above grade locations until final cover has been installed on exterior side slopes.

Leachate Management Plan

8.5 The Owner’s leachate management plan shall not include any direct discharge of leachate or treated leachate from the Site, even as a contingency option, to surface waters, including Bear Creek. The Owner shall not discharge leachate or treated leachate to surface waters, including Bear Creek from the Site.

Leachate Treatment Plant

8.6 (1) (a) Within a minimum of three (3) years prior to closure of the landfill Site, the Owner shall ensure that a leachate treatment system is installed and operational at the Site.

(b) Leachate from the Site not sent to the operational drip irrigation area(s) approved under Condition 8.7 shall be disposed of off-Site at a location approved by the District Manager until the leachate treatment system required by Condition 8.6 (1)(a) is approved and operational.

(c) Any waste from the leachate treatment system that is to be disposed of in the landfill must be classified as a solid non-hazardous waste.

(d) The Owner shall implement all items within the document entitled Leachate Management Framework, listed as Item 86 in Schedule "A". These items include new and existing leachate monitor locations (wells, mini piezometers, and sump), leachate monitoring, leachate level reporting, Leachate Management Plan by March 31, 2020 and updated

every 3 years, and the Leachate Treatment Facility Study to be completed at least 7 years prior to closure of the landfill.

(2) As part of the financial assurance calculation in Section 2.0, the Owner shall provide to the Director for approval, a detailed financial assurance plan including the cost of leachate transportation and disposal for the landfill site during the period preceding the initiation of the leachate treatment system. In addition, the Owner shall provide to the Director for approval a financial assurance plan detailing the capital cost of the on-Site leachate treatment system.

Phytoremediation of Leachate - Existing and Proposed Poplar Plantations

8.7 On-Site phytoremediation may occur at the Poplar System and Poplar Plantation in accordance with the following conditions:

a. The Owner shall ensure that there is a 100 metre grassed buffer at all times from the Poplar Plantation to the Kersey drain.
b. Irrigation of leachate onto the either the Poplar Plantation or the Poplar System shall not occur in the following instances:

i. Between the dates of October 16 to April 30;
ii. On frozen or snow covered ground conditions;
iii. Under conditions that will cause ponded water or runoff;
iv. Conditions where surface water ponding within the area is occurring;
v. Where no poplar trees are currently planted;
vi. In areas within a drip irrigation area where trees have been harvested more than a frequency greater than every other tree;
vii. In areas within a drip irrigation area that has been fully harvested clear of trees and the trees have not started to coppice.

c. If weather forecasts indicate a rainfall storm greater than 12.5 mm/hour will occur, the Owner shall within 1 hour before the storm, shut off all irrigation of the poplar forest.
d. Irrigation zones shall be individually assessed by the Owner for suitability of irrigation after rainfall events greater than 12.5 mm.
e. Records shall be kept for the Poplar System and Poplar Plantation areas as follows:

i. quantities and dates of application of pesticides and herbicides;
ii. inspection notes regarding tree growth rates and health;
iii. inspection notes regarding condition and growth of underlying vegetative landfill cover (ie grass);
iv. observed pooling and/or runoff of irrigated liquid;
v. observations of any odours; and,
vi. weather conditions records as may be obtained from the nearest Environment Canada Weather Office which may include daily high and low temperatures, wind velocity and direction, and precipitation quantities.

f. Irrigation onto either the Poplar System or the Poplar Plantation shall be as follows:

i. Detailed records shall be kept of the quantities of irrigation liquid that are applied, including the dates of application onto either drip irrigation area;
ii. Operations in a given drip irrigation area must immediately stop if contamination problems in surface water or groundwater, which are attributable to the operation of the noted drip irrigation area, are found to be occurring. Recommencement of operations may proceed only upon further written notification of the District Manager;
iii. Operations of a given drip irrigation area must be discontinued immediately if operation of the noted drip irrigation area causes surface runoff from the footprint area or if operations cause surface ponding within the drip irrigation area; operations cannot be restarted during that application day and can only be restarted after surface ponding has evaporated or infiltrated or conditions causing the runoff or ponding have been rectified;
iv. If there are any stoppages of operations under the requirements of items ii) or iii) above, then the District Manager shall be notified immediately; and,
v. If odours attributable to one of the drip irrigation areas become a problem at the site, then the District Manager shall be so informed in writing and the operation of the noted drip irrigation area shall be stopped pending further instructions from the District Manager;

g. (1) Monitoring of the drip irrigation Poplar System and the Poplar Plantation shall be in accordance with Items 63 through 65 of Schedule “A”.

(2) Monitoring frequencies and analyses for the following items shall be as follows:

i. Daily inspections for ponded water or saturated soil during irrigation;
ii. Monthly testing of irrigation liquid quality during the irrigation season;
iii. Soil samples should be taken annually from grade to a depth of 0.6 m minimum and 0.9 m maximum;
iv. Annual soil analyses shall be conducted annually per Section 3.1 of Item 63 of Schedule "A", in addition to pH, electrical conductivity, cation exchange capacity, and sodium absorption ratio;
v. Leaf Tissue analyses once per year in the fall; and
vi. Crop inspection once per year in the fall.

h. Reporting on the drip irrigation areas shall be part of the annual monitoring report for the Site and shall include but not be limited to the following:

i. results and an analysis of the results of the monitoring programs for the drip irrigation areas:
ii. assessment of the results of the vegetation as related to the stated objectives for the Poplar System and Poplar Plantation facilities construction and operations;

iii. assessment of the need to change the monitoring program for the drip irrigation areas and a recommendation of the required changes;
iv. tabulation and assessment of the volumes of leachate produced by the landfill, and those volumes which may be applied to the existing drip irrigation areas;
v. a report on operational problems identified during the operation of the drip irrigation areas and a discussion of each problem and details of what was done to rectify each problem;
vi. a Site plan which shows the location of the areas planted with both trees and grass cover and the vegetation used on those areas;
vii. an assessment of the monitoring results pertaining to the use of trees as vegetation on the final cover.

i. The Director retains the right to request that the Owner conduct additional studies, suspend operations or require the Owner to provide additional methods to handle leachate at the Site in addition to or as a replacement to the drip irrigation areas.

j. If the Director requests removal of the drip irrigation areas, the Owner shall:

i. remove the irrigation equipment and the trees from the noted drip irrigation area. For the Poplar System, removal of trees shall include removal of tree stumps and most roots, excavate the trench to the maximum depth of root depth penetration on each tree row, and then replace, remould and recompact the excavated material;
ii. the landfill cover shall be restored to the same condition as it was in prior to commencement of the Poplar System and a blend of suitable grasses shall be seeded as necessary; and,
iii. within 6 months of completion of the noted drip irrigation area closure activities, submit to the Director a report outlining the work that has been completed.

k. Electrical conductivity of the shallow soil (maximum depth of 0.15 m) beneath the drip irrigation areas shall be monitored on a weekly basis during irrigation.

l. If salt levels are building up in the soil or additional irrigation with leachate is found to be detrimental to the health of the poplars, the leachate application rate shall be reduced or terminated.

Wood Waste and Leaf Litter

m. Any wood waste or leaf litter that is produced in the Poplar System or Poplar Plantation shall managed in accordance with Item 63 of Schedule "A".

Other Items

n. (1) Drip irrigation rates for the Poplar Plantation shall be no greater that the rate specified

in the EPA approval for the Site.

(2) Drip irrigation rates for the Poplar System shall be no greater than the rates noted in Item 63 of Schedule "A".

o. No drip irrigation shall occur within fifty (50) metres of any surface watercourse or drain.

p. (1) Leachate to be used for drip irrigation on the Poplar Plantation shall not exceed the treated leachate effluent criteria specified in the EPAapproval for applicable industrial sewage works for the Site.

(2) Leachate to be used for drip irrigation on the Poplar System shall not exceed the treated leachate effluent criteria specified in the Item 63 through 65 in Schedule "A".

q. The use of the Poplar Plantation to manage irrigation leachate will not be permitted without first providing the District Manger with at least two (2) months written notice of the anticipated irrigation liquid application date. The use of surface water to encourage tree growth will be permitted and will not be considered as irrigation liquid.

r. Monitoring and the associated reporting for the Poplar Plantation will commence at least two (2) months prior to irrigation liquid application and continue until two (2) years after cessation of irrigation liquid application to the Poplar Plantation.

Leachate Storage Tanks

s. The leachate storage tanks shall be inspected by a licenced plumber on an annual basis.

t. The leachate storage tanks shall be cleaned and sediment removed at least once every two (2) years.

9.0 INSPECTIONS AND RECORDS

Inspections

9.1 The Owner shall inspect the Site monthly for the following items but not limited to these items:

a. Erosion rills;
b. General settlement areas or depressions;
c. Shear and tension cracks;
d. Condition of surface water drainage works;
e. Erosion and sedimentation in surface water drainage system;
f. Presence of any ponded water;
h. Adequacy of cover material;
i. Evidence of vegetative stress, distressed poplars or side slope plantings;
j. Condition of groundwater monitoring wells and gas wells;

k. Presence of insects, vermin, rodents and scavenging animals;
l. Condition of fence surrounding the Site; and
m. General Site appearance.

9.2 The Owner shall inspect the Site weekly for presence of leachate seeps.

Daily Inspections and Log Book

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

9.4 A record of the inspections shall be kept in a daily log book or a dedicated electronic file that includes:

i. the name and signature of person that conducted the inspection;
ii. the date and time of the inspection;
iii. the list of any deficiencies discovered;
iv. the recommendations for remedial action; and
v. the date, time and description of actions taken.

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

Monthly Records

9.6 Monthly Site inspection records in the form of a written log or a dedicated electronic file shall include but not be limited to the following:

a. the type, geographic source, date and time of arrival, hauler, and quantity (tonnes) of all waste received at the Site;
b. the area of the Site in which waste disposal operations are taking place;
c. a calculation of the total quantity (tonnes) of waste received at the Site during each operating day and each operating week;
d. Results of any test done to determine the acceptability of waste at the Site;
e. A reference for each load of solid non-hazardous industrial waste received, to the client and type of solid non-hazardous industrial waste;
f. the amount of any leachate removed, or treated and discharged from the Site;
g. a record of litter collection activities and the application of any dust suppressants;
h. a record of the daily inspections;
i. a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore and maintain service;
j. type and amount of daily, intermediate and final cover used;
k. maintenance and repairs performed on equipment employed at the Site;

l. complaints received and actions taken to resolve them;
m. emergency situations and actions taken to resolve them; and
n. any other information required by the District Manager.

9.7 The Owner shall maintain on record at the Site for each client disposing of solid non-hazardous waste at the Site, a description of each type of solid non-hazardous waste received from the client and documentation to demonstrate that the Owner has taken reasonable care to ensure that waste classified as either hazardous or liquid industrial waste under O. Reg. 347 as amended from time to time, is not disposed of at the Site.

Record Retention

9.8 Except as authorized in writing by the Director, all records required by this ECA shall be retained at the Site for a minimum of two (2) years from their date of creation.

9.9 The Owner shall retain all documentation listed in Schedule "A" for as long as this ECA is valid.

9.10 All monthly Site inspection records are to be kept at the Site until they are included in the Annual Report.

9.11 The Owner shall retain employee training records as long as the employee is working at the Site.

9.12 The Owner shall make all of the above documents available for inspection upon request of Ministry staff.

9.13 The Owner shall retain, either on-Site or in another location and notify the District Manager of this location, copies of the annual reports referred to in the preceding condition and any associated documentation of compliance monitoring activities and shall continue to do so for a period of at least two (2) years after the closure of the Site.

10.0 TRAINING

Employees and Training

10.1 A training plan for all employees that operate any aspect of the Site shall be developed and implemented by the Operator . Only trained employees shall operate any aspect of the Site or carry out any activity required under this ECA . Employees must provide proof of training to the Ministry upon request. For the purpose of this ECA "trained" means knowledgeable either through instruction or practice in:

a. the relevant waste management legislation including EPA, O. Reg. 347 and O. Reg. 232/98 , regulations and guidelines;
b. major environmental and occupational health and safety concerns pertaining to the waste to be handled;

c. the proper handling of wastes;
d. the management procedures including the use and operation of equipment for the processes and wastes to be handled;
e. the emergency response procedures;
f. the specific written procedures for the control of nuisance conditions;
g. the terms, conditions and operating requirements of this ECA; and
h. proper inspection, receiving and recording procedures and the activities to be undertaken during and after a load rejection.

11.0 COMPLAINTS PROCEDURES

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

a. The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information, the time and date of the complaint, specific details of operations that were occurring, any changers from normal operations, types of waste loads (including source) and other on Site activities;
b. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine all possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant; and
c. The Owner shall complete and retain on-Site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

11.2 The Owner shall designate a person to receive any complaints and to respond with a written notice of action as soon as possible. The Owner shall post the Site complaints procedure at the Site entrance. All complaints and the Owner's actions taken to remedy the complaints must be summarized in the Annual Report.

11.3 The Company shall notify the District Manager, Township of Warwick and WIFN, in writing, of each environmental complaint within two (2) business days of the complaint. The notification shall include:

1. this Approval number;

2. a description of the nature of the complaint;

3. the time and date of the incident to which the complaint relates.

11.4 The Company shall report all environmental complaints to the WPLC at the next WPLC meeting.

12.0 EMERGENCY SITUATIONS

12.1 In the event of a fire or discharge of a contaminant to the environment, Site staff shall contact the MECP Spills Action Centre (1-800-268-6060) and the District Office of the MECP forthwith.

12.2 The Owner shall submit to the District Manager a written report within three (3) days of the spill or incident, outlining the nature of the incident, remedial measures taken and measures taken to prevent future occurrences at the Site.

12.3 The Owner shall ensure that adequate fire fighting and contingency spill clean up equipment is available in accordance with Item 66 of Schedule "A" and that emergency response personnel are familiar with its use and location.

13.0 MONITORING

Groundwater Monitors

13.1 The Owner shall ensure all groundwater monitoring wells are properly capped, locked and protected from damage.

13.2 In areas where landfilling is to proceed around monitoring wells, the wells must be decommissioned in accordance with O. Reg. 903 as amended from time to time and then replaced when waste placement and capping is completed.

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

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

13.5 All monitoring wells that are no longer required as part of the groundwater monitoring program shall be decommissioned in accordance with good standard practice that will prevent contamination through the abandoned well and in accordance with O. Reg. 903. A report on the decommissioning shall be provided in the annual monitoring report for the period during which the well was decommissioned.

Monitoring Program

13.6 Monitoring programs shall be carried out for groundwater, surface water, landfill gas in accordance with the Environmental Monitoring Plan, as amended from time to time listed as Item 39 and Appendix H of Item 68 of Schedule "A". Surface water will also be evaluated as per Item 91 of Schedule "A".

13.7 The Owner shall ensure that Biochemical Oxygen Demand, Total Suspended Solids, Total coliform, Fecal coliform and E. Coli are added to the parameter list to be sampled for surface water station SS19.

13.8 Air Quality, Dust, Hydrocarbon, and Volatile Organic Carbon monitoring shall be undertaken in accordance with Item 85 in Schedule "A".

13.9 Air quality monitoring shall be in accordance with the canister method (USEPA TO-14/15) .

13.10 Noise monitoring shall be undertaken by the Owner at the Site in accordance with Item 28 on Schedule "A" including any noise monitoring in response to noise complaints.

13.11 No alterations to the groundwater, air quality, noise or surface water monitoring programs shall be implemented prior to receiving written approval from the District Manager. The Owner shall give all requests to the Township of Warwick, the WPLC and WIFN at the same time or prior to the time that such request is made to the District Manager.

14.0 CONTINGENCY PLANS AND TRIGGER MECHANISMS

Hydraulic Containment

14.1 If the leachate level elevation in any of the pumping stations wells listed below rise above their respective trigger level, the Owner shall take additional groundwater levels within four (4) weeks as detailed in Figure 2 of Item 39 and Appendix H of Item 68 of Schedule "A".

Monitoring location	Trigger Leachate Elevation (mASL)
PS1	232.7
PS3	232.6
PS5	232.8
PS7	233.4

The assessment process for leachate levels is detailed in Figure 2 of Appendix H of Item 68 on Schedule “A”.

Groundwater Quality

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

14.3 Groundwater chemical concentrations must be assessed with the trigger concentrations within six (6) weeks of sample collection.

14.4 The assessment process for groundwater quality is detailed in Figure 3 of Item 39 and Appendix H of of Item 68 of Schedule “A”.

Surface Water Quality

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

a. Where off Site surface water quality satisfies the Ministry's PWQO, the respective PWQO shall be used as a trigger concentration; or

b. Where the background surface water quality naturally exceeds the PWQO, the background concentration should be considered in evaluating and updating the trigger concentration.

14.6 Surface water quality results will be assessed in accordance with the requirements established under the Industrial Sewage Works component of the EPA approval for the Site.

14.7 The assessment process for surface water quality is detailed in Figure 4 of Appendix H of Item 68 in Schedule "A ".

Landfill Gas

14.8 If landfill gas concentrations exceed 10% LEL, the Owner shall undertake additional monitoring, assess the source and pathway of methane to determine if the elevated concentrations are landfill related.

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

General Contingency Measures

14.10 In the event a result of a monitoring test exceeds the trigger mechanisms detailed above, the Owner shall:

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

15.0 REPORTING

Semi Annual Volume Determination

15.1 The Owner shall undertake semi-annual air space surveys of the bottom and top waste contours to determine the estimated air space used for waste disposal in the prior six months. The air space survey shall include daily cover material and shall take into account settlement. The first air space survey shall be undertaken by no later than February 2012 with an air space survey being completed semi-annually

after the completion of the first air space survey, until landfill Site closure.

15.2 Wastes which the Owner has been ordered to dispose of at the Site by any ministry, department or agency of the federal or Provincial Crown shall be excluded from the air space survey calculations.

15.3 Each air space survey shall be conducted by an Ontario Land Surveyor or other qualified consultant and such air space survey shall be provided to the District Manager. The Owner shall keep a copy of each air space survey on-Site and make them available to MECP personnel upon request.

Quarterly Monitoring Reports

15.4 The Owner shall submit quarterly monitoring reports to the Township of Warwick, WIFN, District Manager and the WPLC within sixty (60) days of the end of the calendar quarterly reporting period starting September 30, 2012.

15.5 Each report will include the following:

a. a summary of monitoring activities and results;
b. a summary of any exceedences and related operator responses;
c. any complaints received and operator response;
d. a summary of mitigation activities for noise, dust, litter, air quality or other taken during the quarter in accordance with the Best Management Practices;
e. any proposed improvements to monitoring or operating procedures; and
f. any implemented improvements to monitoring or operating procedures that have been identified to address or reduce impacts.

Annual Report

15.6 A written report on the development, operation and monitoring of the Site , shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the Regional Director , the District Manager, the Township of Warwick, WIFN, and the WPLC, by March 31st of each year, and shall cover the 12 month period preceding December 31st.

15.7 The Annual Report shall include the following:

a. the results and an interpretive analysis of the results of all leachate, groundwater, surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
b. an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the Site, and the adequacy of and need to implement the contingency plans;
c. an assessment of the effectiveness of the Poplar Plantation and the Poplar System for leachate;
d. an assessment of the effectiveness of the on Site leachate treatment facility;
e. Site plans showing the existing contours of the Site;

f. areas of landfilling operation during the reporting period;
g. areas of intended operation during the next reporting period;
h. areas of excavation during the reporting period;
i. the progress of final cover, vegetative cover, and any intermediate cover application;
j. previously existing site facilities;
k. facilities installed during the reporting period;
l. Site preparations and facilities planned for installation during the next reporting period;
m. calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;
n. a calculation of the remaining capacity of the Site, an estimate of the remaining Site life and a comparison of actual capacity used to approved Site capacity;
o. a summary of the quantity of any leachate or pre-treated leachate removed from the Site or leachate treated and discharged from the Site;
p. a summary of the weekly, maximum daily and total annual quantity (tonnes) of waste received at the Site;
q. a summary of any complaints received and the responses made;
r. a discussion of any operational problems encountered at the Site and corrective action taken;
s. an update summary of the amount of financial assurance which has been provided to the Director;
t. a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903;
u. any other information with respect to the site which the District Manager or Regional Director may require from time to time;
v. a statement of compliance with all conditions of this ECA and other relevant Ministry requirements, guidelines and regulations;
w. summary of inspections undertaken at the Site;
x. a summary of recycling, processing and composting efforts undertaken including the amount of recyclable received, amount of processed material and composted material each year;
y. any changes in operations, equipment or procedures employed at the Site; and
z. recommendations regarding any proposed changes in operations of the Site.

16.0 SITE CLOSURE

Closure Plan

16.1 At least two (2) years prior to closure or when 90% of the site capacity is reached, whichever comes first, the Owner shall submit to the Director for approval, with copies to the District Manager, the Township of Warwick, WIFN and the WPLC, a detailed Site closure plan pertaining to the termination of landfilling operations at this Site , post-closure inspection, maintenance and monitoring, and end use. The plan shall include the following:

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

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

d. a schedule indicating the time-period for implementing sub-conditions i) to vi) above.
e. descriptions of the procedures for post-closure care of the Site, including:

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

f. an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas;
g. an updated estimate of the contaminating life span of the Site , based on the results of the monitoring programs to date; and
h. an update of the cost estimates for financial assurance and the amount which has been provided to the Director to date.

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

End Use

16.3 The Owner shall consult with affected stakeholders on the proposed end uses as committed to in Item 35 of Schedule "A" prior to the submission of its closure report under the EPA. The proposed end use activities should be consistent with the types of activities consulted upon during the EA.

Closure of the Site

16.4 Upon closure of the Site, the following features will be inspected, recorded on a quarterly basis and maintained as required on a seasonal basis:

a. evidence of settlement;
b. possible leachate seeps and springs;
c. cover soil integrity;
d. vegetative cover;

e. surface water drainage works;
f. erosion and sediment in surface water drainage system; and
g. groundwater monitoring wells.

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

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

SCHEDULE "A"

1. Document entitled "Environmental Assessment Act Section 9 Notice of Approval to Proceed with the Undertaking" , Re: An Environmental Assessment for Warwick Landfill Expansion, Waste Management of Canada Corporation, EA File Number: EA-02-08-02-03, dated January 15, 2007.

2. Application for a Provisional Certificate of Approval for the Warwick Landfill, dated March 27, 2006.

3. Document entitled "Development and Operations Plans Warwick Landfill Expansion Volume 1 of 2" dated March 2006 prepared by Henderson, Paddon and Associates Limited.

4. Document entitled "Development and Operations Plans Warwick Landfill Expansion Volume 2 of 2" dated March 2006 prepared by Henderson, Paddon and Associates Limited.

5. Document entitled "Assessment of Geotechnical Design Requirements New Landfill Facility Warwick, Ontario" prepared by Alston Associates Inc., dated July 31, 2006.

6. Document entitled "2006 Poplar System Monitoring Report Warwick Landfill Site Township of Warwick Ontario" prepared by Jagger Hims Limited, dated January 2007.

7. Document entitled "Warwick Landfill Expansion Contaminating Lifespan Review" prepared by Jagger Hims Limited, dated March 2006.

8. Drawing No. 105716-111 entitled " Proposed Final Contours and Stormwater Management Plan" prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

9. Drawing No. 105716-112 entitled " Landfill Bottom Contours (Top of Primary Gravel)" prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

10. Drawing No. 105716-113 entitled "Landfill Perimeter Sections" prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

11. Drawing No. 105716-114 entitled " Landfill Perimeter Sections" prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

12. Drawing No. 105716-115 entitled "Leachate Collection Sump Details" prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

13. Drawing No. 105716-116 entitled "Proposed Primary Leachate Collection System" prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

14. Drawing No. 105716-117 entitled "Proposed Secondary Leachate Collection System" prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

15. Drawing No. 105716-118 entitled "Landfill Sections" prepared by Henderson Paddon and Associates

Limited, dated February 24, 2006.

16. Drawing No. 105716-119 entitled “Landfill Perimeter Sections” prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

17. Drawing No. 105716-120 entitled “ Landfill Perimeter Sections” prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

18. Drawing No. 105716-125 entitled “Details and Sections” prepared by Henderson Paddon and Associates Limited, dated February 24, 2006.

19. Letter dated April 16, 2007 from Frank Ford, Henderson Paddon and Associated Limited to Wilf Ruland, Citizens Environmental Consulting.

20. Letter dated May 2, 2007 from Frank Ford, Henderson Paddon and Associated Limited to Wilf Ruland, Citizens Environmental Consulting.

21. Letter dated June 1, 2007 from Greg Washuta, P. Eng., M. Eng., Senior Waste Engineer, Ministry of the Environment to Reid Cleland, Waste Management of Canada Corporation.

22. Drawing No. 106716-127A entitled "Plough Furrow Surface Water Distribution Warwick Landfill" prepared by Henderson Paddon and Associates Limited, dated March 21, 2007.

23. Drawing No. 106716-F215 entitled "Proposed Mini-Transfer Area" prepared by Henderson Paddon and Associates Limited, dated March 29, 2007.

24. Report entitled "Best Management Practices Plan (Dust) Warwick Landfill Watford, Ontario " prepared by RWDI Air Inc., dated December 11, 2007.

25. Report entitled "Best Management Practices Plan (Litter) Warwick Landfill Watford, Ontario " prepared by RWDI Air Inc., dated December 11, 2007.

26. Report entitled "Best Management Practices Plan (Odour) Warwick Landfill Watford, Ontario " prepared by RWDI Air Inc., dated December 11**,** 2007.

27. Document entitled "Appendix F Air Quality Monitoring Plan and Letter", prepared by RWDI, dated November 29, 2007.

28. Document entitled "Environmental Noise Monitoring Program for the Warwick Landfill" , prepared by Aercoustics Engineering Limited, dated November 21, 2007.

29. Document entitled "Proposed Expansion of WM Warwick Landfill Predicted Noise Impact" , prepared by Aercoustics Engineering Limited, dated June 15, 2007.

30. Document entitled "Application for Approval of ECA of Approval A032203 Warwick Township

County of Lambton MOE. Reference No. 0539-6N7TRY Part 1 of 2" , dated July 13, 2007, prepared by Henderson Paddon and Associates Limited.

31. Document entitled "Application for Approval of ECA of Approval A032203 Warwick Township County of Lambton MOE. Reference No. 0539-6N7TRY Part 2 of 2- Financial Assurances" , dated August 22, 2007, prepared by Henderson Paddon and Associates Limited.

32. Letter dated July 27, 2007 from Dan Toner, Assistant Director, Laboratory Services Branch to Tesfaye Gebrezghi, Supervisor- Waste Unit, MOE.

33. Table 6.1 entitled "Phasing-Analysis for Leachate Quantities WM- Warwick Landfill Expansion" prepared by Henderson Paddon and Associates Ltd., dated August 17, 2007.

34. Letter dated August 20, 2007 from John DeYoe, RWDI to Frank Ford, Henderson Paddon and Associates Limited.

35. Discussion Paper 9 entitled "Impact Management Plan" and all Appendices dated October 2005 prepared by Waste Management of Canada Corporation.

36. Letter Report and attachments dated May 10, 2001 from Frank C. Ford of Henderson, Paddon Environmental to Mark Turner, Environmental Assessment and Approvals Branch.

37. Development and Operations Report - Canadian Waste Services Inc. - Warwick Landfill, Warwick Township - Revised, dated October 1997, prepared by Henderson Paddon Environmental Inc.

38. Consolidated Report Leachate Management Plan - Canadian Waste Services Inc. - Warwick Landfill - Warwick Township dated July 2001 prepared by Henderson Paddon Environmental Inc.

39. Environmental Monitoring Plan - Warwick Landfill - Township of Warwick, Ontario dated December 2007, prepared by Jagger Hims Limited.

40. Letter dated October 11, 2007 from Brad Bergeron, RWDI to Greg Washuta, Senior Waste Engineer, Ministry of the Environment.

41. Report entitled "Stormwater Management Plan Poplar Irrigation Area Warwick Landfill Expansion Watford, Ontario" dated December 2007, prepared by Henderson Paddon Environmental Inc.

42. Letter dated November 21, 2007 from Kevin Smith, Aercoustics Engineering Limited to Wayne Jenken, Waste Management of Canada Corporation.

43. E-mail and attachments dated February 12, 2008 from Brad Bergeron, RWDI Air Inc. to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

44. E-mail and attachments dated January 29, 2008 from Brad Bergeron RWDI Air Inc. to Greg Washuta, Senior Waste Engineer, EAAB, MOE.

45. Letter dated March 3, 2008 from Wayne Jenken, Landfill Engineer, WMCC to Ian Parrott, Manager, ECA of Approval Review Section, EAAB, MOE.

46. Letter dated June 13, 2008 from Frank Ford, Senior Environmental Engineer, Henderson Paddon and Associates Limited to Greg Washuta, P. Eng., Senior Waste Engineer, Waste Unit, EAAB, MOE.

47. Application for a Provisional Certificate of Approval for a Waste Disposal Site for the Twin Creeks Landfill Site, signed and dated December 11, 2008.

48. Letter dated December 11, 2008 from Reid Cleland, District Landfill Manager, WMCC to Doris Dumais, Approvals Director, EAAB, MOE.

49. Report entitled "Cell 12 Project and Changes Affecting The Warwick Landfill Expansion" and attached appendices, created by Henderson Paddon & Associates Limited, dated August 2008.

50. Application for a Provisional Certificate of Approval for a Waste Disposal Site for the Twin Creeks Landfill Site, dated August 11, 2008.

51. Letter dated December 18, 2008 from Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE to Reid Cleland, District Landfill Manager, WMCC.

52. Letter dated December 18, 2008 from Wayne Jenken, Landfill Engineer, WMCC to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.

53. Letter dated December 18, 2008 from Jason Balsdon and Brent Langille, Jagger Hims Limited to Wayne Jenken, Landfill Engineer, WMCC.

54. Application for a Provisional Certificate of Approval for a Waste Disposal Site for Waste Management of Canada Corporation's Twin Creeks Landfill Site, signed and dated January 16, 2009.

55. Report and Appendix A entitled "Waste Management of Canada Corporation Twin Creeks Landfill Use of Geonet for Secondary Drainage Layer" prepared by Henderson Paddon and Associates, dated January 2009.

56 Letter dated March 18, 2009 from Greg Washuta Senior Waste Engineer, Waste Unit, EAAB, MOE to Reid Cleland, Landfill Manager, WMCC.

57. Letter report and appendices A, B and C dated April 9, 2009 from Jeff Armstrong, Genivar Consultants LP to Greg Washuta, Senior Waste Engineer, Waste Unit, EAAB, MOE.

58. Application for a Waste Disposal Site Certificate of Approval dated April 28, 2009 and signed by Reid Cleland, District Manager, Waste Management of Canada Corporation.

59. Report produced by Genivar Consultants LP entitled "Development & Operations Report for a Waste

Transfer Station Application" dated June 2009.

60. November 24, 2009 e-mail from Jeff Armstrong of Genivar Consultants LP to Jim Chisholm, Senior Review Engineer with the Ministry of Environment indicating that the application is for an existing mini transfer area but flexibility is being applied for to direct the waste collected at this area to alternate waste disposal sites.

61. November 24, 2009 e-mail from Jim Chisholm, Senior Review Engineer with the Ministry of Environment to Jeff Armstrong, Genivar Consultants LP, requesting information about how the Mini-Transfer Area already located at the landfill is covered by the existing Certificate of Approval and the December 21, 2009 e-mail response from Jeff Armstrong to Jim Chisholm to his November 24, 2009 e-mail, outlining that the Mini-Transfer Area is covered by the 1997 Design and Operation Report that is identified in Item 37 and attached page 7-4 of the report in which Section 7.8 dealt with the Mini-Transfer Area.

62. January 24, 2011, 12:11PM, e-mail from Wayne Jenken, Area Landfill Engineer, Waste Management of Canada Corporation to Jim Chisholm, Senior Review Engineer with the Ministry of Environment indicating that the original Mini Transfer Area moved to the new location on November 2009 and that the old location for the Mini Transfer Area has been removed. The e-mail also made suggested changes to a draft of the Notice.

63. Document entitled "Twin Creeks Landfill - Expansion of Poplar Cap Irrigation System for Existing Waste Disposal Area January 2010" prepared for Waste Management of Canada Corporation by Genivar Consultants LP dated January 2010.

64. Letter dated November 2, 2010 addressed to Mr. Reid Cleland, Waste Management of Canada Corporation from Mr. Greg Washuta, Ministry of the Environment providing comments and requesting additional information on MOE Reference File No. 1486-829MCN.

65. Document entitled "Twin Creeks Landfill, Watford, ON 091-13089-00 (91730R) - Application for Approval for Expansion of Poplar Plantation (South Fill Area) - Response to MOE Comments Letter dated November 2, 2010" prepared for Waste Management of Canada Corporation by Genivar Consultants LP dated December 2, 2010.

66. Report entitled "Development and Operations Plan - Warwick Landfill Expansion - Volume 1 of 3" prepared for WMCC by Henderson Paddon & Associates dated March 2008.

67. Report entitled "Development and Operations Plan - Warwick Landfill Expansion - Volume 2 of 3" prepared for WMCC by Henderson Paddon & Associates dated March 2008.

68. Report entitled "Development and Operations Plan - Warwick Landfill Expansion - Monitoring Plans - Volume 3 of 3" prepared for WMCC by Henderson Paddon & Associates dated March 2008.

69. Letter dated May 6, 2009 addressed to Mr. Reid Cleland, WMCC from Mr. Greg Washuta, Ministry of the Environment providing ministry review comments on the Development and Operations Plan

70. Letter dated August 19, 2009 addressed to Mr. Reid Cleland, WMCC from Mr. Greg Washuta, Ministry of the Environment providing comments from the Township of Warwick, Walpole Island First Nation and the Warwick Public Liaison Committee on the Development and Operations Plan

71. Letter dated November 12, 2009 addressed to Mr. Greg Washuta, Ministry of the Environment from Mr. Wayne Jenken, WMCC.

72. Drawing set entitled "Twin Creeks Landfill - Landscaping and Signage Detail Construction Drawings" prepared by Schollen & Company Inc. and dated July 4, 2008. The drawing set consists of the following:

    i. Cover page entitled "Twin Creeks Landfill - Landscaping and Signage Detail Construction Drawings" prepared by Schollen & Company Inc. and dated July 4, 2008;
    ii. Drawing No. L-1 entitled "Landscape Plan - Screening Berm";
    iii. Drawing No. L-1A entitled " Lanscape Detail at Intersections - Screening Berm"
    iv. Drawing No. L-2 entitled "Landscape Plan - Screening Berm";
    v. Drawing No. L-3 entitled "Landscape Plan - Screening Berm & Area F";
    vi. Drawing No. L-4 entitled "Landscape Plan - Screening Berm";
    vii. Drawing No. L-5 entitled "Landscape Plan - Screening Berm and Area G (North)";
    vii. Drawing No. L-6 entitled "Landscape Plan - Screen Planting Area G (South)";
    viii. Drawing No. L-7 entitled "Landscape Plan - Screen Planting and Creek Area A and Area B";
    ix. Drawing No. L-8 entitled "Landscape Plan - Screen Planting Areas C, D and E";
    x. Drawing No. L-9 entitled "Landscape Plan - Restoration Planting Area H";
    xi. Drawing No. LD-1 entitled "Landscape Detail Plan ";
    xii. Drawing No. LD-2 entitled "Landscape Notes and Master Plant List"; and
    xiii. Drawing No. LD-3 entitled "Signage Details";

73. Application for a Certificate of Approval for a Waste Disposal Site dated April 6, 2011 submitted by Waste Management of Canada Corporation for Provisional Certificate of Approval No. A032203 requesting approval for use of an alternative daily cover material and amended Best Management Practices for Odour.. The supporting documentation for the application included the following:

    i. Cover letter dated April 7, 2011 addressed to Mr. Tes Gebrezghi, Ministry of the Environment from Mr. Reid Cleland, Waste Management of Canada Corporation;
    ii. Report entitled "Best Management Practices Plan (Odour) Warwick Landfill" prepared for Waste Management of Canada Corporation by RWDI Air Inc. (Project No. 1100800) dated April 7, 2011;
    iii. Letter dated March 24, 2011 addressed to Mr. Wayne Jenken, Waste Management of Canada Corporation from Mr. Peter Pickfield, Garrod Pickfield; and
    iv. Email dated March 22, 2011 at 3:32 p.m. sent to Mr. Peter Pickfield, Garrod Pickfield from Mr. Wayne Jenken.

74. Letter dated October 4, 2011 addressed to Mr. Tesfaye Gebrezghi, Ministry of the Environment from

Mr. Reid Cleland, Waste Management of Canada requesting an amendment to Condition 167 (a). The supporting documentation attached to the letter included the following:

a. Application for a Certificate of Approval for a Waste Disposal Site dated October 4, 2011;
b. Provisional Certificate of Approval A032203 Notice No. 7 dated June 1, 2011;
c. Letter from Wayne Jenken, WMCC to Don Bruder, Township of Warwick dated February 23, 2011;
d. Letter from Wayne Jenken, WMCC to Don Bruder, Township of Warwick dated May 26, 2011;
e. Letter from Peter Pickfield, Garrod Pickfield LLP to Reid Cleland, WMCC dated September 14, 2011;
f. Letter from Wayne Jenken, WMCC to Dean Jacobs, Walpole Island First Nations dated July 14, 2011;
g. Email from Kent Hunter, Neegan Burnside to Wayne Jenken dated September 19, 2011 at 3:54 p.m.;
g. Email from Wayne Jenken, WMCC to Kent Hunter, Neegan Burnside dated September 20, 2011 at 1:52 p.m.;
h. Email from Kent Hunter, Neegan Burnside to Wayne Jenken dated September 27, 2011 at 10:23 a.m.;
i. WPLC meeting minutes dated September 15, 2011; and
j. WPLC meeting minutes dated April 7, 2011.

75. Letter dated May 22, 2012 addressed to Ms. Agatha Garcia Wright, Director, Ministry of the Environment from Mr. Wayne Jenken, Waste Management of Canada Corporation requesting amendment to Condition No. 7.10 (Landfill Gas Management). The letter included the following supporting documentation:

i. Letter report entitled "Early Vertical Gas Well Collection System" dated May 2012 and addressed to Mr. Reid Cleland, Waste Management of Canada Corporation from Mr. Frank Ford, GENIVAR Inc.;
ii. Drawings No. 102 and G111 - Landfill Gas Collection System;
iii. Landfill Gas Headers, Gas Building with Blowers and Landfill Gas Flaring System Design Drawings and Design and Operations Plan for Modifications;
iv. Description of Phase 1 of the Gas Collection System;
v. Revised Section 4.7 of the Design and Operations Plan;
vi. Application to Amend Environmental Compliance Approval No. A032203 and supporting documents;
vii. Consultation Summary and Records with Stakeholders; and
viii. Design Drawings for Amended Landfill Gas Management System.

76. Letter dated July 26, 2012 addressed to Mr. Reid Cleland, Waste Management of Canada Corporation from Mr. Dale Gable, Ministry of the Environment requesting additional information on the location of the proposed gas extraction wells.

77. Letter dated August 9, 2012 addressed to Mr. Dale Gable, Ministry of the Environment from Mr. Frank

Ford, GENIVAR Inc. providing details on the location of the gas wells.

78. Letter Report dated May 9, 2012 addressed to Ms. Agatha Garcia Wright, Director, Ministry of the Environment form Mr. Wayne Jenken, Waste Management of Canada requesting Conditions 6.48 to 6.61 be amended. The letter report included the following Sections:

    i. Environmental Compliance Approval application signed by Reid Cleland, WMCC and dated May 9, 2012;
    ii. Proof of legal name and zoning;
    iii. Record of consultation with Township of Warwick;
    iv. Record of consultation with Walpole First Island First Nation; and
    v. Record of consultation with WPLC.

79. Letter report dated September 26, 2012 addressed to Ms. Agatha Garcia-Wright. Director, Environmental Approvals Branch, Ministry of the Environment from Mr. Philip Janisse and Mr. Brent Langille, RWDI Inc. requesting the time frame for the use of ASR be extended and the sampling frequency for the ASR be reduced.

80. Letter dated October 15, 2012 and supporting drawings addresses to Ms. Agatha Garcia-Wright. Director, Environmental Approvals Branch, Ministry of the Environment from Mr. Wayne Jenken, Waste Management of Canada Corporation detailing the proposed changes to the landscape plan for the Site. The supporting drawings include the following drawing prepared by Schollen and Company Inc (Contract No. 27007) dated June 2012:

    i. Cover page entitled "Twin Creeks Landfill Expansion - Landscape and Details Drawings" dated June 29, 2012
    ii. Drawing No. L-1 entitled "Landscape Plan - Screening Berm";
    iii. Drawing L-1A entitled "Landscape Detail at Intersections - Screening Berms";
    iv. Drawing L-2 entitled "Landscape Plan - Screening Berm";
    v. Drawing L-3 entitled "Landscape Plan - Screening Berm and Area F";
    vi. Drawing L-4 entitled "Landscape Plan - Screening Berm";
    vii. Drawing L-5 entitled "Landscape Plan - Screening Berm and Area G";
    viii. Drawing L-6 entitled "Landscape Plan - Area G Planting Area";
    ix. Drawing L-7 entitled "Landscape Plan - Area A and Area B Screen Planting and Creek";
    x. Drawing L-8 entitled "Landscape Plan - Area C, D and E Screen Planting";
    xi. Drawing L-9 entitled "Landscape Plan - Area H Restoration Planting";
    xii. Drawing LD-1 entitled "Landscape Detail Plan";
    xiii. Drawing LD-2 entitled "Landscape Notes and Master Plant List";
    xiv. Drawing LD-3 entitled "Signage Details";
    xv. Drawing LD-4 entitled "Details"; and
    xvi. Drawing LD-5 entitled "Details".

81. Letter dated November 13, 2013 addressed to Agatha Garcia-Wright, Director, Ministry of the Environment from Wayne Jenken, Waste Management of Canada Corporation requesting amendment to Condition 8.6 (a). The following supporting documentation was attached to the memorandum.

i. Amended Environmental Compliance Approval Number A032203 issued December 13, 2011
ii. Amended Environmental Compliance Approval Number A032203 Notice No. 1 issued February 29, 2012
iii. Application to Amend Environmental Compliance Approval No. A032203 with Signature of Reid Cleland in Section 1.4
iv. Record of Consultations with Stakeholders

82. Application package dated May 4, 2016 and received on May 16, 2016 including all subsequently submitted supporting documentation and drawings, including the amendment to the D&O plan and associated drawings.

83. Report titled "Twin Creeks Landfill Site: Best Management Practices Plan (Dust) - Version 7" prepared by RWDI Air Inc., dated May 19, 2017.

84. Report titled "Twin Creeks Landfill Site: Best Management Practices Plan (Odour) - Version 8" prepared by RWDI Air Inc., dated May 19, 2017.

85. Report titled "Twin Creeks Landfill Site: Ambient Air Quality Monitoring Plan (Revision #3)" prepared by RWDI Air Inc., dated May 18, 2017.

86. "WM Twin Creeks Landfill Site, Leachate Management Framework" prepared by HDR, dated November 29, 2017.

87. Application for a an amendment to ECA No. A032203 to provide detailed design for the construction of Cell 4 in response to Condition 4.8. Signed by Reid Cleland and dated October 16, 2018. The supporting documentation for the application included the drawing set titled "Waste Management of Canada Corporation, Twin Creeks Landfill Expansion, Warwick Township, Landfill Base Preparation Cell 4." Prepared by WSP Group, October, 2018. The drawing set consists of the following:

i. Drawing No. 106716P-400 - "Title Sheet";
ii. Drawing No. 106716P-401 - "March 2018 Existing Conditions Plan;
iii. Drawing No. 106716P-402 - "Cell 4 - Bottom of Excavation - West";
iv. Drawing No. 106716P-403 - "Cell 4 - Bottom of Excavation - East";
v. Drawing No. 106716P-404 - "Cell 4 - Top of Primary Clay Liner - West";
vi. Drawing No. 106716P-405 - "Cell 4 - Top of Primary Clay Liner - East";
vii. Drawing No. 106716P-406 - "Cell 4 - Temporary Clay Seal - West";
vii. Drawing No. 106716P-407 - "Cell 4 - Temporary Clay Seal - East";
viii. Drawing No. 106716P-408 - "Cell 4 - Section and Details";
ix. Drawing No. 106716P-409 - "Cell 4 - Section and Details";
x. Drawing No. 106716P-410 - "Cell 4 - Section and Details";
xi. Drawing No. 106716P-411 - "Cell 4 - Pumping Station PS5/PS6 Plans and Sections";
xii. Drawing No. 106716P-412 - "Cell 4 - Pumping Station PS5/PS6 Plans and Sections";
xiii. Drawing No. 106716P-413 - "Cell 4 - Sections and Details"; and

xiv Drawing No. 106716P-414 - "Cell 4 - Sections and Details".

88. Environmental Compliance Approval Application signed by Wayne Jenken dated April 28, 2023, for establishment of a Renewable Natural Gas Facility at the Site.

89. Report entitled "Twin Creeks Environmental Centre Renewable Natural Gas Facility Design and Operations Report" dated April 28, 2023 prepared by WSP.

90. Report entitled "Twin Creeks Landfill: Best Management Practices Plan (Odour) - Version 9" dated November 17, 2023 prepared by RWDI.

91. Letter dated February 27, 2014 from Mike Moroney, District Manager of MECP to Angela McLachlan, Environmental Compliance Manager, Twin Creeks Landfill, WMCC.

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

Conditions 1.1, 1.2, 1.3, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.14, 1.15, 1.23, and 1.24 are to clarify the legal rights and responsibilities of the Owner and Operator under this Approval.

Conditions 1.4 and 1.5 are to ensure that the Site is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

Condition 1.12 is to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.

Condition 1.14 is to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Approval.

Conditions 1.15 and 1.16 are to ensure that the successor is aware of its legal responsibilities.

Conditions 1.17, 1.18, 1.19, and 1.20 clarify that the Part II.1 Director is an individual with authority pursuant to Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the Approval to any person who will acquire an interest in the property as a result of the dealing.

Condition 1.21 is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Approval. This Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Act, the OWRA, the PA, the NMA and the SDWA.

Condition 1.25 clarifies what information may be subject to the Freedom of Information Act.

Condition 2.1 is to require Financial Assurance for this company to ensure that sufficient funds are available to the Ministry to clean up the Site in the event that the Owner is unable or unwilling to do so.

Conditions 3.1 to 3.15 inclusive are necessary in order to establish a forum for the exchange of information and public dialogue on activities to be carried out at the landfill site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and environmental protection.

Condition 3.16 has been included in order to ensure that consultation with First Nations is undertaken during the submission of any application to amend any approval required by the Ministry.

Conditions 4.1 to 4.6 inclusive, 4.8, and 4.9 is to ensure that the Site is designed, constructed and operated in an environmentally acceptable manner, based on the conceptual design and operations for the Site.

Condition 4.7 is to ensure the availability of as-built drawings for inspection and information purposes.

Condition 4.10 has been specifically included to allow for optimization of design for subsequent stages based on operating experience and monitoring results and to ensure that any necessary remedial action is undertaken before landfilling may proceed in the next stage.

Condition 4.11 has been included to ensure that the site has been constructed in accordance with the approved design plans, specifications and QA/QC procedures and to ensure that there is not an adverse impact on the environment.

Condition 4.12 is to ensure that there is a person, reporting directly to the Ministry, with associated costs reimbursed by the Owner, who is responsible for inspecting the Site, based on the requirements in this ECA of Approval to ensure that the Site is operated in an environmentally acceptable manner.

Conditions 4.13, 4.14, 15.1, 15.2 and 15.3 is to specify the amount of days the environmental inspector is required to be on site based on the conditions in this approval and in accordance with the previously approved EA for the site.

Condition 5.1 is to ensure safe side slopes of the berm.

The reason for Condition 5.2 is to approve the diversion area based on the information submitted. This is ensure the protection of the environment and the public.

Condition 5.3 is to approve the use of Cell 12 for contaminated soil.

Condition 5.4 is to ensure the Owner carries out the landscape plan based on the submitted information.

Conditions 6.1 and 6.18 are included in order to ensure that waste disposal at the site is undertaken in accordance with applicable Ministry of the Environment regulations and guidelines. Compliance with these regulations and guidelines will ensure that the site does not cause and adverse effect on the environment.

Conditions 6.4 and 6.7 is to specify the approved areas from which waste may be accepted at the Site and the

types and amounts of waste that may be accepted for disposal at the Site, based on the Owner's application and supporting documentation.

Condition 6.5 is to specify restrictions on the extent of landfilling at this Site based on the Owner's application and supporting documentation. These limits define the approved volumetric capacity of the site. Approval to landfill beyond these limits would require an application with supporting documentation submitted to the Director.

Condition 6.6 specifies the maximum amount of waste that may be received at the site based on the previously approved Environmental Assessment for the site.

Condition 6.8 has been inserted to minimize the potential for clogging of the drainage layer and to minimize temperature effects on the leachate collection system. Failure to maintain the specified minimum thickness of waste and cover material may result in a decrease in the service life of the drainage layer.

Conditions 6.9 to 6.14 inclusive have been included in order to ensure asbestos waste is handled and disposed of in accordance with O. Reg. 347 as amended from time to time. Proper handling and disposal of asbestos waste ensures that the asbestos waste does not cause an adverse impact on the environment and also does not affect human health.

Condition 6.16 is needed to make certain that uses at the site are for waste disposal purposes only and not any other uses which may cause an adverse impact on the environment and human health.

Condition 6.17 is necessary in order to ensure that all waste loads are inspected and waste that is disposed of at the site is in accordance with the terms and conditions in this ECA of Approval.

Condition 6.19 is to ensure that open burning of municipal waste is not permitted because of concerns with air emissions, smoke and other nuisance affects, and the potential fire hazard.

Conditions 6.20 through 6.22 inclusive are to ensure that users of the Site are fully aware of important information and restrictions related to Site operations under this ECA of Approval.

Conditions 6.23 to 6.27 inclusive are to specify the normal hours of operation for the landfill Site and a mechanism for amendment of the hours of operation.

Conditions 6.28 to 6.30 inclusive are to specify site access to/from the Site and to ensure the controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site attendant is on duty.

Condition 6.31 is needed in order to make certain that the waste received at the site is in accordance with the ECA and O. Reg. 347.

Condition 6.32 has been included is to ensure that access roads are clear and do not pose a safety hazard to the general public.

Condition 6.33 is for the protection of public health and safety and minimization of the potential for damage to environmental control, monitoring and other works at the landfill Site. Scavenging is the uncontrolled removal of material from waste at a landfill site.

Conditions 6.34 to 6.40 inclusive are to ensure that the Site is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.

Condition 6.41 is to ensure that noise from or related to the operation of the landfill is kept to within Ministry limits and does not result in a hazard or nuisance to any person.

Condition 6.42 is included to ensure that noise monitoring is undertaken in accordance with the noise monitoring program prepared and to ensure that an independent acoustic audit is completed in accordance with the Ministry's requirements.

Condition 6.43 is to clarify when the Best Management Plans can be amended and the mechanism for amending the Best Management Plans.

Condition 6.44 is to ensure that appropriate measures are taken in order to prevent surface water from contacting waste so as not to cause an adverse effect on the environment.

Conditions 6.45 and 7.18 is to specify other approvals required for works and activities related to the operation of this Site as a landfill.

Condition 6.46 has been included is in order to prevent ponding in on site ditches and any adverse impact on the environment and human health.

Condition 6.47 is to ensure that landfilling operations are conducted in an environmentally acceptable manner. Daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the site.

Condition 6.48 to 6.61 inclusive is to specify the approval requirements for use of alternative cover material at the Site.

Condition 7.1 is necessary so that runoff from contaminated soils does not create and adverse impact on the environment.

Conditions 7.2 and 7.3 are included in order to ensure that the composting and processing operations at the site are conducted in a fashion in accordance with Ministry's regulations, guidelines and so as not to pose a threat to human health or the environment.

Conditions 7.4, 9.3, 9.4, 9.5, 9.6 and 9.7 are to provide for the proper assessment of effectiveness and efficiency of site design and operation, their effect or relationship to any nuisance or environmental impacts, and the

occurrence of any public complaints or concerns. Record keeping is necessary to determine compliance with this ECA of Approval, the EPA and its regulations.

Conditions 7.5 and 7.6 inclusive have been included are to ensure tire shred storage in accordance with the Fire Protection and Prevention Act and to protect the natural environment.

Condition 7.7 is to ensure that backup power is available so that all facilities remain operational during a power disruption thus preventing any adverse impacts on the environment.

Condition 7.8 has been inserted in order to ensure that concentrations of landfill gas do not pose a hazard to human health or the environment.

Condition 7.9 is to ensure that landfill gas is built and managed in accordance with the Ministry's requirement and regulation.

Condition 7.10 is needed in order to ensure that an adequate landfill gas management system is installed at the site in order to protect human health and the environment.

Conditions 7.11 and 7.12 are to minimize the potential for clogging of leachate collection pipes and to ensure effective operation of the leachate collection system components for as long as they are required. Failure to clean out these components on a regular basis may result in a decrease in their service lives. Regular cleaning of the leachate collection pipes is especially important during stages of landfilling when the level of both organic and inorganic constituents in the leachate is high and, consequently, the potential for clogging due to encrustation is greatest. As the landfill reaches the more stable methane producing stage, pipe cleaning may be required less frequently.

Condition 7.13 has been added to ensure adequate flow of leachate in the leachate collection pipes.

Conditions 7.14 to 7.17 are to ensure that the leachate collection system is designed and built in accordance with Regulations and the ministry's requirements.

Condition 7.18 is included is in order to prevent off site migration of leachate which may cause an adverse effect on the environment.

Condition 7.19 is to approve the proposed Renewable Natural Gas facility for processing of the landfill gas and converting into quality natural gas.

Conditions 7.20 and 21 are to ensure the RNG facility has adequate capacity and the operation of the landfill gas collection system is not impacted.

Condition 7.22 is to ensure the RNG facility is property operated and does not result in any unacceptable impacts to the environment.

Condition 7.23 is to ensure operational record of the RNG facility is maintained for evaluation of the system performance and identification of improvement measures.

Conditions 8.1 to 8.4 inclusive are needed to ensure leachate recirculation is undertaken in accordance with the ministry's requirements and leachate recirculation does not pose an adverse impact on the environment.

Condition 8.5 is in accordance with EA condition 22 and protects the natural environment from any impacts due to discharge of raw or treated leachate to adjacent creeks.

Condition 8.6 is to ensure that a fully functional leachate treatment system is in place on site prior to waste placement.

Condition 8.7 clarifies the responsibilities of the owner, the requirements of the ministry, the authority of the Ministry and protects the natural environment and human health.

Conditions 9.1 and 9.2 are needed to ensure regular inspections of the site are conducted in order to protect the natural environment.

Conditions 9.8 to 9.12 inclusive is to ensure that accurate waste records are maintained to ensure compliance with the conditions in this ECA of Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the EPA and its regulations.

Conditions 9.13, 15.4, 15.5 and 15.6 are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.

Condition 10.1 is to ensure that the Site is supervised and operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.

Conditions 11.1, 11.2, 11.3 and 11.4 is to establish a forum for the exchange of information and public dialogue on activities carried out at the landfill Site. Open communication with the public and local authorities is important in helping to maintain high standards for site operation and environmental protection.

Conditions 12.1 and 12.2 are to ensure that the Ministry is informed of any spills or fires at the Site and to provide public health and safety and environmental protection.

Condition 12.3 is contained in the ECA to guarantee that appropriate measures are taken by the County to prevent future occurrences of spills or fires at the site and to protect public health and safety and the environment.

Conditions 13.1 to 13.5 inclusive are to ensure protection of the natural environment and the integrity of the groundwater monitoring network.

Conditions 13.6 through 13.11 inclusive are to demonstrate that the landfill site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency

action can be taken.

Conditions 14.1 through 14.10 inclusive are to ensure that the Owner follows a plan with an organized set of procedures for identifying and responding to unexpected but possible problems at the Site. A remedial action / contingency plan is necessary to ensure protection of the natural environment. A leachate contingency plan is a specific requirement of Reg. 232.

Conditions 16.1 and 16.2 are to ensure that final closure of the Site is completed in an aesthetically pleasing manner and to ensure the long-term protection of the natural environment.

Condition 16.3 ensures proper public consultation about the end use of the Site is undertaken and that the end use activities are consistent with those identified during the EA process.

Conditions 16.4 to 16.6 ensure that certain activities are undertaken upon closure of the site in order to ensure that the closed site does not affect the natural environment.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A032203 issued on February 4, 2023

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon me, the Ontario Land Tribunal and in accordance with Section 47 of the *Environmental Bill of Rights,* 1993, the Minister of the Environment, Conservation and Parks, within 15 days after receipt of this notice, require a hearing by the Tribunal. The Minister of the Environment, Conservation and Parks will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the notice requiring the hearing ("the Notice") shall state:

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

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

The Notice should also include:

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

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

This Notice must be served upon:

Registrar*

The Minister of the Environment,

The Director appointed for the purposes of Part II.1 of the *Environmental Protection Act*

Ontario Land Tribunal 655 Bay Street, Suite 1500 Toronto, Ontario M5G 1E5 OLT.Registrar@ontario.ca	and	Conservation and Parks 777 Bay Street, 5th Floor Toronto, Ontario M7A 2J3	and	Ministry of the Environment, Conservation and Parks 135 St. Clair Avenue West, 1st Floor Toronto, Ontario M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.olt.gov.on.ca**

This instrument is subject to Section 38 of the *Environmental Bill of Rights,* 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at https://ero.ontario.ca/, you can determine when the leave to appeal period ends.

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

DATED AT TORONTO this 16th day of December, 2023

Mohsen Keyvani, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

RL/

c: District Manager, MECP Sarnia
Cristina Olarte, WSP

APPENDIX A2:

Amended ECA [Industrial Sewage Works] No. 2403-BE6LZ4, dated August 21, 2019

Ontario

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

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 2403-BE6LZ4
Issue Date: August 21, 2019

Waste Management of Canada Corporation
117 Wentworth Court
Brampton, Ontario
L6T 5L4

Site Location: Twin Creeks Environmental Centre
5768 Nauvoo Road, Watford
Township of Warwick , County of Lambton

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

Usage and operation of a leachate collection, treatment, and disposal facility and a stormwater management facility to service the Twin Creeks Landfill Site located in the Township of Warwick, County of Lambton, consisting of the following:

Proposed Works (previously approved by ECA number 3506-7M5PU3)

LEACHATE TREATMENT AND DISPOSAL FACILITY

use and operation of a leachate collection, treatment, and disposal facility with a *Rated Capacity* of 400 m^3/day to service Phases 1 to 9 and during closure and post closure period of the Twin Creeks Landfill Site expansion, consisting of the following:

Raw Leachate Pumping Stations

- two (2) primary leachate pumps (one for each PS5 and PS7) and each rated at 7.3 L/sec, together with their associated forcemains discharging to the equalization tank described below.

Secondary Drainage Layer Pumping Stations

- two (2) secondary drainage layer pumps (one for each PS6 and PS8) each rated at 3.5 L/sec, together with their associated forcemains discharging to the equalization tank described below.

Equalization Tank

- Three (3) additional variable frequency drive (VFD) recirculation pumps each rated at approximately 9.6 L/sec proposed to be pumping leachate to the leachate treatment system;

- two (2) VFD raw leachate pumps (one duty, one standby) each rated at 27.7 L/sec, to be used in combination to fill the Sequencing Batch Reactor (SBR) reactors at a faster rate.

Chemical Feed System

- one (1) 1.0 m^3 capacity phosphoric acid solution storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 32.0 L/hr, dosing phosphoric acid into the SBR reactors as required;

- one (1) 1.0 m^3 capacity flocculant storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 363 L/hr, dosing flocculant upstream of the SBR reactors as required;

- one (1) 1.0 m^3 capacity anti-foam agent storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 32.0 L/hr, dosing anti-foam agent upstream of the SBR reactors as required;

- one (1) 10.0 m^3 capacity methanol storage tank equipped with a spill containment structure and two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 144 L/hr, dosing methanol upstream of the SBR reactors as required; and

- one (1) 88 m^3 capacity in-ground high strength carbon waste storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 288 L/hr, dosing high strength carbon waste upstream of the SBR reactors as required.

Sequencing Batch Reactor (SBR)

- a sequencing batch reactor system consisting of two (2) reactors each with approximate dimensions of 6.4 m long x 16.2 m wide x 5.5 m SWD providing active reactor volume of 572 m^3, each tank equipped with a jet aeration header and one (1) dry pit jet pump rated at 227 L/sec and a decanter system capable of decanting 69.4 L/sec; and

- three (3) 50 hp positive displacement air blowers each with VFD control and rated at of 462 L/sec at 65.5 kPa supplying the air required for SBR aeration.

Effluent and Sludge Pumps

- two (2) effluent transfer pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 69.4 L/sec, transferring effluent from the SBR units to an effluent holding tank, as described below; and

- two (2) activated sludge wasting pumps (one duty for each reactor) each rated at 22 L/sec, transferring activated wasted sludge to aerated sludge tanks, as described below.

Effluent and Sludge Holding Tanks

- one (1) 400 m^3 storage capacity effluent holding tank with approximate dimensions of 9.75 m long x 8.5 m wide x 5.5 m SWD equipped with coarse bubble diffusers, discharging to a reverse osmosis membrane filtration system, as described below;

- two (2) aerated sludge tanks operating in either parallel or series mode, each with approximate dimensions of 11.8 m long x 3 m wide x 5.5 m SWD providing a storage capacity of 200 m^3 equipped with coarse bubble diffusers, two (2) supernatant pumps returning supernatant to the SBR units described above, and two (2) sludge pumps discharging settled sludge to a sludge dewatering press, as described below; and

- three (3) positive displacement air blowers each rated at 141 L/sec and at 65.5 kPa with VFD control providing air required for the effluent tank and sludge holding tanks.

Reverse Osmosis Membrane Filtration System

- one (1) treated effluent storage tank with a capacity of 15.0 m^3, equipped with one (1) pump rated at 8.3 L/sec discharging to a cartridge sand filtration unit, as described below;

- one (1) sulphuric acid storage tank with a capacity of 7,000 L for pH adjustment of effluent at the effluent storage tank, as described above;

- two (2) dual redundant 3.47 L/sec capacity cartridge sand filtration unit discharging to a reverse osmosis membrane filtration system described below;

- one (1) three-staged reverse osmosis membrane filtration system with an overall treatment capacity of 3.47 L/sec consisting of three (3) filtration units, equipped with a 32-piece ST-RO membrane modules, a 20-piece ST-RO membranes modules, a 15 piece ST-NF membrane modules and the following pumps:

    a. four (4) high pressure plunger pumps each rated at1.8 L/s (1st and 2nd stage RO);
    b. five (5) multistage centrifugal booster pumps with under water motor each rated at.8 L/s (1st and 2nd stage RO);
    c. one (1) multi stage vertical centrifugal pump (cleaning pump) rated at 3.47 L/s;
    d. one (1) high pressure plunger pump with a capacity of 1.06 L/s (3rd stage NF);
    e. three (3) multistage centrifugal booster pumps with under water motor rated at 2.8 L/s each (3rd

stage NF); and

f. one (1) multi stage vertical centrifugal pump (cleaning pump) rated at 1,06 L/s.

all discharging final permeate to a treated effluent storage pond described below and final concentrate to a concentrate storage tank described below;

Treated Effluent Storage Ponds

- one (1) clay lined pond **(Inlet cell)** with a capacity of 2,200 m^3, equipped with a floating aerator and one (1) pumping station manhole with a submersible pump rated at 30 m^3/hr;

- one (1) clay lined pond **(Cell 1)** with a capacity of 53,900 m^3 equipped with one (1) interconnecting manhole with a gate valve; and

- one (1) clay lined pond **(Cell 2)** with a capacity of 28,400 m^3, providing storage for treated effluent from the membrane filtration system, equipped with one (1) interconnecting manhole with a gate valve, a pumping station **(Pumping Station 11)** equipped with one (1) VFD submersible pump rated at 56.9 L/sec to be used for truck loading purposes, one (1) submersible effluent return pump rated at 7.3 L/sec , and two (2) VFD submersible irrigation pumps each rated at 45.7 L/sec (one duty, one standby) discharging to a poplar tree land irrigation area described below;

Concentrate Evaporator and Dryer

- one (1) concentrate storage tank with approximate dimensions of 4.4 m long x 4.8 m wide and 5.5 m SWD (total capacity of 102 m^3), equipped with a submersible pump for off-site disposal rated at 9.5 L/sec, also used for off-site disposal slurry, and a pump for transferring concentrate to an evaporator treatment system, as described below, rated at 0.63 L/sec;

- one (1) mechanical vapor compression evaporator rated at 0.63 L/sec, equipped with electric heating element and heat exchangers to remove moisture from concentrate and produce a slurry discharging to a slurry holding tank described below;

- one (1) slurry holding tank with approximate dimensions of 4.4 m long x 4.8 m wide and 5.5 m SWD (total capacity of 102.0 m^3) equipped with one (1) slurry pump rated at 1.57 L/sec, discharging to a slurry dryer described below; and

- one (1) slurry dryer rated at 0.035 L/sec with approximate dimensions of 4.7 m long x 2.1 m wide x 1.5 m high discharging to a salt cake disposal bin (water vapour will be evaporated through the slurry dryer exhaust).

Treated Effluent On-Site Disposal

Upgrades to the disposal system of the treated leachate effluent, as follows:

- two (2) 3.31 ha treated effluent drip-irrigation zones using approximately 250 m long drip-irrigation tubing installed in each zone;

Previous Works:

STORMWATER MANAGEMENT FACILITY

a stormwater management facility to service a 146.5 ha drainage area of the Twin Creeks Landfill Site Expansion within the 300 ha area of the Twin Creeks Landfill Site consisting of the following:

Stormwater Management Pond - SWM Pond #1

a stormwater management facility (**SWM Pond #1**) to service a total drainage area of 33.7 ha consisting of the eastern part of the existing landfill site and future excess soil stockpile area, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:100 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- one (1) approximately 1,300 m long perimeter trapezoidal ditch along the toe of the eastern side of the closed landfill having a 0.6 m wide bottom and 2H:1V side slopes, discharging collected stormwater to an extended detention wet pond described below;

- one (1) ditch along the south and west side of the leachate storage lagoon collecting runoff from the excess soil stockpile area, discharging collected stormwater to a forebay described below;

- one (1) forebay with approximate dimensions of 19 m long x 16 m wide bottom, and 4H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 294.0 m long bottom, 23.5 m wide bottom and 4H:1V side slopes, equipped with a permanent vertical baffle with a minimum elevation of 238.7 m ASL, providing a total storage capacity of 21,429 m^3 consisting of a permanent pool storage volume of 3,651 m^3 with an average depth of 0.5 m, and an extended storage volume of 17,778 m^3 with an extended storage depth of 1.91 m, equipped with an outlet structure described below;

- an outlet structure consisting of two (2) 1500 mm diameter concrete manholes discharging through two (2) 750 mm diameter outlet pipes, each pipe equipped with a 1200 mm x 1200 mm concrete valve chamber and a sluice gate valve, to a perimeter ditch flowing towards a roadside ditch along County Road 79; and

- one (1) 8.0 m wide emergency overflow structure with weir elevation of 239.55 m ASL discharging to a perimeter ditch flowing towards County Road 79 roadside ditch.

Stormwater Management Pond - SWM Pond #2

a stormwater management facility (**SWM Pond #2**) to service a total drainage area of 67.9 ha consisting of southwestern part of the expanded landfill site, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:100 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- two (2) approximately 400 m and 1500 m long perimeter ditches along the southern part of the landfill having a minimum depth of 1.0 m, and 3H:1V & 4H:1V side slopes discharging collected stormwater through two (2) culverts, 3000 mm X 1200 mm concrete box and 1390 x 970 mm CSPA, to a forebay described below;

- one (1) forebay with approximate dimensions of 47 m long x 30 m wide bottom and 4H:1V and 3H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 413.0 m long x 44.0 m wide bottom and 4H:1V and 3H:1V side slopes, providing a total storage capacity of 51,725 m^3 consisting of a permanent pool storage volume of 11,427 m^3 with a average depth of 0.60 m, and an extended storage volume of 38,098 m^3 with an extended storage depth of 1.75 m, equipped with an outlet structure described below;

- an outlet structure consisting of one (1)1800 mm diameter and one (1) 2400 mm diameter concrete manholes discharging through a 1,050 mm and a 1,200 mm diameter outlet pipes, each pipe equipped with a 2000 mm x 2000 mm concrete valve chamber and a sluice gate valve, to a roadside ditch along County Road 79; and

- one (1) 18 m wide emergency overflow structure with weir elevation of 234.05 m ASL discharging to a roadside ditch along County Road 79.

Stormwater Management Pond - SWM Pond #3

a stormwater management facility (**SWM Pond #3**) to service a total drainage area of 30.5 ha consisting of northwestern part of the expanded landfill site, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:00 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- one (1) approximately 650 m long perimeter ditch along the northern part of the expanded landfill and one (1) approximately 500 m long perimeter ditch along the western part of the expanded landfill, each having a minimum of 1.0 m depth and 3H:1V & 4H:1V side slopes, discharging collected stormwater through a 3000 mm x 1200 mm concrete box culvert to a forebay described below;

- one (1) forebay with approximate dimensions of 33 m long x 25 m wide bottom and 4H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 255.0 m long, 36.0 m wide bottom and 3H:1V and 4H:1V side slopes, providing a total storage capacity of 24,996 m^3 consisting of a permanent pool storage volume of 4,843 m^3 with an average depth of 0.50 m, and an extended storage volume of 20,053 m^3 with an extended storage depth of 1.67 m, equipped with an outlet structure described below;

- an outlet structure consisting of three (3)1200 mm diameter concrete manholes discharging through two (2) 600 mm diameter and one (1) 450 mm diameter outlet pipes, each pipe equipped with 1200 mm x 1200 mm box concrete valve chamber and a sluice gate valve, to a roadside ditch along County Road 79; and

- one (1) 9 m wide emergency overflow structure with a weir elevation of 238.00 m ASL discharging to a roadside ditch along County Road 79.

Stormwater Management Pond - SWM Pond #4

a stormwater management facility (**SWM Pond #4**) to service a total drainage area of 14.4 ha consisting of the north eastern part of the expanded landfill site and norther part of the existing landfill site, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:100 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- four (4) perimeter ditches collecting runoff from the northern side of the expanded landfill and from the northwestern portion of the existing landfill, having a minimum of 1.0 m depth and 3H:1V & 4H:1V side slopes, discharging collected stormwater through two (2) inlet structures to a forebay described below;

- one (1) forebay with approximate dimensions of 16 m long x 16 m wide bottom and 4H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 165.0 m long bottom, 20.0 m wide bottom and 3H:1V and 4H:1V side slopes, providing a total storage capacity of 8,328 m^3 consisting of a permanent pool storage volume of 1,812 m^3 with an average depth of 0.50 m, and an extended storage volume of 6,516 m^3 with an extended storage depth of 1.32 m, equipped with an outlet structure described below;

- an outlet structure consisting of one (1)1800 mm diameter concrete manhole discharging through one (1)1050 mm diameter outlet pipe equipped with 2000 mm X 2000 mm concrete valve chamber and a sluice gate valve to a perimeter ditch along Zion Line to a roadside ditch along Zion Line;

- one (1) 8 m wide emergency overflow structure with a weir elevation of 242.00 m ASL discharging to a road side ditch along Zion Line; and

all other controls, electrical equipment, instrumentation, piping, valves and appurtenances essential for the proper operation of the aforementioned sewage Works;

all in accordance with the following submitted supporting documents listed in Schedule A.

LEACHATE TREATMENT AND DISPOSAL FACILITY

use and operation of a leachate collection, treatment, and disposal facility with a *Rated Capacity* of 400 m^3/day to service Phases 1 to 9 and during closure and post closure period of the Twin Creeks Landfill Site expansion, consisting of the following:

Raw Leachate Pumping Stations

- two (2) primary raw leachate pumps (one for each PS1 and PS3) each rated at 7.3 L/sec, together with their associated forcemains discharging to the equalization tank described below.

Secondary Drainage Layer Pumping Stations

- two (2) secondary drainage layer pumps (one for each PS2 and PS4) each rated at 3.5 L/sec, together with their associated forcemains discharging to the equalization tank described below.

Equalization Tank

- one (1) 2,300 m^3 capacity steel and glass lined tank enclosed with a clay berm containment area, receiving raw leachate from the landfill leachate collection system, equipped with three (3) variable frequency drive (VFD) recirculation pumps (two duty and one standby) each rated at 9.6 L/sec, all pumping leachate to the leachate treatment system, as described below; and

Treated Effluent On-Site Disposal (Poplar Plantation)

Upon substantial completion of the Works, treated leachate effluent will be disposed as follows:

- one (1) 28.32 ha poplar tree irrigation land established to handle an average of 1,187 m^3/day of treated leachate effluent during suitable irrigation days between the period extending from May 1st to October 15th, consisting of six (6) 3.62 ha treated effluent drip-irrigation zones using approximately 250 m long drip-irrigation tubing installed in each zone;

- a stormwater management system to control the quality of stormwater runoff from the poplar tree irrigation land to Kersey Drain (Brown Creek), consisting of one (1) west furrow approximately 710 m long x 200 mm deep and one (1) east furrow approximately 510 m long x 200 mm deep, running parallel to each other with a grassed area in between, each equipped with a 200 mm high berm for distributing stormwater runoff across the entire length of the furrow, discharging by sheet flow to Kersey Drain; and

Raw/Diluted Leachate Effluent Disposal (Poplar System)

- one (1) existing 9.3 ha poplar tree irrigation system identified as the Poplar System, of approximately 150 m length for each poplar row. Leachate is applied through pressure drip-irrigation tubing at a rate not to exceed 476 mm/m², or 44,000 L/day, during the growing season. The system is subject to conditions as specified in the *EPA* Section 27 approval for the site. Revised to a 9.3 ha area with a rate of 476 mm/m^2 or 44,000 m^3/year.

    - a system of maintenance holes, collector system and leachate sump across the existing site to transfer leachate to the leachate holding tanks via two methods: 1) down-hole leachate pumps transfer leachate through piping units directly to the leachate holding tanks and the Equalization Tank; and 2) the use of a tanker truck, which transfers the leachate via gravity drainage into the leachate holding tanks or maintenance holes of the leachate conveyance system.

all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage Works;

all in accordance with the following submitted supporting documents listed in Schedule A.

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

1. "Approval" means this entire document and any schedules attached to it, and the application;

2. "District Manager" means the District Manager of the Sarnia District Office of the Ministry;

3. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

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

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

6. "Owner" means Waste Management of Canada Corporation and its successors and assignees;

7. "OWRA" means the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40, as amended;

8. "Poplar System" is the irrigation area of 9.3 hectares located on top of the cap of the Existing Site (old landfill) that is used for the phytoremediation of leachate that is generated at the Site.

9. "Poplar Plantation" is the irrigation area located on native soil to the south of the Site that is used for the phytoremediation of irrigation liquid that satisfies the Effluent Limit criteria.

10. "Previous Works" means those portions of the sewage works previously constructed and approved under an Approval;

11. "Proposed Works" means the sewage works described in the Owner's application, this Approval, to the extent approved by this Approval;

12. "Township" means the Township of Warwick;

13. "Works" means the sewage works described in the Owner's application, and this Approval, and includes both Proposed Works and Previous Works;

14. "WIFN" refers to Walpole Island First Nation; and

15. "WPLC" refers to the Warwick Public Liaison Committee.

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

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL CONDITION

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

2. Except as otherwise provided by these conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

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

5. The Conditions of this Approval are severable. If any Condition of this Approval, or the application

of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

2. CHANGE OF OWNER

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

    a. change of Owner or operating authority, or both;

    b. change of address of Owner or operating authority or address of new Owner or operating authority;

    c. change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Partnerships Registration Act;*

    d. change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the *Corporations Information Act* , shall be included in the notification to the District Manager;

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

3. The Owner shall ensure that all communications made pursuant to this condition will refer to this Approval's number.

PART II - STORMWATER MANAGEMENT FACILITY

3. OPERATIONS MANUAL

1. The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

4. EFFLUENT MONITORING AND RECORDING

1. The Owner shall carry out a monitoring program and all samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

2. Samples shall be collected and analyzed at the sampling point(s), at the sampling frequencies and using the sample type specified for each parameter listed in the effluent monitoring table included in **Schedule B**:

3. The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

    a. the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

    b. the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

    c. in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager, which approval shall be obtained prior to sampling.

4. The temperature and pH of the effluent from the Works shall be determined in the field at the time of sampling for total ammonia. The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (un-ionized).

5. The measurement frequencies specified in Condition 4 (2) in respect to any parameter are minimum requirements which ma, after 24 months of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

6. The Owner shall provide to the Township, WPLC, WIFN a copy of all requests to be submitted to the District Manager for any changes to the monitoring program specified in Condition 4 (5) at the same time or prior to the time such request is made to the District Manager.

5. OPERATION AND MAINTENANCE

1. The Owner shall apply the "Stormwater Contingency and Remedial Action Plan as included in Appendix N.27 of the Operations and Maintenance manual, Warwick Landfill Expansion, WM, May 2008.

2. The Owner shall operate the Works (**SWM Ponds**) with the outlet sluice gate valve in a **Normally Open Position** during normal operation period.

3. The Owner shall compare monitoring results obtained under Condition 4 (2) for the trigger parameters listed in Table 2 in **Schedule B** with respective trigger levels listed in Table 2 in **Schedule B** to identify any potential leachate impact to stormwater.

4. In the event that a monitoring result for any parameter that is listed in Table 2 of **Schedule B** for any of **SWM Ponds** exceeds its trigger level, the Owner shall conduct sampling of the contents of the affected **SWM Pond** within one (1) week to confirm the exceedance of the trigger level for that parameter and identify potential source of contamination. Upon confirmation of the exceedence of the exceedance of any trigger level for any parameter that is listed in Table 2 of **Schedule B**, the Owner shall close the outlet sluice gate valve of the affected Works **(SWM Pond)** and implement an approved "Stormwater Contingency and Remedial Action Plan".

5. The Owner shall dispose of the contents of an affected Work **(SWM Pond)** which failed to meet the quality requirements outlined in Condition 5 (5) in accordance with an approved "Stormwater Contingency and Remedial Action Plan".

6. In the event that a monitoring result for any parameter that is listed in Table 2 for the **Poplar Plantation** exceeds its trigger level, the Owner shall conduct sampling of the stormwater runoff from the affected part of the **Poplar Plantation** as soon as possible to confirm the exceedence of the trigger level for that parameter and identify potential source of contamination. Upon confirmation of the exceedence of any trigger level for any parameter that is listed in Table 2, the Owner shall implement an approved "Stormwater Contingency and Remedial Action Plan".

7. The Owner shall inspect the Works **(SWM Ponds)** at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

8. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site or Owner's operational head quarter for inspection by the Ministry. The logbook shall include the following:

    a. the name of the Works (SWM Pond #1, SWM Pond #2, SWM Pond #3, and SWM Pond #4);

    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed; and

    c. the occurrence date of each spill within the catchment area of a given SWM Pond, including follow-up action/ remedial measures undertaken.

6. RECORD KEEPING

1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance and monitoring activities required by this Approval.

PART III - LEACHATE TREATMENT FACILITY

7. EFFLUENT LIMITS

1. The Owner shall design, construct and operate the Works such that the concentrations of the materials listed as effluent parameters in the effluent limits table in **Schedule B** are not exceeded in the effluent from the **Treated Effluent Storage Pond** (Cell 2).

2. For the purposes of determining compliance with and enforcing subsection (1):

    a. The Average Monthly Concentration of a parameter named in Column 1 of Table 3 in **Schedule B** shall not exceed the corresponding maximum concentration set out in Column 2 of Table 3 in **Schedule B;**

    b. non-compliance with respect to pH is deemed to have occurred when any single measurement is outside of the indicated range.

8. OPERATION AND MAINTENANCE

1. The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training procedures and other requirements of this Approval and OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances in the Works.

2. The Owner shall main the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

9. EFFLUENT MONITORING AND RECORDING

The Owner shall carry out a monitoring program:

1. all samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

2. For the purpose of this condition, the following definitions apply:

    a. Daily means once each day;

    b. Weekly means once each week;

    c. Monthly means once every month; and

d. Semi-annually means once every six months.

3. Samples shall be collected and analyzed at the sampling point(s), at the sampling frequencies and using the sample type specified for each parameter listed in the effluent monitoring table included in **Schedule B**:

4. The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

    a. the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)", as amended from time to time by more recently published editions;

    b. the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

    c. the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

    d. in respect of any parameters not mentioned in (a) - (c), the written approval of the District Manager, which approval shall be obtained prior to sampling.

5. The measurement frequencies specified in **Schedule B** in respect to any parameter are minimum requirements which may, after 24 months of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

6. The Owner shall provide to the Township, WPLC and WIFN a copy of all requests to be submitted to the District Manager for any changes to the monitoring program specified in **Schedule B** at the same time or prior to the time such request is made to the District Manager.

7. A continuous flow measuring device(s) shall be installed and maintained to measure the flowrate of the effluent from the sewage works, with an accuracy to within plus or minus fifteen (15) per cent of the actual flowrate for the entire design range of the flow measuring device and the Owner shall measure, record and calculate the flowrate for each effluent stream on each day of sampling.

8. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

9. The Owner shall visually inspect the drip-irrigation pipeline systems at least once per week during operation period to look for leaking and/or failed (broken) lines that would otherwise produce run-off. The inspection should be supported by a log book documenting routine inspection and notes on repair as required.

10. GROUNDWATER MONITORING - POPLAR PLANTATION LAND IRRIGATION AREA

1. The Owner shall collect grab samples during May and November from the sampling location outlined in Table 7 of **Schedule B** and analyze for the parameters listed in Table 7 of **Schedule B.**

2. The methods and protocols for sampling, analysis and recording shall conform to that outlined in Condition 9 (4).

3. The measurement frequencies specified in Condition 10 (2) in respect to any parameter are minimum frequencies which may, after 24 months of monitoring in accordance with this Condition, be modified by the District Manager, in writing from time to time.

4. The Owner shall provide to the Township, WPLC, and WIFN a copy of all requests to be submitted to the District Manager for any changes to the monitoring program specified in Condition 10 (2) at the same time or prior to the time such request is made to the District Manager.

11. OPERATION - POPLAR PLANTATION LAND IRRIGATION

1. The Owner shall apply the "Groundwater Contingency and Remedial Action Plan" for any potential groundwater impact caused by Effluent Storage Ponds and the Poplar Forest Irrigation Area, as included in Appendix N.26 of the Operation and Maintenance Manual, Warwick Landfill Expansion, WM, May 2008.

2. The Owner shall compare monitoring results obtained under condition 10 (2) for the trigger parameter listed in Table 8 of **Schedule B** with their respective trigger levels listed in Table 8 of **Schedule B** to identify any potential leachate impact to groundwater.

3. In the event that a monitoring result for any parameter that is listed in Table 8 of **Schedule B** exceeds its trigger level, the Owner shall re-sample within one (1) month to confirm the exceedence of the trigger level for that parameter. Upon confirmation of the exceedence of any trigger level for any parameter that is listed in Table 8 of **Schedule B**, the Owner shall conduct a second round re-sampling within six (6) months to re-confirm the exceedence of the trigger level for the parameter of concern.

4. In the event that the presence of the parameter(s) of concern is (are) not confirmed after the second round of sampling conducted under Condition 11 (3), then, normal groundwater monitoring shall be resumed.

5. In the event that the presence of the parameter(s) of concern is confirmed after the second round of sampling conduced under Condition 11 (3), then, it shall constitute as a confirmation of leachate impact to groundwater and the *Owner* shall immediately implement the "Groundwater Contingency and Remedial Action Plan" approved under Condition 11 (1).

6. The Owner shall notify the District Manager orally, as soon as possible, and in writing within seven days of the confirmation of leachate impact to groundwater including an assessment of the relative severity and extent of leachate impact and proposed remedial actions.

7. The Owner shall record and report a summary of all trigger exceedence incidents and all remedial action measures taken under Condition 11 (5) in the Annual Report prepared under Condition 13.

8. The Owner shall dispose of **only** treated leachate effluent that meets the effluent limits requirements outlined under Condition 7 (1) for treatment and disposal by drip-irrigation on the approved poplar tree land area during the period between May 1st and October 15th of each calendar year.

9. The Owner shall not allow under any circumstance (including as emergency contingency plan) any direct discharge of leachate or treated leachate effluent from the Works to any receiving surface water including Bear Creek;

10. The Owner shall record the total volume of treated leachate effluent drip-irrigated on the poplar tree land irrigation area on a daily basis.

11. The Owner shall ensure that treated leachate effluent is disposed of via drip-irrigation in the designated six (6) poplar tree drip-irrigation zones initially, and ultimately on eight (8) poplar tree drip-irrigation zones on a planned rotation basis.

12. The Owner shall visually inspect drip-irrigation operations at least twice each day during operation period to ensure that no surface ponding or surface run-off is taking place.

13. The *Owner* shall retain records of inspections and drip-irrigation operation data collected under subsections (10), (11) and (12) and make them available for inspection Ministry staff upon request.

14. No drip irrigation is to take place:

    a. on frozen or snow covered ground conditions;

    b. with the occurrence of surface ponding in any area subjected to drip irrigation;

    c. within 100 m of any surface watercourse or drain; and

    d. at an average daily application rate greater than 4.8 mm;

15. The Owner shall notify and provide the Township, WPLC and WIFN with a copy of the proposed "Groundwater Contingency and Remedial Action Plan" required under Condition 11 (1).

PART IV - GENERAL

12. REPORTING

1. In addition to the obligations under Part X of the EPA, the Owner shall, within ten (10) working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

2. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

3. The Owner shall prepare and submit a performance report to the District Manager on an annual basis within before March 31 of each calendar year. The reports shall contain, but shall not be limited to, the following information:

    a. a summary and interpretation of all monitoring data and a comparison to the effluent objectives outlined in Condition 7, including an overview of the success and adequacy of the Works;

    b. a summary and interpretation of all monitoring data and a comparison to the trigger limits outlined in Condition 5, including an overview of the success and adequacy of the Works;

    c. a description of any operating problems encountered and corrective actions taken;

    d. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works;

    e. a summary of any effluent quality assurance or control measures undertaken in the reporting period;

    f. a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

    g. a tabulation of dry salt cake generated in the reporting period, an outline of anticipated amount of dry salt cake to be generated in the next reporting period and a summary of the locations to where the cake was disposed;

    h. a summary of any complaints received during the reporting period and any steps taken to address the complaints; and

    i. any other information the District Manager requires from time to time.

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

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

3. Conditions 3, 5, 8 and 11 are included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and injury to any person or deterioration, loss and damage to property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions.The manual will also act as a benchmark for *Ministry* staff when reviewing the Owner′ s operation of the work.

4. Conditions 4, 9 and 10 are included to require the owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved Works is consistent with the effluent limits specified in the certificate and that the approved Works does not cause any impairment to the receiving watercourse and/or the groundwater.

5. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

6. Condition 7 is imposed to ensure that the effluent irrigated from the Works to the poplar irrigation area meets the Ministry's effluent quality requirements thus minimizing environmental impact on groundwater and receiving surface water.

7. Condition 12 is included to provide a performance record for future references to ensure that the *Ministry* is made aware of problems as they arise and to provide a compliance record for all the terms and conditions outlined in this Approval so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Schedule A

1. Application for Environmental Compliance Approval submitted by Reid Cleland, Director of Operations- Eastern Canada Landfills of Waste Management of Canada Corporation received on March 5, 2019 and all supporting documentation and information submitted during the review process.

Schedule B

Table 1 - Stormwater Monitoring Sampling Locations: SWM Pond Outlets - SP1, SP2, SP3, SP4. Irrigation Area - SS17A, SS17B, SS18A and **SS18B.**			
Parameter	**Parameter**	**Parameter**	**Field -Parameter**
Alkalinity	Magnesium	Toluene	Conductivity
Total Ammonia Nitrogen	Potassium	Ethylbenzene	Dissolved Oxygen
Un-ionized Ammonia	Sodium	Xylene	pH (Field)
Chloride	Arsenic	Vinyl Chloride	Temperature
Conductivity (Lab)	Barium	1,2,4-Trichlorobenzene	Turbidity
Nitrate Nitrogen	Boron	1,2-Dichlorobenzene	
Nitrite Nitrogen	Cadmium	1,3-Dichlorobenzene	
TKN	Chromium (Total)	1,4-Dichlorobenzene	
pH (Lab)	Copper	Hexachlorobenzene	
Total Phosphorus	Iron	Diethylphthalate	
Total Suspended Solids	Lead	Dimethylphthalate	
Total Dissolved Solids	Mercury	Di-n-butyl phthalate	
Sulphate	Nickel	Phenol	
BOD5	Zinc	Benzo(a)pyrene	
Chemical Oxygen Demand	Benzene	2,4,6-Trichlorophenol	
Phenols	1,4-Dichlorobenzene	2,4-Trichlorophenol	
Calcium	Dichloromethane	Pentachlorophenol	

Note: Samples shall be collected within twenty four hours after a rainfall event (more than 10 mm rainfall in 24 hour period) resulting in a stormwater discharge from each SWM Pond or Poplar Plantation Irrigation Area at a minimum interval of one (1) month between consecutive sampling events.

Table 2	
Trigger Parameter	**Trigger Level [SS10 & SS16 - 90th percentile]** (mg/L)
Ammonia (unionized)	0.020
Boron	0.20
Boron (SP1 only)	0.39
Chloride	210
Chromium (Total)	0.024
Nickel	0.027
Phenols	0.001
Zinc	0.06

Note: Annually, a trigger level for a parameter listed above will be replaced by the corresponding 90th percentile of background surface water concentration where background surface water concentrations collected upstream of the landfill (Sampling Locations SS10 and SS16).

Table 3 - Effluent Limits Sampling Location: **Discharge Point from Treated Effluent Storage Pond**	
Effluent Parameter	**Average Monthly Concentration** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
Total Ammonia Nitrogen	68.7
Total Phosphorus	0.72
Phenols	0.2
Chlorides	247
Copper	0.014
Iron	27.0
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

Table 4 - Leachate Monitoring Sampling Location: **Equalization Tank**		
Parameters	**Sample Type**	**Frequency**
BOD5	Grab	Quarterly
Dissolved Organic Carbon (DOC)	Grab	Quarterly
Total Phosphorus	Grab	Quarterly
Total Kjeldahl Nitrogen	Grab	Quarterly
BTEX	Grab	Quarterly
pH	Grab	Quarterly
VOCs [Note 1]	Grab	Semi-Annually
Semi-VOCs [Note 2]	Grab	Semi-Annually
Metals [Note 3]	Grab	Semi-Annually
General Chemistry [Note 4]	Grab	Semi-Annually

Table 5 - Leachate Treatment Plant Effluent Monitoring Sampling Location: **Discharge to Treated Effluent Storage Pond**		
Parameters	**Sample Type**	**Frequency**
CBOD5	Grab	Weekly
Dissolved Organic Carbon (DOC)	Grab	Weekly
Total Ammonia Nitrogen	Grab	Weekly
Chloride	Grab	Weekly
BTEX	Grab	Weekly
pH	Grab	Weekly
VOCs [Note 1]	Grab	Monthly
Semi-VOCs [Note 2]	Grab	Monthly
Metals [Note 3]	Grab	Monthly
General Chemistry [Note 4]	Grab	Monthly
PCB	Grab	Semi-Annually
Organochlorides	Grab	Semi-Annually

Table 6 - Treated Effluent Storage Pond Effluent Monitoring Sampling Location: **Discharge to Poplar Plant Irrigation Area**		
Parameters	**Sample Type**	**Frequency**
CBOD5	Grab	Weekly
Dissolved Organic Carbon (DOC)	Grab	Weekly
Total Ammonia Nitrogen	Grab	Weekly
Chloride	Grab	Weekly
BTEX	Grab	Weekly
pH	Grab	Weekly
VOCs[Note 1]	Grab	Monthly
Semi-VOCs [Note 2]	Grab	Monthly
Metals [Note 3]	Grab	Monthly
General Chemistry [Note 4]	Grab	Monthly

Note 1: VOCs: Benzene, 1,4-Dichlorobenzene, Dichloromethane, Toluene, Ethylbenzene, Xylenes, and Vinyl Chloride.

Note 2: Semi-VOCs: 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Hexachlorobenzene, Diethylphthalate, Dimethylphthalate, Di-n-butyl phthalate, Phenol, Benzo(a)pyrene, 2,4,6- Trichlorophenol, 2,4-Dichlorophenol, Pentachlorophenol.

Note 3: Metals: Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc.

Note 4: G. Chemistry: Alkalinity, Calcium, Chloride, Conductivity, COD, Nitrate, Nitrite, Magnesium, pH, Potassium, Sodium, Sulphate, Total Dissolved Solids, TKN, Temperature, Turbidity, Total Phosphorus, TSS, Phenols, Dissolved Oxygen.

Table 7 - Groundwater Monitoring Sampling Location: **OW40, OW60 and OW79 - at Annual Frequency** Sampling Location: **OW16, OW61, and OW62 - at Semi-Annual Frequency**		
Parameters	**Parameters**	**Field Parameters**
Alkalinity	Boron	pH
Conductivity	Cadmium	Conductivity
Chloride	Lead	Turbidity
pH	Iron	
Dissolved Organic Carbon	Barium	
Total Dissolved Solids	Benzene	
Total Ammonia	1,4-Dichlorobenzene	
Total Kjeldahl Nitrogen	Dichloromethane	
Sulphate	Ethylbenzene	
Nitrate	Vinyl Chloride	
Calcium	Toluene	
Potassium	Xylenes	
Sodium		
Magnesium		

Table 8 - Trigger Limits for Poplar Plantation Land Irrigation			
Trigger Parameter	**Trigger Level** (mg/L)		
	Active Aquitard	Interstadial Silt and Sand	Interface Aquifer
Chloride	106	116	134
Nitrate	2.3	2.3	2.3
Boron	1.1	2.1	2.6
Cadmium	0.001	0.001	0.001
Lead	0.002	0.002	0.002
Benzene	0.001	0.001	0.001
1,4-Dichlorobenzene	0.001	0.001	0.001
Dichloromethane	0.01	0.01	0.01
Vinyl Chloride	0.0004	0.0004	0.0004

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 3506-7M5PU3 issued on July 9, 2009

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

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

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

The Notice should also include:

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

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

This Notice must be served upon:

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

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

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

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

DATED AT TORONTO this 21st day of August, 2019

Youssouf Kalogo, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

SO/

c: District Manager, MECP Sarnia District Office
Larry Fedec, HDR Corporation

APPENDIX A3:

Amended ECA [Industrial Sewage Works] No. 8117-CUSNXX, dated April 29, 2024

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 8117-CUSNXX
Issue Date: April 29, 2024

Waste Management of Canada Corporation
5768 Nauvoo Road
Warwick, Ontario
N0M 2S0

Site Location: Twin Creeks Environmental Centre
5768 Nauvoo Road Watford
Township of Warwick, County of Lambton
N0M 2S0

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

amendment to the existing industrial sewage works and establishment of new proposed industrial sewage works for usage and operation of condensate collection system, leachate collection, treatment, and disposal facility and stormwater management works to service a proposed Renewable Natural Gas (RNG) facility at the existing Twin Creeks Landfill Site located in the Township of Warwick, County of Lambton, consisting of the following:

PROPOSED WORKS A

Establishment of condensate collection and disposal system and stormwater management Works for a Proposed Renewable Natural Gas Facility (RNG), located at Twin Creeks Landfill Site, comprising;

RNG condensate collection and disposal system

a Proposed RNG condensate system (combined with the existing Landfill Gas (LFG) condensate system) for collection and discharge of the condensate generated at a maximum flow rate of 432 m^3/day, at the newly proposed RNG facility, collected in the two Slop Tanks inside the RNG building to the Proposed Equalization Tank 2 during first year of the operation of Proposed Works, and disposal to Equalization Tank 1 or hauled offsite depending upon the Proposed Sampling Program results, the Proposed Works also include upgrades to the Existing Pump Station 10 (PS10) for pumping of condensate to Equalization Tank, all comprising;

Oil/Water Separator

One (1) oil/water separator (Titan Production Equipment) located upstream of the Slop Discharge Tank, having a total capacity of 1.39 m3, a maximum treatment flow rate of 26.17 L/min, receiving RNG condensate flow from the RNG condensate system through a 75mm diameter pipe, and discharging to the Slop Tank through as 50mm diameter pipe;

Slop Tanks

Two condensate storage tanks (Slop Tanks), each having a volume of 64 m^3, installed in series receiving the condensate from the Proposed new RNG facility, through the 50 mm diameter pipe, generated at a rate of 38,264 L/day, and receiving rejected process water from the compressor room catalytic oxygen removal, generated at a rate of 726 L/day, emptied on an as-needed, discharging on demand, via a slop pump, discharging at a maximum rate of 6.3 L/s, to a proposed new 200 mm HDPE gravity sewer, to CMH1 adjacent to PS10, via manhole CMH2;

LFG Condensate collection and disposal system

collection and conveyance of condensate from the proposed LFG header pipe, from CMH3 to CMH2, at a maximum flow rate of 3.2 L/s in a condensate collection sump CMH3 and convey the flow by gravity, through a 200 mm diameter, 74 m long HDPE gravity sewer and discharging to a 200 mm diameter sewer and CMH1 adjacent to PS10, via manhole CMH2;

Combined Condensate and LFG Condensate Collection Pipes

Combined condensate from the RNG and LFG header, collected at CMH2, flowing by gravity through a 200 mm diameter sewer to manhole CMH1 adjacent to PS10;

Upgrades to Pumping Station 10 (PS10)

- upgrades to the existing pumping Station 10 (PS10), comprising of a new dedicated 4th pump, rated at 9.5 L/s under 28 m TDH, pumping the combined condensate to the Proposed new Equalization Tank 2 for the first operational year and subsequently disposed off as per this Approval, at an maximum flow rate of 5 L/s, complete with a 100mm diameter foot valve to control the flow to be temporarily stored in the equalization tanks;

New Equalization Tank 2

- one proposed steel glass-lined equalization tank 2, proposed to be operational during the first year of its construction, having a capacity of 2,300 m^3, located west of the existing Equalization Tank 1, receiving the combined RNG condensate and LFG condensate through the 4th pump installed in PS10, capable to provide two days storage, and discharging to Equalization Tank 1 or wastewater is to be hauled offsite depending upon the results of the Proposed Sampling program;

B. RNG Stormwater management Works

Proposed use of the existing stormwater management works discharging to Stormwater Management Pond 1, for the quality and quantity control of stormwater generated at the new proposed RNG facility;

PROPOSED WORKS B

LEACHATE TREATMENT AND DISPOSAL FACILITY

use and operation of a leachate collection, treatment, and disposal facility with a Rated Capacity of 400 m^3/day to service Phases 1 to 9 and during closure and post closure period of the Twin Creeks Landfill Site expansion, consisting of the following:

Chemical Feed System

- one (1) 1.0 m^3 capacity phosphoric acid solution storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 32.0 L/hr, dosing phosphoric acid into the SBR reactors as required;

- one (1) 1.0 m^3 capacity flocculent storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 363 L/hr, dosing flocculent upstream of the SBR reactors as required;

- one (1) 1.0 m^3 capacity anti-foam agent storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 32.0 L/hr, dosing anti-foam agent upstream of the SBR reactors as required;

- one (1) 10.0 m^3 capacity methanol storage tank equipped with a spill containment structure and two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 144 L/hr, dosing methanol upstream of the SBR reactors as required; and

- one (1) 88 m^3 capacity in-ground high strength carbon waste storage tank equipped with two (2) metering pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 288 L/hr, dosing high strength carbon waste upstream of the SBR reactors as required.

Sequencing Batch Reactor (SBR)

- a sequencing batch reactor system consisting of two (2) reactors each with approximate dimensions of 6.4 m long x 16.2 m wide x 5.5 m SWD providing active reactor volume of 572 m^3, each tank equipped with a jet aeration header and one (1) dry pit jet pump rated at 227 L/sec and a decanter system capable of decanting 69.4 L/sec; and

- three (3) 50 hp positive displacement air blowers each with VFD control and rated at of 462 L/sec at 65.5 kPa supplying the air required for SBR aeration.

Effluent and Sludge Pumps

- two (2) effluent transfer pumps (one duty for each SBR reactor with interconnecting piping for redundancy) each rated at 69.4 L/sec, transferring effluent from the SBR units to an effluent holding tank, as described below; and

- two (2) activated sludge wasting pumps (one duty for each reactor) each rated at 22 L/sec, transferring activated wasted sludge to aerated sludge tanks, as described below.

Effluent and Sludge Holding Tanks

- one (1) 400 m^3 storage capacity effluent holding tank with approximate dimensions of 9.75 m long x 8.5 m wide x 5.5 m SWD equipped with coarse bubble diffusers, discharging to a reverse osmosis membrane filtration system, as described below;

- two (2) aerated sludge tanks operating in either parallel or series mode, each with approximate dimensions of 11.8 m long x 3 m wide x 5.5 m SWD providing a storage capacity of 200 m^3 equipped with coarse bubble diffusers, two (2) supernatant pumps returning supernatant to the SBR units described above, and two (2) sludge pumps discharging settled sludge to a sludge dewatering press, as described below; and

- three (3) positive displacement air blowers each rated at 141 L/sec and at 65.5 kPa with VFD control providing air required for the effluent tank and sludge holding tanks.

Reverse Osmosis Membrane Filtration System

- one (1) treated effluent storage tank with a capacity of 15.0 m^3, equipped with one (1) pump rated at 8.3 L/sec discharging to a cartridge sand filtration unit, as described below;

- one (1) sulphuric acid storage tank with a capacity of 7,000 L for pH adjustment of effluent at the effluent storage tank, as described above;

- two (2) dual redundant 3.47 L/sec capacity cartridge sand filtration unit discharging to a reverse osmosis membrane filtration system described below;

- one (1) three-staged reverse osmosis membrane filtration system with an overall treatment capacity of 3.47 L/sec consisting of three (3) filtration units, equipped with a 32-piece ST-RO membrane modules, a 20-piece ST-RO membranes modules, a 15 piece ST-NF membrane modules and the following pumps:

    a. four (4) high pressure plunger pumps each rated at 1.8 L/s (1st and 2nd stage RO);
    b. five (5) multistage centrifugal booster pumps with under water motor each rated at.8 L/s (1st and 2nd stage RO);

c. one (1) multi stage vertical centrifugal pump (cleaning pump) rated at 3.47 L/s;
d. one (1) high pressure plunger pump with a capacity of 1.06 L/s (3rd stage NF);
e. three (3) multistage centrifugal booster pumps with under water motor rated at 2.8 L/s each (3rd stage NF); and
f. one (1) multi stage vertical centrifugal pump (cleaning pump) rated at 1,06 L/s.

all discharging final permeate to a treated effluent storage pond described below and final concentrate to a concentrate storage tank described below;

Treated Effluent Storage Ponds

- one (1) clay lined pond **(Inlet cell)** with a capacity of 2,200 m^3, equipped with a floating aerator and one (1) pumping station manhole with a submersible pump rated at 30 m^3/hr;

- one (1) clay lined pond **(Cell 1)** with a capacity of 53,900 m^3 equipped with one (1) interconnecting manhole with a gate valve; and

- one (1) clay lined pond **(Cell 2)** with a capacity of 28,400 m^3, providing storage for treated effluent from the membrane filtration system, equipped with one (1) interconnecting manhole with a gate valve, a pumping station **(Pumping Station 11)** equipped with one (1) VFD submersible pump rated at 56.9 L/sec to be used for truck loading purposes, one (1) submersible effluent return pump rated at 7.3 L/sec , and two (2) VFD submersible irrigation pumps each rated at 45.7 L/sec (one duty, one standby) discharging to a poplar tree land irrigation area described below;

Concentrate Evaporator and Dryer

- one (1) concentrate storage tank with approximate dimensions of 4.4 m long x 4.8 m wide and 5.5 m SWD (total capacity of 102 m^3), equipped with a submersible pump for off-site disposal rated at 9.5 L/sec, also used for off-site disposal slurry, and a pump for transferring concentrate to an evaporator treatment system, as described below, rated at 0.63 L/sec;

- one (1) mechanical vapour compression evaporator rated at 0.63 L/sec, equipped with electric heating element and heat exchangers to remove moisture from concentrate and produce a slurry discharging to a slurry holding tank described below;

- one (1) slurry holding tank with approximate dimensions of 4.4 m long x 4.8 m wide and 5.5 m SWD (total capacity of 102.0 m^3) equipped with one (1) slurry pump rated at 1.57 L/sec, discharging to a slurry dryer described below; and

- one (1) slurry dryer rated at 0.035 L/sec with approximate dimensions of 4.7 m long x 2.1 m wide x 1.5 m high discharging to a salt cake disposal bin (water vapour will be evaporated through the slurry dryer exhaust).

Treated Effluent On-Site Disposal

Upgrades to the disposal system of the treated leachate effluent, as follows:

- two (2) 3.31 ha treated effluent drip-irrigation zones using approximately 250 m long drip-irrigation tubing installed in each zone;

EXISTING WORKS

Raw Leachate Pumping Stations

- four (4) primary leachate pumps (one for each PS1, PS3, PS5 and PS7) and each rated at 7.3 L/sec, together with their associated forcemains discharging to the equalization tank described below.

Secondary Drainage Layer Pumping Stations

- four (4) secondary drainage layer pumps (one for each PS2, PS4, PS6 and PS8) each rated at 3.5 L/sec, together with their associated forcemains discharging to the equalization tank described below.

Pumping Station 10 (PS10)

Pumping Station 10 (PS10) located South of the landfill leachate from Equalization Tank 1 seasonally to the poplar treatment system or hauled offsite, comprising;

- Three (3) additional variable frequency drive (VFD) recirculation pumps each rated at approximately 9.6 L/sec proposed to be pumping leachate to the leachate treatment system;

- two (2) VFD raw leachate pumps (one duty, one standby) each rated at 27.7 L/sec, to be used in combination to fill the Sequencing Batch Reactor (SBR) reactors at a faster rate;

STORMWATER MANAGEMENT FACILITY

a stormwater management facility to service a 146.5 ha drainage area of the Twin Creeks Landfill Site Expansion within the 300 ha area of the Twin Creeks Landfill Site consisting of the following:

Stormwater Management Pond - SWM Pond #1

a stormwater management facility (**SWM Pond #1**) to service a total drainage area of 33.7 ha consisting of the eastern part of the existing landfill site and future excess soil stockpile area, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:100 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- one (1) approximately 1,300 m long perimeter trapezoidal ditch along the toe of the eastern side of the closed landfill having a 0.6 m wide bottom and 2H:1V side slopes, discharging collected

stormwater to an extended detention wet pond described below;

- one (1) ditch along the south and west side of the leachate storage lagoon collecting runoff from the excess soil stockpile area, discharging collected stormwater to a forebay described below;

- one (1) forebay with approximate dimensions of 19 m long x 16 m wide bottom, and 4H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 294.0 m long bottom, 23.5 m wide bottom and 4H:1V side slopes, equipped with a permanent vertical baffle with a minimum elevation of 238.7 m ASL, providing a total storage capacity of 21,429 m³ consisting of a permanent pool storage volume of 3,651 m³ with an average depth of 0.5 m, and an extended storage volume of 17,778 m³ with an extended storage depth of 1.91 m, equipped with an outlet structure described below;

- an outlet structure consisting of two (2) 1500 mm diameter concrete manholes discharging through two (2) 750 mm diameter outlet pipes, each pipe equipped with a 1200 mm x 1200 mm concrete valve chamber and a sluice gate valve, to a perimeter ditch flowing towards a roadside ditch along County Road 79; and,

- one (1) 8.0 m wide emergency overflow structure with weir elevation of 239.55 m ASL discharging to a perimeter ditch flowing towards County Road 79 roadside ditch;

Stormwater Management Pond - SWM Pond #2
a stormwater management facility (**SWM Pond #2**) to service a total drainage area of 67.9 ha consisting of southwestern part of the expanded landfill site, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:100 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- two (2) approximately 400 m and 1500 m long perimeter ditches along the southern part of the landfill having a minimum depth of 1.0 m, and 3H:1V & 4H:1V side slopes discharging collected stormwater through two (2) culverts, 3000 mm X 1200 mm concrete box and 1390 x 970 mm CSPA, to a forebay described below;

- one (1) forebay with approximate dimensions of 47 m long x 30 m wide bottom and 4H:1V and 3H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 413.0 m long x 44.0 m wide bottom and 4H:1V and 3H:1V side slopes, providing a total storage capacity of 51,725 m³ consisting of a permanent pool storage volume of 11,427 m³ with a average depth of 0.60 m, and an extended storage volume of 38,098 m³ with an extended storage depth of 1.75 m, equipped with an outlet structure described below;

- an outlet structure consisting of one (1)1800 mm diameter and one (1) 2400 mm diameter concrete manholes discharging through a 1,050 mm and a 1,200 mm diameter outlet pipes, each pipe equipped with a 2000 mm x 2000 mm concrete valve chamber and a sluice gate valve, to a roadside ditch along County Road 79; and

- one (1) 18 m wide emergency overflow structure with weir elevation of 234.05 m ASL discharging to a roadside ditch along County Road 79.

Stormwater Management Pond - SWM Pond #3
a stormwater management facility (**SWM Pond #3**) to service a total drainage area of 30.5 ha consisting of northwestern part of the expanded landfill site, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:100 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- one (1) approximately 650 m long perimeter ditch along the northern part of the expanded landfill and one (1) approximately 500 m long perimeter ditch along the western part of the expanded landfill, each having a minimum of 1.0 m depth and 3H:1V & 4H:1V side slopes, discharging collected stormwater through a 3000 mm x 1200 mm concrete box culvert to a forebay described below;

- one (1) forebay with approximate dimensions of 33 m long x 25 m wide bottom and 4H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 255.0 m long, 36.0 m wide bottom and 3H:1V and 4H:1V side slopes, providing a total storage capacity of 24,996 m^3 consisting of a permanent pool storage volume of 4,843 m^3 with an average depth of 0.50 m, and an extended storage volume of 20,053 m^3 with an extended storage depth of 1.67 m, equipped with an outlet structure described below;

- an outlet structure consisting of three (3)1200 mm diameter concrete manholes discharging through two (2) 600 mm diameter and one (1) 450 mm diameter outlet pipes, each pipe equipped with 1200 mm x 1200 mm box concrete valve chamber and a sluice gate valve, to a roadside ditch along County Road 79; and,

- one (1) 9 m wide emergency overflow structure with a weir elevation of 238.00 m ASL discharging to a roadside ditch along County Road 79.

Stormwater Management Pond - SWM Pond #4
a stormwater management facility (**SWM Pond #4**) to service a total drainage area of 14.4 ha consisting of the north eastern part of the expanded landfill site and norther part of the existing landfill site, designed to provide quantity and quality control by attenuating peak stormwater flows from storm events up to 1:100 year return frequency including regional storm (Hazel) at or below pre-development levels, consisting of the following:

- four (4) perimeter ditches collecting runoff from the northern side of the expanded landfill and from the northwestern portion of the existing landfill, having a minimum of 1.0 m depth and 3H:1V & 4H:1V side slopes, discharging collected stormwater through two (2) inlet structures to a forebay described below;

- one (1) forebay with approximate dimensions of 16 m long x 16 m wide bottom and 4H:1V side slopes, discharging to an extended detention wet pond described below;

- one (1) extended detention wet pond with approximate dimensions of 165.0 m long bottom, 20.0 m wide bottom and 3H:1V and 4H:1V side slopes, providing a total storage capacity of 8,328 m^3 consisting of a permanent pool storage volume of 1,812 m^3 with an average depth of 0.50 m, and an extended storage volume of 6,516 m^3 with an extended storage depth of 1.32 m, equipped with an outlet structure described below;

- an outlet structure consisting of one (1)1800 mm diameter concrete manhole discharging through one (1)1050 mm diameter outlet pipe equipped with 2000 mm X 2000 mm concrete valve chamber and a sluice gate valve to a perimeter ditch along Zion Line to a roadside ditch along Zion Line;

- one (1) 8 m wide emergency overflow structure with a weir elevation of 242.00 m ASL discharging to a road side ditch along Zion Line;

Equalization Tank 1

- one (1) 2,300 m^3 capacity steel and glass lined equalization tank enclosed with a clay berm containment area, receiving raw leachate from the landfill leachate collection system, equipped with three (3) variable frequency drive (VFD) recirculation pumps (two duty and one standby) each rated at 9.6 L/sec, all pumping leachate to the leachate treatment system, as described below;

all discharging final permeate to a treated effluent storage pond described below and final concentrate to a concentrate storage tank described below;

Treated Effluent On-Site Disposal <u>(Poplar Plantation)</u>

- one (1) 28.32 ha poplar tree irrigation land established to handle an average of 1,187 m^3/day of treated leachate effluent during suitable irrigation days between the period extending from May 1st to October 15th, consisting of six (6) 3.62 ha treated effluent drip-irrigation zones using approximately 250 m long drip-irrigation tubing installed in each zone;
- a stormwater management system to control the quality of stormwater runoff from the poplar tree irrigation land to Kersey Drain (Brown Creek), consisting of one (1) west furrow approximately 710 m long x 200 mm deep and one (1) east furrow approximately 510 m long x 200 mm deep, running parallel to each other with a grassed area in between, each equipped with a 200 mm high berm for distributing stormwater runoff across the entire length of the furrow, discharging by sheet flow to Kersey Drain; and

Raw/Diluted Leachate Effluent Disposal <u>(Poplar System)</u>

- one (1) existing 9.3 ha poplar tree irrigation system identified as the Poplar System, of approximately 150 m length for each poplar row. Leachate is applied through pressure drip-irrigation tubing at a rate not to exceed 476 mm/m², or 44,000 L/day, during the growing season. The system is subject to conditions as specified in the EPA Section 27 approval for the site. Revised to a 9.3 ha area with a rate of 476 mm/m^2 or 44,000 m^3/year;

- a system of maintenance holes, collector system and leachate sump across the existing site to transfer leachate to the leachate holding tanks via two methods: 1) down-hole leachate pumps transfer leachate through piping units directly to the leachate holding tanks and the Equalization Tank 1 and 2, the use of tanker truck to transfer the leachate into the leachate holding tanks or maintenance holes of the leachate conveyance system.

all other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage Works;

all in accordance with the Schedule A.

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

1. "Approval" means this entire document and any schedules attached to it, and the application;

2. "BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demands;

3. "CBOD5" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

4. "District Manager" means the District Manager of the Sarnia District Office of the Ministry;

5. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

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

7. "Existing Works" means those portions of the Works included in the Approval that have been constructed previously;

8. "Maximum Daily Flow" means the largest volume of flow to be received during a one-day period for which the sewage treatment process unit or equipment is designed to handle;

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

10. "Owner" means Waste Management of Canada Corporation and its successors and assignees;

11. "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

12. "Poplar System" is the irrigation area of 9.3 hectares located on top of the cap of the Existing Site (old landfill) that is used for the phytoremediation of leachate that is generated at the Site.

13. "Poplar Plantation" is the irrigation area located on native soil to the south of the Site that is used for the phytoremediation of irrigation liquid that satisfies the Effluent Trigger Limits.

14. "Proposed Works A" means the sewage works described in the Owner's application, this Approval, to the extent approved by this Approval;

15. "Proposed Works B" means unconstructed sewage works that were previously Approved and will be constructed in future"

16. "Township" means the Township of Warwick;

17. "Works" means the sewage works described in the Owner's application, and this Approval, and includes both Proposed Works and Existing Works;

18. "WIFN" refers to Walpole Island First Nation; and

19. "WPLC" refers to the Warwick Public Liaison Committee.

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

TERMS AND CONDITIONS

1. GENERAL CONDITION

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

2. The Owner shall design, construct, operate and maintain the Works in accordance with the conditions of this Approval.

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

4. The issuance of, and compliance with the conditions of, this Approval does not:

    a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority necessary to construct or operate the Works; or

    b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. CHANGE OF OWNER

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

    a. change of address of Owner;

    b. change of Owner, including address of new owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B.17shall be included in the notification;

    d. change of name of the corporation and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C.39 shall be included in the notification.

2. The Owner shall notify the District Manager, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

    a. change of address of the Operating Agency;

    b. change of the Operating Agency, including address of the new Operating Agency.

3. In the event of any change in ownership of the Works, the Owner shall notify the succeeding owner in writing, of the existence of this Approval, and forward a copy of the notice to the District Manager.

4. The Owner shall ensure that all communications made pursuant to this condition refer to the number of this Approval.

3. CONSTRUCTION OF PROPOSED WORKS

1. All Proposed Works A included -in this Approval shall be constructed and installed and must commence operation within **five (5) years** of issuance of this Approval, after which time the Approval ceases to apply in respect of any portions of the Works not in operation. In the event that the construction, installation and/or operation of any portion of the Proposed Works is anticipated to be delayed beyond the time period stipulated, the Owner shall submit to the Director an application to amend the Approval to extend this time period, at least six (6) months prior to the end of the period. The amendment application shall include the reason(s) for the delay and whether there is any design change(s).

2. Upon the construction of the Works, the Owner shall prepare a statement, certified by a Licensed Engineering Practitioner, that the Works are constructed in accordance with this Approval, and upon request, shall make the written statement available for inspection by Ministry personnel.

3. Within **six (6)** months of the construction of the Proposed Works, a set of as-built drawings showing the Works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works for the operational life of the Works.

4. A set of record drawings of the Works shall be kept up to date through revisions undertaken from time to time and a copy shall be readily accessible for reference at the Works.

4. EFFLUENT LIMITS FOR LEACHATE TREATMENT FACILITY

1. The Owner shall design, construct and operate the Works such that the concentrations of the materials listed as effluent parameters in the Effluent Limits Table in **Schedule B** are not exceeded in the effluent from the **Treated Effluent Storage Pond** (Cell 2).

2. For the purposes of determining compliance with and enforcing subsection (1):

    1. The Average Monthly Concentration of a parameter named in Column 1 of the Effluent Limits Table included in the **Schedule B** shall not exceed the corresponding maximum concentration set out in Column 2 of the Effluent Limits Table in the **Schedule B;**

    2. non-compliance with respect to pH is deemed to have occurred when any single measurement is outside of the indicated range.

5. OPERATIONS AND MAINTENANCE

1. The Owner shall ensure that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate staffing and training, including training in all procedures and other requirements of this Approval and the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

2. The Owner shall prepare an operations manual within **six (6) months** of the introduction of sewage to the Works, that includes, but not necessarily limited to, the following information:

    a. operating procedures for routine operation of all the Works;

    b. inspection programs, including frequency of inspection, for all the Works and the methods or tests employed to detect when maintenance is necessary;

    c. repair and maintenance programs, including the frequency of repair and maintenance for all the Works; copies of maintenance contracts for any routine inspections and pump-outs should be included for all the tanks and treatment units;

    d. procedures for the inspection and calibration of monitoring equipment;

    e. a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the Spills Action Centre (SAC) and District Manager; and,

    f. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

3. The Owner shall maintain an up to date operations manual and make the manual readily accessible for reference at the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

4. The Owner shall ensure that the oil/grease interceptor is inspected and maintained on regular basis as required, and grease is disposed off site by a licensed hauler.

5. The Owner shall employ for the overall operation of the Works a person who possesses the level of training and experience sufficient to allow safe and environmentally sound operation of the Works.

6. The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operations and maintenance activities required by this Approval.

7. RNG AND LFG CONDENSATE COLLECTION WORKS

    1. The Owner shall ensure that Maximum Daily Flow from the RNG and LFG Condensate Collection Works does not exceed 432 cubic metres per day.

    2. During the first year of the operation of RNG and LFG Condensate Collection Works, contents of the Equalization Tank 2 shall be hauled offsite.

    3. The Owner shall compare the **Schedule D** sampling results to Effluent Triggers Table 1 of the **Schedule C**, and accordingly direct RNG/LFG Condensate to the Existing Poplar Plantation or to the Existing Poplar System or haul offsite, upon the confirmation that the effluent water quality meets the requirements in respect to all of the parameters included in the Effluent Trigger Parameters Table 1. In case the effluent water quality does not meet any single parameter concentration as included the Effluent Trigger Parameters Table 1, then the RNG/LFG Condensate may either be directed to the Existing Poplar System, or hauled off-site.

8. STORMWATER MANAGEMENT FACILITY

    1. The Owner shall apply the "Stormwater Contingency and Remedial Action Plan as included in Appendix N.27 of the Operations and Maintenance manual, Warwick Landfill Expansion, WM, May 2008.

    2. The Owner shall operate the Works (**SWM Ponds**) with the outlet sluice gate valve in a **normally open position** during normal operation period.

    3. The Owner shall compare monitoring results obtained under Condition 6.3 with their respective Trigger Limits listed in Table 2 in the **Schedule C** to identify any potential leachate impact to stormwater.

    4. In the event that a monitoring result for any parameter that is listed in Table 2 of **Schedule C** for any of **SWM Ponds** exceeds its Trigger Limits, the Owner shall conduct sampling of the contents of the affected **SWM Pond** within one (1) week to confirm the exceedance of the Trigger Limits for that parameter and identify potential source of contamination. Upon confirmation of exceedance of any Trigger Limits of any parameter that is listed in Table 2 of **Schedule C** and exceedance for the SWM Ponds noted in the EPA Section 27 approval for the site, the Owner shall close the outlet sluice gate valve of the affected Works **(SWM Pond)** and implement an approved "Stormwater Contingency and Remedial Action Plan".

5. The Owner shall dispose of the contents of an affected Work **(SWM Pond)** which failed to meet the quality requirements outlined in Condition 5.8.4 above, in accordance with an approved "Stormwater Contingency and Remedial Action Plan".

6. In the event that a monitoring result for any parameter that is listed in Table 2 of the **Schedule C** for the **Poplar Plantation** exceeds its Trigger Limits, the Owner shall conduct sampling of the stormwater runoff from the affected part of the **Poplar Plantation** as soon as possible to confirm the exceedence of the Trigger Limits for that parameter and identify potential source of contamination. Upon confirmation of the exceedence of any Trigger Limits for any parameter that is listed in Table 2 of the **Schedule C**, the Owner shall implement an approved "Stormwater Contingency and Remedial Action Plan".

7. The Owner shall inspect the Works **(SWM Ponds)** at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

8. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site or Owner's operational head quarter for inspection by the Ministry. The logbook shall include the following:

    a. the name of the Works (SWM Pond #1, SWM Pond #2, SWM Pond #3, and SWM Pond #4);

    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed; and

    c. the occurrence date of each spill within the catchment area of a given SWM Pond, including follow-up action/ remedial measures undertaken.

9. POPLAR PLANTATION LAND IRRIGATION OPERATION

    a. The Owner shall apply the "Groundwater Contingency and Remedial Action Plan" for any potential groundwater impact caused by Effluent Storage Ponds and the Poplar Plantation Irrigation Area, as included in Appendix N.26 of the Operation and Maintenance Manual, Warwick Landfill Expansion, WM, May 2008.

    b. The Owner shall compare monitoring results obtained under Condition 6.3 with their respective Trigger Limits listed in Table 3 of **Schedule C** to identify any potential leachate impact to groundwater.

c. In the event that a monitoring result for any parameter that is listed in Table 3 of **Schedule C** exceeds its Trigger Limits, the Owner shall re-sample within one (1) month to confirm the exceedence of the Trigger Limits for that parameter. Upon confirmation of the exceedence of any Trigger Limits for any parameter that is listed in Table 3 of **Schedule C**, the Owner shall conduct a second round re-sampling within six (6) months to re-confirm the exceedence of the Trigger Limits for the parameter of concern.

d. In the event that the presence of the parameter(s) of concern is (are) not confirmed after the second round of sampling conducted under Condition 5.9.c above, then, normal groundwater monitoring shall be resumed.

e. In the event that the presence of the parameter(s) of concern is confirmed after the second round of sampling conduced under Condition 5.9.c above, then, it shall constitute as a confirmation of leachate impact to groundwater and the Owner shall immediately implement the "Groundwater Contingency and Remedial Action Plan" included under Condition 5.9.a above.

f. The Owner shall notify the District Manager orally, as soon as possible, and in writing within seven days of the confirmation of leachate impact to groundwater including an assessment of the relative severity and extent of leachate impact and proposed remedial actions.

g. The Owner shall record and report a summary of all trigger exceedence incidents and all remedial action measures taken under Condition 5.9.e above in the Annual Report prepared under Condition 7.

h. The Owner shall dispose off Landfill Leachate and RNG/LGG condensate that meets the Effluent Limits included in the **Schedule B** for treatment and disposal by drip-irrigation on the approved Poplar Tree Land Area during the period between May 1st and October 15th of each calendar year.

i. The Owner shall not allow under any circumstance (including as emergency contingency plan) any direct discharge of leachate, RNG/LFG condensate, or treated leachate effluent from the Works to any receiving surface water including Bear Creek;

j. The Owner shall record the total volume of RNG/LFG Condensate and treated leachate effluent drip-irrigated on the poplar tree land irrigation area on a daily basis.

k. The Owner shall ensure that treated leachate effluent is disposed of via drip-irrigation in the designated six (6) poplar tree drip-irrigation zones initially, and ultimately on eight (8) poplar tree drip-irrigation zones on a planned rotation basis.

l. The Owner shall visually inspect drip-irrigation operations at least twice each day during operation period to ensure that no surface ponding or surface run-off is taking place.

m. The Owner shall retain records of inspections and drip-irrigation operation data collected under subsections 5.9.j, 5.9.k, and 5.9.l above, and make them available for inspection Ministry staff upon request.

n. No drip irrigation is to take place:
   a. on frozen or snow covered ground conditions;
   b. with the occurrence of surface ponding in any area subjected to drip irrigation;
   c. within 100 m of any surface watercourse or drain; and
   d. at an average daily application rate greater than 4.8 mm;

o. The Owner shall notify and provide the Township, WPLC and WIFN with a copy of the proposed "Groundwater Contingency and Remedial Action Plan" required under Condition 5.9.a above.

6. MONITORING AND RECORDING

The Owner shall carry out a monitoring program:

1. all samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

2. For the purpose of this condition, the following definitions apply:

   1. Daily means once each day;

   2. Weekly means once each week;

   3. Monthly means once every month;

   4. Quarterly means once every three months, and,

   5. Semi-annually means once every six months.

3. Samples shall be collected and analyzed at the sampling point(s), at the sampling frequencies and using the sample type specified for each parameter listed in the effluent monitoring table included in **Schedule D**.

4. The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

a. the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)", as amended from time to time by more recently published editions;

b. the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

c. the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

d. in respect of any parameters not mentioned in 6.5.a, b and c, the written approval of the District Manager, which approval shall be obtained prior to sampling.

5. The measurement frequencies specified in **Schedule D** in respect to any parameter are minimum requirements which may, after 24 months of monitoring in accordance with this Condition, be modified by the Director in writing from time to time.

6. The Owner shall provide to the Township, WPLC and WIFN a copy of all requests to be submitted to the District Manager for any changes to the monitoring program specified in **Schedule D** at the same time or prior to the time such request is made to the District Manager.

7. A continuous flow measuring device(s) shall be installed and maintained to measure the flowrate of the effluent from each of the sewage works, with an accuracy to within plus or minus fifteen (15) per cent of the actual flowrate for the entire design range of the flow measuring device and the Owner shall measure, record and calculate the flowrate for each effluent stream on each day of sampling.

8. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

9. POPLAR PLANTATION LEACHATE TREATMENT WORKS

    1. The Owner shall visually inspect the drip-irrigation pipeline systems at least once per week during operation period to look for leaking and/or failed (broken) lines that would otherwise produce run-off. The inspection should be supported by a log book documenting routine inspection and notes on repair as required.

10. GROUNDWATER MONITORING - POPLAR PLANTATION WORKS (LAND IRRIGATION AREA)

    1. The Owner shall collect grab samples during May and November from the sampling location outlined in the **Schedule E** and analyze for the parameters listed in the **Schedule E.**

2. The methods and protocols for sampling, analysis and recording shall conform to that outlined in Condition 6(5).

3. The measurement frequencies specified in Condition 6.11.1 above and the Schedule E, in respect to any parameter are minimum frequencies which may, after 24 months of monitoring in accordance with this Condition, be modified by the Director, in writing from time to time.

4. The Owner shall provide to the Township, WPLC, and WIFN a copy of all requests to be submitted to the District Manager for any changes to the monitoring program specified in Condition 6.11.3 above at the same time or prior to the time such request is made to the District Manager.

7. REPORTING

1. **One week** prior to the start up of the operation of the Proposed Works, the Owner shall notify the District Manager (in writing) of the pending start up date.

2. The Owner shall report to the District Manager orally **as soon as possible** any non-compliance with the compliance limits specified in Condition 4, and in writing within **seven (7) days** of non-compliance.

3. In addition to the obligations under Part X of the EPA and O. Reg. 675/98 (Classification and Exemption of Spills and Reporting of Discharges) made under the EPA, the Owner shall, within **fifteen (15) days** of the occurrence of any reportable spill as provided in Part X of the EPA and O. Reg. 675/98, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill, clean-up and recovery measures taken, preventative measures to be taken and a schedule of implementation.

4. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

5. The Owner shall prepare and submit a performance report to the District Manager on an annual basis within before March 31 of each calendar year. The reports shall contain, but shall not be limited to, the following information:

    a. a summary and interpretation of all monitoring data and a comparison to the effluent limits (Condition 4) including an overview of the success and adequacy of the Works, and a contingency plan in the event of non-compliance with the effluent limits.

    b. a summary and interpretation of all monitoring data for constructed and operational Works, including RNG and LFG Condensate Collection works, stormwater management works monitoring data, groundwater monitoring data and leachate treatment facility;

    c. a review and assessment of the performance of all sewage Works

d. a description of any operating problems encountered and corrective actions taken at all Works located at the property;

e. a record of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of all Works;;

f. a summary of any effluent quality assurance or control measures undertaken in the reporting period;

g. a summary and interpretation of all daily flow data and results achieved in not exceeding the Maximum Daily Flow discharged from each of the sewage Works excluding the Poplar Plantation, the Poplar System, and Stormwater Management Works;

h. a summary of any complaints received during the reporting period and any steps taken to address the complaints;

i. a summary of all spill or abnormal discharge events; and

j. any other information the District Manager requires from time to time;

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

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to ensure that the Owner continue to comply with the effluent criteria established for the Works in the previous approval until such time as the Proposed Works are constructed and commissioned.

5. Condition 5 is included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner and made available to the Ministry. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the Works.

6. Condition 6 is included to require the Owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved Works is consistent with the (design objectives and) effluent limits specified in the Approval and that the approved Works does not cause any impairment to the receiving watercourse.

7. Condition 7 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

Schedule A

1. Application for Environmental Compliance Approval dated April 28, 2023 and received on May 19, 2023.

Schedule B

Effluent Limits for Leachate Treatment Facility

Sampling Location: Discharge Point from Treated Effluent Storage Pond

Effluent Parameter	**Average Monthly Concentration** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
Total Ammonia Nitrogen	68.7
Total Phosphorus	0.72
Phenols	0.2
Chlorides	247
Copper	0.014
Iron	27.0
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

Schedule C

TABLE 1

Effluent Trigger Concentration for RNG AND LFG Condensate Collection Works

Effluent Trigger Concentration to direct the sewage flow to the Existing Poplar System or Existing Plantation Irrigation disposal or hauled offsite

Sampling Location: Equalization Tank 2

Effluent Parameter	**Single Sample Concentration** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
Total Ammonia Nitrogen	68.7
Total Phosphorus	0.72
Phenols	0.2
Chlorides	247
Copper	0.014
Iron	27.0
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

TABLE 2

Trigger Limits for Stormwater Management Works

Sampling Location: SS10 and SS16

Trigger Parameter	Trigger Limits [SS10 & SS16 - 90th percentile] (mg/L)
Ammonia (unionized)	0.020
Boron	0.20
Boron (SP1 only)	0.39
Chloride	210
Chromium (Total)	0.024
Nickel	0.027
Phenols	0.001
Zinc	0.06

*Note: Annually, a Trigger Limit for a parameter listed above will be replaced by the corresponding 90th percentile of background surface water concentration where background surface water concentrations collected upstream of the landfill (Sampling Locations SS10 and SS16).

TABLE 3

Trigger Limits for Poplar Plantation Land Irrigation

Sampling Location: OW40, OW60 and OW79, OW16, OW61 and OW62

Trigger Parameter	Trigger Limits (mg/L)		
	Active Aquitard	Interstadial Silt and Sand	Interface Aquifer
Chloride	106	116	134
Nitrate	2.3	2.3	2.3
Boron	1.1	2.1	2.6
Cadmium	0.001	0.001	0.001
Lead	0.002	0.002	0.002
Benzene	0.001	0.001	0.001
1,4-Dichlorobenzene	0.001	0.001	0.001
Dichloromethane	0.01	0.01	0.01
Vinyl Chloride	0.0004	0.0004	0.0004

Schedule D

Monitoring Program

Table 1

RNG AND LFG CONDENSATE COLLECTION WORKS

Sampling Location: Equalization Tank 2

Parameters	Sample Type	Frequency[8]
BOD5	Grab	Quarterly
Dissolved Organic Carbon (DOC)	Grab	Quarterly
Total Phosphorus	Grab	Quarterly
Total Kjeldahl Nitrogen	Grab	Quarterly
BTEX	Grab	Quarterly
pH	Grab	Quarterly
PLIL-SW	Grab	Semi-Annually
SLIL-SW	Grab	Semi-Annually
LS	Grab	Semi-Annually
General Chemistry	Grab	Semi-Annually

Notes: 1.PLIL-SW indicates: chloride, ammonia (total and unionized), phenols, boron, nickel, chromium (total), zinc.

2.SLIL-SW indicates: alkalinity, sulfate, calcium, magnesium, potassium, sodium, total phosphorus, iron, nitrate, TKN, TDS, pH, conductivity. Field parameters of temperature, pH, conductivity, turbidity, DO.

3.LS indicates: arsenic, barium, cadmium, copper, lead, manganese, mercury, nitrite, TSS, volatiles, semi-volatiles, BOD5, COD.

4.Volatiles should include the following at a minimum: benzene, 1,4-dichlorobenzene, dichloromethane, toluene, ethylbenzene, xylenes, and vinyl chloride.

5.Semi-volatiles should include the following at a minimum: 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, hexachlorobenzene, diethylphthalate, dimethyiphthalate, di-n-butyl phthalate, phenol, benzo(a)pyrene, 2,4,6-trichlorophenol, 2,4-dichlorophenol, pentachlorophenol.

6.General Chemistry includes Alkalinity, Calcium, Chloride, Conductivity, COD, Nitrate, Nitrite, Magnesium, pH, Potassium, Sodium, Sulfate, Total Dissolved Solids, TKN, Temperature, Turbidity, Total Phosphorus, TSS, Phenols, Dissolved Oxygen.

7.QA/QC to include one (1) blind duplicate for each 15 samples or once per event, whichever is greater.

8. Notwithstanding the monitoring frequencies included in this table, the monitoring frequency in the first year of the operation of these RNG/LFG condensate sewage works in respect of all of the parameters shall be monthly.

Table 2

Stormwater Monitoring Program

Sampling Locations: SWM Pond Outlets - SP1, SP2, SP3, SP4. Irrigation Area - SS17A, SS17B, SS18A and SS18B

Parameter	Parameter	Parameter	Field -Parameter
Alkalinity	Magnesium	Toluene	Conductivity
Total Ammonia Nitrogen	Potassium	Ethylbenzene	Dissolved Oxygen
Un-ionized Ammonia	Sodium	Xylene	pH (Field)
Chloride	Arsenic	Vinyl Chloride	Temperature
Conductivity (Lab)	Barium	1,2,4-Trichlorobenzene	Turbidity
Nitrate Nitrogen	Boron	1,2-Dichlorobenzene	
Nitrite Nitrogen	Cadmium	1,3-Dichlorobenzene	
TKN	Chromium (Total)	1,4-Dichlorobenzene	
pH (Lab)	Copper	Hexachlorobenzene	
Total Phosphorus	Iron	Diethylphthalate	
Total Suspended Solids	Lead	Dimethylphthalate	
Total Dissolved Solids	Mercury	Di-n-butyl phthalate	
Sulfate	Nickel	Phenol	
CBOD5	Zinc	Benzo(a)pyrene	
Chemical Oxygen Demand	Benzene	2,4,6-Trichlorophenol	
Phenols	1,4-Dichlorobenzene	2,4-Dichlorophenol	
Calcium	Dichloromethane	Pentachlorophenol	

Note: Irrigation Area locations for the Poplar Plantation will be monitored when the Poplar Plantation is operational. The Owner shall collect at least one sample per calendar month of representative runoff from any precipitation event that exceeds 10 mm in a 24 hour period for the poplar plantation while irrigation is operational between May 1 through October 15 every year. In case where there is insufficient precipitation to produce a runoff event in a calendar month , the owner shall record that no runoff occurred and therefore no sample was collected.

Table 3

LANDFILL LEACHATE

Sampling Location: Equalization Tank 1

Parameters	Sample Type	Frequency
CBOD5	Grab	Quarterly
Dissolved Organic Carbon (DOC)	Grab	Quarterly
Total Phosphorus	Grab	Quarterly
Total Kjeldahl Nitrogen	Grab	Quarterly
BTEX	Grab	Quarterly
pH	Grab	Quarterly
VOCs [Note 1]	Grab	Semi-Annually
Semi-VOCs [Note 2]	Grab	Semi-Annually
Metals [Note 3]	Grab	Semi-Annually
General Chemistry [Note 4]	Grab	Semi-Annually

Table 4

Leachate Treatment Plant Effluent Monitoring

Sampling Location: Discharge to Treated Effluent Storage Pond

Parameters	Sample Type	Frequency
CBOD5	Grab	Weekly
Dissolved Organic Carbon (DOC)	Grab	Weekly
Total Ammonia Nitrogen	Grab	Weekly
Chloride	Grab	Weekly
BTEX	Grab	Weekly
pH	Grab	Weekly
VOCs [Note 1]	Grab	Monthly
Semi-VOCs [Note 2]	Grab	Monthly
Metals [Note 3]	Grab	Monthly
General Chemistry [Note 4]	Grab	Monthly
PCB	Grab	Semi-Annually
Organochlorides	Grab	Semi-Annually

Table 5

Treated Effluent Storage Pond Effluent Monitoring

Sampling Location: Discharge to Poplar Plant Irrigation Area

Treated Effluent Storage Pond Effluent Monitoring Sampling Location: **Discharge to Poplar Plant Irrigation Area**		
Parameters	**Sample Type**	**Frequency**
CBOD5	Grab	Weekly
Dissolved Organic Carbon (DOC)	Grab	Weekly
Total Ammonia Nitrogen	Grab	Weekly
Chloride	Grab	Weekly
BTEX	Grab	Weekly
pH	Grab	Weekly
VOCs Note 1	Grab	Monthly
Semi-VOCs Note 2	Grab	Monthly
Metals Note 3	Grab	Monthly
General Chemistry Note 4	Grab	Monthly

Note 1: VOCs: Benzene, 1,4-Dichlorobenzene, Dichloromethane, Toluene, Ethylbenzene, Xylenes, and Vinyl Chloride.

Note 2: Semi-VOCs: 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Hexachlorobenzene, Diethylphthalate, Dimethylphthalate, Di-n-butyl phthalate, Phenol, Benzo(a)pyrene, 2,4,6- Trichlorophenol, 2,4-Dichlorophenol, Pentachlorophenol.

Note 3: Metals: Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc.

Note 4: G. Chemistry: Alkalinity, Calcium, Chloride, Conductivity, COD, Nitrate, Nitrite, Magnesium, pH, Potassium, Sodium, Sulfate, Total Dissolved Solids, TKN, Temperature, Turbidity, Total Phosphorus, TSS, Phenols, Dissolved Oxygen.

Schedule E

Groundwater Monitoring Program

Sampling Locations: OW40, OW60 and OW79, OW16, OW61 and OW62

Parameters	Parameters	Field Parameters
Alkalinity	Boron	pH
Conductivity	Cadmium	Conductivity
Chloride	Lead	Turbidity
pH	Iron	
Dissolved Organic Carbon	Barium	
Total Dissolved Solids	Benzene	
Total Ammonia	1,4-Dichlorobenzene	
Total Kjeldahl Nitrogen	Dichloromethane	
Sulfate	Ethylbenzene	
Nitrate	Vinyl Chloride	
Calcium	Toluene	
Potassium	Xylenes	
Sodium		
Magnesium		

Note:
Sampling Location OW40, OW60 and OW79, to be monitored Annually
Sampling Location: OW16, OW61, and OW62 to be monitored Semi-Annually (OW61, and OW62 to be monitored Semi-Annually while Poplar Plantation is operational)

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 2403-BE6LZ4 issued on August 21, 2019.

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon me, the Ontario Land Tribunal and in accordance with Section 47 of the *Environmental Bill of Rights,* 1993, the Minister of the Environment, Conservation and Parks, within 15 days after receipt of this notice, require a hearing by the Tribunal. The Minister of the Environment, Conservation and Parks will place notice of your appeal on the Environmental Registry. Section 142 of the *Environmental Protection Act* provides that the notice requiring the hearing ("the Notice") shall state:

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

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

The Notice should also include:

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

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

This Notice must be served upon:

Registrar*
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

and

The Minister of the Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, Ontario
M7A 2J3

and

The Director appointed for the purposes of Part II.1 of the *Environmental Protection Act*
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.olt.gov.on.ca**

This instrument is subject to Section 38 of the *Environmental Bill of Rights,* 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at https://ero.ontario.ca/, you can determine when the leave to appeal period ends.

The above noted activity is approved under s.20.3 of Part II.1 of the *Environmental Protection Act.*
DATED AT TORONTO this 29th day of April, 2024

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

KH/
c: District Manager, MECP Sarnia District.
Cristina Olarte, P.Eng., WSP Canada Inc.
Brent Lengille, P.Geo., RWDI Consulting Engineers.

APPENDIX A4:

Amended ECA [Air] No. 6318-CX4NFX, dated December 13, 2023

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 6318-CX4NFX
Issue Date: December 13, 2023

Waste Management of Canada Corporation
5768 Nauvoo Road
Warwick, Ontario
N0M 2S0

Site Location: Twin Creeks Environmental Centre
5768 Nauvoo Road Watford
Warwick Township, County of Lambton
N0M 2S0

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

- Two (2) enclosed flares (FLARE5, FLARE6), flaring either landfill gas or off-spec renewable natural gas (RNG), each having a maximum inlet capacity of:

  - 1.89 cubic metres per second of landfill gas, exhausting to the atmosphere at an approximate volumetric flowrate of 41.7 cubic metres per second, or

  - 0.94 cubic metres per second of off-spec RNG, exhausting to the atmosphere at an approximate volumetric flowrate of 37.2 cubic metres per second,

  exhausting to the atmosphere through individual stacks, each having an exit diameter of 3.7 metres, extending 15.2 metres above grade;

- One (1) pre-treatment thermal oxidizer (RNG_TO1), with a maximum thermal input of 2.44 million kilojoules per hour and a maximum inlet capacity of 0.33 cubic metres per second of off-spec RNG gas, exhausting to the atmosphere at an approximate volumetric flowrate of 2.5 cubic metres per second, through a stack, having an exit diameter of 1.2 metres, extending 15.2 metres above grade;

- One (1) main thermal oxidizer (RNG_TO2), with a maximum thermal input of 20.57 million kilojoules per hour and a maximum inlet capacity of 2.31 cubic metres per second of off-spec RNG gas, exhausting to the atmosphere at an approximate volumetric flowrate of 18 cubic metres per second, through a stack, having an exit diameter of 2.9 metres, extending 15.2 metres above grade;

- One (1) amine reboiler, having a maximum thermal input of 8,904,706 kilojoules per hour, exhausting to the atmosphere through a stack having an exit diameter of 0.4 metres, extending 4.9 metres above grade;

- Three (3) enclosed flares (FLARE1, FLARE2, FLARE3), each having a maximum inlet capacity of 2.08 cubic metres per second of landfill gas, exhausting into the air at a maximum volumetric flow rate of 61.3 cubic metres per second through individual stacks, each having an exit diameter of 3.7 metres, extending 15.2 metres above grade; used to:

    - incinerate the landfill gas from a landfill gas collection system;

    - control the off-gases from the enclosed building housing the leachate treatment facility; and

    - maintain a negative pressure on the leachate collection system on an as-needed basis;

- One (1) enclosed flare (FLARE4) having a maximum inlet capacity of 0.94 cubic metres per second of landfill gas, exhausting into the air at a maximum volumetric flow rate of 25.8 cubic metres per second through a stack having an exit diameter of 3.2 metres, extending 12.2 metres above grade; used to:

    - incinerate the landfill gas from a landfill gas collection system;

    - control the off-gases from the enclosed building housing the leachate treatment facility; and

    - maintain a negative pressure on the leachate collection system on an as-needed basis;

- One (1) diesel fuel fired generator (GEN2) rated at 50 kilowatts that will be used to provide regular power to the leachate pumping system; exhausting into the air at a maximum volumetric flow rate of 0.24 cubic metres per second; having an exit diameter of 0.10 metre, extending 3.6 metres above grade;

- One (1) diesel fuel fired emergency generator (GEN3) rated at 250 kilowatts that will be used to provide back-up power for the office buildings; exhausting into the air at a maximum volumetric flow rate of 0.97 cubic metres per second; having an exit diameter of 0.15 metre, extending 3.6 metres above grade;

- One (1) leachate treatment facility with a maximum capacity of 300 cubic metres per day of raw leachate consisting of:

- Two (2) passive exhaust louvres (L3, L4) serving two (2) sequencing batch reactors (SBR) and two (2) aeration tanks; exhausting into the air individually at a maximum volumetric flow rate of 1.96 cubic metres per second; each having an exit dimension of 1.22 x 1.22 metres, extending 2.13 metres above grade;

- One (1) process exhaust fan (EF-2) serving the reverse osmosis system area; exhausting into the air at a maximum volumetric flow rate of 1.71 cubic metres per second; having an exit dimension of 0.45 x 0.45 metres, extending 4.0 metres above grade;

- One (1) exhaust fan (SD-1) serving slurry dryer; exhausting into the air at a maximum volumetric flow rate of 0.24 cubic metres per second; having an exit diameter of 0.3 metre, extending 5.0 metres above grade;

- Two (2) RNG plant condensate tanks equipped with carbon drum filters;

- One (1) leachate treatment facility laboratory;

- Maintenance welding;

all in accordance with the Environmental Compliance Approval Application submitted by Waste Management of Canada Corporation, dated May 8, 2023 and signed by Wayne Jenken, Landfill Engineering Manager; and the supporting information, including the Emission Summary and Dispersion Modelling Report, submitted by RWDI AIR Inc., dated May 6, 2023 and signed by Brad Bergeron; additional information provided by Sarah Pellatt in a memo dated October 17, 2023; and the Primary Noise Screening Method Form prepared by RWDI AIR Inc., dated January 27, 2023 and signed by Daniel Kremer.

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

1. "Approval" means this Environmental Compliance Approval, including the application and supporting documentation listed above;

2. "Best Management Practices Plan" means the document titled "Twin Creeks Landfill Site: Best Management Practices Plan (Dust) - Version 5", dated April 3, 2017 and prepared by RWDI AIR Inc.;

3. "Carbon Drum Filters" means the carbon drum filters controlling emissions from the two RNG plant condensate tanks, described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval;

4. "Company" means Waste Management of Canada Corporation that is responsible for the construction or operation of the Facility and includes any successors and assigns in accordance with section 19 of the EPA;

5. "Director" means a person appointed for the purpose of section 20.3 of the EPA by the Minister pursuant to section 5 of the EPA;

6. "District Manager" means the District Manager of the appropriate local district office of the Ministry, where the Facility is geographically located;

7. "Enclosed Flares" means FLARE1, FLARE2, FLARE3 and FLARE4, described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval;

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

9. "Equipment" means the equipment and processes described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval;

10. "ESDM Report" means the Emission Summary and Dispersion Modelling Report which was prepared in accordance with section 26 of O. Reg. 419/05 and the Procedure Document by Brad Bergeron, RWDI AIR Inc. and dated May 6, 2023, submitted in support of the application, and includes any changes to the report made up to the date of issuance of this Approval;

11. "Exhausted" means the capacity of the activated carbon to adsorb emissions is reached and the Carbon Drum Filters are no longer able to effectively reduce emissions;

12. "Facility" means the entire operation located on the property where the Equipment is located;

13. "Manager" means the Manager, Technology Standards Section, Technical Assessment and Standards Development Branch, or any other person who represents and carries out the duties of the Manager, Technology Standards Section, Technical Assessment and Standards Development Branch, as those duties relate to the conditions of this Approval;

14. "Manual" means a document or a set of documents that provide written instructions to staff of the Company;

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

16. "O. Reg. 419/05" means Ontario Regulation 419/05: Air Pollution – Local Air Quality, made under the EPA;

17. "Odour Best Management Practices Plan" means the document titled "Twin Creeks Landfill: Best Management Practices Plan (Odour) - Version 9", dated November 17, 2023 and prepared by RWDI AIR Inc.;

18. "Organic Matter" means organic matter having carbon content expressed as equivalent methane;

19. "Point of Impingement" has the same meaning as in section 2 of O. Reg. 419/05;

20. "Pre-Test Plan" means a plan for the Source Testing including the information required in Section 5 of the Source Testing Code;

21. "Procedure Document" means Ministry guidance document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018, as amended;

22. "Publication NPC-300" means the Ministry Publication NPC-300, “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300”, August 2013, as amended;

23. "RNG Plant Enclosed Flares" means FLARE5 and FLARE6, described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval;

24. "Sensitive Receptor" means any location where routine or normal activities occurring at reasonably expected times would experience adverse effect(s) from odour discharges from the Facility, including one or a combination of:

    a. private residences or public facilities where people sleep (e.g.: single and multi-unit dwellings, nursing homes, hospitals, trailer parks, camping grounds, etc.),

    b. institutional facilities (e.g.: schools, churches, community centres, day care centres, recreational centres, etc.),

    c. outdoor public recreational areas (e.g.: trailer parks, play grounds, picnic areas, etc.), and

    d. other outdoor public areas where there are continuous human activities (e.g.: commercial plazas and office buildings);

25. "Source Testing" means site-specific sampling and testing to measure emissions resulting from operating the Targeted Sources under operating conditions that will derive an emission rate that, for the relevant averaging period of the contaminant, is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of, or a rate approved by the Manager within the approved operating range of Targeted Sources which satisfies paragraph 1 of subsection 11(1) of O. Reg. 419/05;

26. "Source Testing Code" means the Ontario Source Testing Code, dated June 2010, prepared by the Ministry, as amended;

27. "Targeted Sources" means the sources listed in Schedule B;

28. "Test Contaminants" means the contaminants listed in Schedule B; and

29. "Thermal Oxidizers" means RNG_TO1 and RNG_TO2, described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval.

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

TERMS AND CONDITIONS

1. OPERATION AND MAINTENANCE

1. The Company shall ensure that the Equipment is properly operated and maintained at all times. The Company shall:

   a. prepare, not later than three (3) months after the date of this Approval, and update, as necessary, a Manual outlining the operating procedures and a maintenance program for the Equipment, including:

      i. routine operating and maintenance procedures in accordance with good engineering practices and as recommended by the Equipment suppliers;

      ii. emergency procedures, including spill clean-up procedures;

      iii. procedures for any record keeping activities relating to operation and maintenance of the Equipment; and

      iv. all appropriate measures to minimize noise, dust and odorous emissions from all potential sources;

   b. implement the recommendations of the Manual.

2. The Company shall ensure that the activated carbon in the Carbon Drum Filters is replaced before it is Exhausted.

2. THERMAL OXIDIZERS

1. The Company shall operate each of the Thermal Oxidizers in such a manner that:

   a. The combustion chamber shall be preheated to a minimum of 815 degrees Celsius prior to introducing the emissions for destruction.

   b. The temperature in the combustion chamber, is maintained at a minimum of 815 degrees Celsius at all times, when the Thermal Oxidizer is in operation.

c. The residence time of the combustion gases in the combustion chamber of RTO_TO1 shall not be less than 5 seconds at a temperature of 815 degrees Celsius minimum.

d. The residence time of the combustion gases in the combustion chamber of RTO_TO2 shall not be less than 4 seconds at a temperature of 815 degrees Celsius minimum.

e. The concentration of Organic Matter in the flue gas of the Thermal Oxidizer,being an average of ten measurements taken at approximately one minute intervals, shall not be greater than 100 parts per million by volume, measured on an undiluted basis.

2. The Company shall install, conduct and maintain a program to continuously monitor temperature in the combustion chamber of each of the Thermal Oxidizers. The continuous monitoring system shall be equipped with continuous recording devices and shall comply with the requirements outlined in Schedule A.

3. FLARES

1. The Company shall operate each of the Enclosed Flares in such a manner that:

   a. The temperature in the combustion chamber, is maintained at a minimum of 875 degrees Celsius at all times, when the Enclosed Flare is in operation; and

   b. The residence time of the combustion gases in the combustion chamber of the Enclosed Flare shall not be less than 0.7 seconds at a temperature of 875 degrees Celsius.

2. The Company shall continuously monitor the temperature in the combustion chamber of the Enclosed Flare. The temperature monitor and recorder shall shall comply with the requirements outlined in Schedule A.

3. The Company shall operate each of the RNG Plant Enclosed Flares in such a manner that:

   a. The temperature in the combustion chamber, is maintained at a minimum of 871 degrees Celsius at all times, when the RNG Plant Enclosed Flare is in operation; and

   b. The residence time of the combustion gases in the combustion chamber of the RNG Plant Enclosed Flare shall not be less than 0.7 seconds at a temperature of 871 degrees Celsius.

4. The Company shall continuously monitor the temperature in the combustion chamber of the RNG PLant Enclosed Flare. The temperature monitor and recorder shall shall comply with the requirements outlined in Schedule A.

4. SOURCE TESTING

1. The Company shall perform Source Testing in accordance with the procedures in Schedule C to

determine the rates of emissions of the Test Contaminants from the Targeted Sources.

5. FUGITIVE DUST CONTROL

1. The Company shall implement the Best Management Practices Plan for the control of fugitive dust emissions resulting from the operation of the Facility. The Company shall update the Best Management Practices Plan as necessary or at the direction of the District Manager.

6. ODOUR

1. The Company shall implement the Odour Best Management Practices Plan for the control of odour emissions resulting from the operation of the Facility. The Company shall update the Odour Best Management Practices Plan as necessary or at the direction of the District Manager.

7. RECORD RETENTION

1. The Company shall retain, for a minimum of two (2) years from the date of their creation, all records and information related to or resulting from the recording activities required by this Approval, and make these records available for review by staff of the Ministry upon request. The Company shall retain:

    a. all records on the maintenance, repair and inspection of the Equipment;

    b. all records produced by the temperature monitors required in Condition 2 and Condition 3;

    c. all records of any environmental complaints, including:

        i. a description, time and date of each incident to which the complaint relates;

        ii. wind direction at the time of the incident to which the complaint relates; and

        iii. a description of the measures taken to address the cause of the incident to which the complaint relates and to prevent a similar occurrence in the future.

8. NOTIFICATION OF COMPLAINTS

1. The Company shall notify the District Manager, in writing, of each environmental complaint within two (2) business days of the complaint. The notification shall include:

    a. this Approval number;

    b. a description of the nature of the complaint;

    c. the time and date of the incident to which the complaint relates; and

d. a description of the measures taken to address the cause of the incident to which the complaint relates and to prevent a similar occurrence in the future.

9. CONSULTATION

1. During the process of submission of an application to amend any Approval for the Site, the Company shall:

   a. discuss with Walpole Island First Nation (WIFN), Township of Warwick and Warwick Public Liaison Committee (WPLC) the proposed application prior to submission of the application to the Director;

   b. provide the same documents to WIFN, Township of Warwick and WPLC that are provided to the Director in respect of the amendment; and

   c. provide the Director with a statement indicating how WIFN, Township of Warwick and WPLC's comments were considered by the Company before it submitted the application to the Ministry.

10. NOISE

1. The Company shall, at all times, ensure that the noise emissions from the Facility comply with the limits set out in Ministry Publication NPC-300.

SCHEDULE A

Continuous Temperature Monitoring and Recording System Requirements

PARAMETER: Temperature

LOCATION:

The sample point for the continuous temperature monitoring and recording system shall be located at a location where the measurements are representative of the minimum temperature of the gases leaving the combustion chamber of the Thermal Oxidizer, Enclosed Flare or RNG Plant Enclosed Flare.

PERFORMANCE:

The continuous temperature monitoring and recording system shall meet the following minimum performance specifications for the following parameters:

Type: shielded "K" type thermocouple, or equivalent

Accuracy: ±1.5 percent of the minimum gas temperature

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitoring system without a significant loss of accuracy and with a time resolution of five (5) minutes or better.

RELIABILITY:

The monitoring system shall be operated and maintained so that accurate data is obtained during a minimum of 95 percent of the time for each calendar quarter.

SCHEDULE B

Targeted Sources and Test Contaminants for Source Testing:

Source ID	Description	Test Contaminants
L3	Exhaust serving sequencing a batch reactor (SBR) and an aeration tank	Odour, hydrogen sulfide, total Mercaptans and a complete scan for volatile organic compounds
L4	Exhaust serving sequencing a batch reactor (SBR) and an aeration tank	Odour, hydrogen sulfide, total Mercaptans and a complete scan for volatile organic compounds
EF-2	Exhaust serving reverse osmosis system area	Odour, hydrogen sulfide, total Mercaptans and a complete scan for volatile organic compounds
SD-1	Exhaust serving slurry dryer	Odour, hydrogen sulfide, total Mercaptans and a complete scan for volatile organic compounds

SCHEDULE C

Source Testing Procedures

1. The Company shall submit, not later than three (3) months after commencement of operation of the Targeted Sources, to the Manager a Pre-Test Plan for the Source Testing required under this Approval.

2. The Company shall finalize the Pre-Test Plan in consultation with the Manager.

3. The Company shall not commence the Source Testing required under this Approval until the Manager has accepted the Pre-Test Plan.

4. The Company shall complete the Source Testing, no later than three (3) months after the Manager has approved the Pre-Test Plan or a date agreed upon in consultation with the District Manager.

5. The Company shall notify the Manager, the District Manager and the Director in writing of the location, date and time of any impending Source Testing required by this Approval, at least fifteen (15) days prior to the Source Testing.

6. The Company shall submit a report (electronic format) on the Source Testing to the Manager, the District Manager and the Director not later than three (3) months after completing the Source Testing. The report shall be in the format described in the Source Testing Code, and shall also include, but not be limited to:

    a. an executive summary;

    b. an identification of the applicable North American Industry Classification System code (NAICS) for the Facility;

    c. records of weather conditions such as ambient temperature and relative humidity, wind speed and direction, and any environmental complaints if received, at the time of the Source Testing;

    d. records of operating conditions at the time of Source Testing, including but not limited to the quantity of raw leachate processed through the leachate treatment facility;

    e. results of Source Testing, including the emission rate, emission concentration of odour from the Targeted Sources;

    f. the results of dispersion calculations, taking into account all other odour sources not tested in the Source Testing, indicating the maximum 10-minute average concentration of odour at the Point of Impingement and at the most impacted Sensitive Receptor computed in accordance with Schedule D.

    g. a tabular comparison of emission rates based on Source Testing results to relevant estimates described in the ESDM Report

7. The Director may not accept the results of the Source Testing if:
    1. the Source Testing Code or the requirement of the Manager were not followed;
    2. the Company did not notify the Manager, the District Manager and Director of the Source Testing; or
    3. the Company failed to provide a complete report on the Source Testing.

8. If the Director does not accept the result of the Source Testing, the Director may require re-testing. If re-testing is required, the Pre-Test Plan strategies need to be revised and submitted to the Manager for approval. The actions taken to minimize the possibility of the Source Testing results not being accepted by the Director must be noted in the revision.

9. The Company shall update their ESDM Report in accordance with Section 26 of O. Reg. 419/05 and the Procedure Document with the results from the Source Testing if any of the calculated emission factors or calculated emission rates are higher than the predicted rates in the ESDM report, not later than three (3) months after the submission of the Source Testing report and make these records available for review by staff of the Ministry upon request.

SCHEDULE D

Procedure to Calculate and Record the 10-minute Average Concentration of Odour

1. Calculate and record one-hour average concentration of odour at the Point of Impingement and at the most impacted Sensitive Receptor, employing the AERMOD atmospheric dispersion model or any other model acceptable to the Director, that employs at least five (5) years of hourly local meteorological data and that can provide results reported as individual one-hour average odour concentrations;

2. Convert and record each of the one-hour average concentrations predicted over the five (5) years of hourly local meteorological data at the Point of Impingement and at the most impacted Sensitive Receptor to 10-minute average concentrations using the One-hour Average to 10-Minute Average Conversion described below; and

3. Record and present the 10-minute average concentrations predicted to occur over a five (5) year period at the Point of Impingement and at the most impacted Sensitive Receptor in a histogram. The histogram shall identify all predicted 10-minute average odour concentration occurrences in terms of frequency, identifying the number of occurrences over the entire range of predicted odour concentration in increments of not more than 1/10 of one odour unit. The maximum 10-minute average concentration of odour at the Sensitive Receptor will be considered to be the maximum odour concentration at the most impacted Sensitive Receptor that occurs and is represented in the histogram, disregarding outlying data points on the histogram as agreed to by the Director.

4. Use the following formula to convert and record one-hour average concentrations at the Point of Impingement and at the most impacted Sensitive Receptor to 10-minute average concentrations:

$$X_{10min} = X_{60min} * 1.65$$

where X_{10min} = 10-minute average concentration

X_{60min} = one-hour average concentration

(Equation: X Subscript 10min Baseline equals X Subscript 60min Baseline times 1.65, where X Subscript 10min Baseline equals 10-minute average concentration and X Subscript 60min Baseline equals one-hour average concentration.)

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

1. Condition No. 1 is included to emphasize that the Equipment must be maintained and operated according to a procedure that will result in compliance with the EPA, the Regulations and this Approval.

2. Conditions No. 2 and 3 are included to emphasize that the Equipment must be maintained and operated according to a procedure that will result in compliance with the EPA, the Regulations and this Approval and to gather accurate information so that compliance with the operating requirements of this Approval can be verified.

3. Condition No. 4 is included to require the Company to gather accurate information so that compliance with the operating requirements of this Approval can be verified.

4. Conditions No. 5 and 6 are included to emphasize that the Equipment must be maintained and operated according to a procedure that will result in compliance with the EPA, the Regulations and this Approval.

5. Condition No. 7 is included to require the Company to keep records and to provide information to staff of the Ministry so that compliance with the EPA, the Regulations and this Approval can be verified.

6. Condition No. 8 is included to require the Company to notify staff of the Ministry so as to assist the Ministry with the review of the site's compliance.

7. Condition No. 9 is included in order to ensure that consultation with Walpole Island First Nation (WIFN), Township of Warwick and Warwick Public Liaison Committee (WPLC) is undertaken during the submission of any application to amend any Approval required by the Ministry.

8. Condition No. 10 is included to provide the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Facility.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4155-BMCLZ8 issued on March 3, 2020

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon me, the Ontario Land Tribunal and in accordance with Section 47 of the *Environmental Bill of Rights,* 1993, the Minister of the Environment, Conservation and Parks, within 15 days after receipt of this notice, require a hearing by the Tribunal. The Minister of the Environment, Conservation and Parks will place notice of your appeal on the Environmental Registry. Section 142 of the *Environmental Protection Act* provides that the notice requiring the hearing ("the Notice") shall state:

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

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

The Notice should also include:

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

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

This Notice must be served upon:

Registrar*
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

and

The Minister of the Environment,
Conservation and Parks
777 Bay Street, 5th Floor
Toronto, Ontario
M7A 2J3

and

The Director appointed for the purposes of
Part II.1 of the *Environmental Protection Act*
Ministry of the Environment,
Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.olt.gov.on.ca**

This instrument is subject to Section 38 of the *Environmental Bill of Rights,* 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at https://ero.ontario.ca/, you can determine when the leave to appeal period ends.

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

DATED AT TORONTO this 13th day of December, 2023

Nancy E Orpana, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

KS/
c: District Manager, MECP Sarnia
Brad Bergeron, RWDI Air

6. The Owner shall notify the District Manager orally, as soon as possible, and in writing within seven days of the confirmation of leachate impact to groundwater including an assessment of the relative severity and extent of leachate impact and proposed remedial actions.

7. The Owner shall record and report a summary of all trigger exceedence incidents and all remedial action measures taken under Condition 11 (5) in the Annual Report prepared under Condition 13.

8. The Owner shall dispose of **only** treated leachate effluent that meets the effluent limits requirements outlined under Condition 7 (1) for treatment and disposal by drip-irrigation on the approved poplar tree land area during the period between May 1st and October 15th of each calendar year.

9. The Owner shall not allow under any circumstance (including as emergency contingency plan) any direct discharge of leachate or treated leachate effluent from the Works to any receiving surface water including Bear Creek;

10. The Owner shall record the total volume of treated leachate effluent drip-irrigated on the poplar tree land irrigation area on a daily basis.

11. The Owner shall ensure that treated leachate effluent is disposed of via drip-irrigation in the designated six (6) poplar tree drip-irrigation zones initially, and ultimately on eight (8) poplar tree drip-irrigation zones on a planned rotation basis.

12. The Owner shall visually inspect drip-irrigation operations at least twice each day during operation period to ensure that no surface ponding or surface run-off is taking place.

13. The *Owner* shall retain records of inspections and drip-irrigation operation data collected under subsections (10), (11) and (12) and make them available for inspection Ministry staff upon request.

14. No drip irrigation is to take place:

    a. on frozen or snow covered ground conditions;

    b. with the occurrence of surface ponding in any area subjected to drip irrigation;

    c. within 100 m of any surface watercourse or drain; and

    d. at an average daily application rate greater than 4.8 mm;

15. The Owner shall notify and provide the Township, WPLC and WIFN with a copy of the proposed "Groundwater Contingency and Remedial Action Plan" required under Condition 11 (1).

PART IV - GENERAL

12. REPORTING

1. In addition to the obligations under Part X of the EPA, the Owner shall, within ten (10) working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

2. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

3. The Owner shall prepare and submit a performance report to the District Manager on an annual basis within before March 31 of each calendar year. The reports shall contain, but shall not be limited to, the following information:

    a. a summary and interpretation of all monitoring data and a comparison to the effluent objectives outlined in Condition 7, including an overview of the success and adequacy of the Works;

    b. a summary and interpretation of all monitoring data and a comparison to the trigger limits outlined in Condition 5, including an overview of the success and adequacy of the Works;

    c. a description of any operating problems encountered and corrective actions taken;

    d. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works;

    e. a summary of any effluent quality assurance or control measures undertaken in the reporting period;

    f. a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

    g. a tabulation of dry salt cake generated in the reporting period, an outline of anticipated amount of dry salt cake to be generated in the next reporting period and a summary of the locations to where the cake was disposed;

    h. a summary of any complaints received during the reporting period and any steps taken to address the complaints; and

    i. any other information the District Manager requires from time to time.

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

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

3. Conditions 3, 5, 8 and 11 are included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and injury to any person or deterioration, loss and damage to property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions.The manual will also act as a benchmark for *Ministry* staff when reviewing the Owner′ s operation of the work.

4. Conditions 4, 9 and 10 are included to require the owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved Works is consistent with the effluent limits specified in the certificate and that the approved Works does not cause any impairment to the receiving watercourse and/or the groundwater.

5. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

6. Condition 7 is imposed to ensure that the effluent irrigated from the Works to the poplar irrigation area meets the Ministry's effluent quality requirements thus minimizing environmental impact on groundwater and receiving surface water.

7. Condition 12 is included to provide a performance record for future references to ensure that the *Ministry* is made aware of problems as they arise and to provide a compliance record for all the terms and conditions outlined in this Approval so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Schedule A

1. Application for Environmental Compliance Approval submitted by Reid Cleland, Director of Operations- Eastern Canada Landfills of Waste Management of Canada Corporation received on March 5, 2019 and all supporting documentation and information submitted during the review process.

Schedule B

Table 1 - Stormwater Monitoring Sampling Locations: SWM Pond Outlets - SP1, SP2, SP3, SP4. Irrigation Area - SS17A, SS17B, SS18A and **SS18B.**			
Parameter	**Parameter**	**Parameter**	**Field -Parameter**
Alkalinity	Magnesium	Toluene	Conductivity
Total Ammonia Nitrogen	Potassium	Ethylbenzene	Dissolved Oxygen
Un-ionized Ammonia	Sodium	Xylene	pH (Field)
Chloride	Arsenic	Vinyl Chloride	Temperature
Conductivity (Lab)	Barium	1,2,4-Trichlorobenzene	Turbidity
Nitrate Nitrogen	Boron	1,2-Dichlorobenzene	
Nitrite Nitrogen	Cadmium	1,3-Dichlorobenzene	
TKN	Chromium (Total)	1,4-Dichlorobenzene	
pH (Lab)	Copper	Hexachlorobenzene	
Total Phosphorus	Iron	Diethylphthalate	
Total Suspended Solids	Lead	Dimethylphthalate	
Total Dissolved Solids	Mercury	Di-n-butyl phthalate	
Sulphate	Nickel	Phenol	
BOD5	Zinc	Benzo(a)pyrene	
Chemical Oxygen Demand	Benzene	2,4,6-Trichlorophenol	
Phenols	1,4-Dichlorobenzene	2,4-Trichlorophenol	
Calcium	Dichloromethane	Pentachlorophenol	

Note: Samples shall be collected within twenty four hours after a rainfall event (more than 10 mm rainfall in 24 hour period) resulting in a stormwater discharge from each SWM Pond or Poplar Plantation Irrigation Area at a minimum interval of one (1) month between consecutive sampling events.

Table 2	
Trigger Parameter	**Trigger Level [SS10 & SS16 - 90th percentile]** (mg/L)
Ammonia (unionized)	0.020
Boron	0.20
Boron (SP1 only)	0.39
Chloride	210
Chromium (Total)	0.024
Nickel	0.027
Phenols	0.001
Zinc	0.06

Note: Annually, a trigger level for a parameter listed above will be replaced by the corresponding 90th percentile of background surface water concentration where background surface water concentrations collected upstream of the landfill (Sampling Locations SS10 and SS16).

Table 3 - Effluent Limits Sampling Location: **Discharge Point from Treated Effluent Storage Pond**	
Effluent Parameter	**Average Monthly Concentration** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
Total Ammonia Nitrogen	68.7
Total Phosphorus	0.72
Phenols	0.2
Chlorides	247
Copper	0.014
Iron	27.0
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

Table 4 - Leachate Monitoring Sampling Location: **Equalization Tank**		
Parameters	**Sample Type**	**Frequency**
BOD5	Grab	Quarterly
Dissolved Organic Carbon (DOC)	Grab	Quarterly
Total Phosphorus	Grab	Quarterly
Total Kjeldahl Nitrogen	Grab	Quarterly
BTEX	Grab	Quarterly
pH	Grab	Quarterly
VOCs [Note 1]	Grab	Semi-Annually
Semi-VOCs [Note 2]	Grab	Semi-Annually
Metals [Note 3]	Grab	Semi-Annually
General Chemistry [Note 4]	Grab	Semi-Annually

Table 5 - Leachate Treatment Plant Effluent Monitoring Sampling Location: **Discharge to Treated Effluent Storage Pond**		
Parameters	**Sample Type**	**Frequency**
CBOD5	Grab	Weekly
Dissolved Organic Carbon (DOC)	Grab	Weekly
Total Ammonia Nitrogen	Grab	Weekly
Chloride	Grab	Weekly
BTEX	Grab	Weekly
pH	Grab	Weekly
VOCs [Note 1]	Grab	Monthly
Semi-VOCs [Note 2]	Grab	Monthly
Metals [Note 3]	Grab	Monthly
General Chemistry [Note 4]	Grab	Monthly
PCB	Grab	Semi-Annually
Organochlorides	Grab	Semi-Annually

Table 6 - Treated Effluent Storage Pond Effluent Monitoring Sampling Location: **Discharge to Poplar Plant Irrigation Area**		
Parameters	**Sample Type**	**Frequency**
CBOD5	Grab	Weekly
Dissolved Organic Carbon (DOC)	Grab	Weekly
Total Ammonia Nitrogen	Grab	Weekly
Chloride	Grab	Weekly
BTEX	Grab	Weekly
pH	Grab	Weekly
VOCs[Note 1]	Grab	Monthly
Semi-VOCs [Note 2]	Grab	Monthly
Metals [Note 3]	Grab	Monthly
General Chemistry [Note 4]	Grab	Monthly

Note 1: VOCs: Benzene, 1,4-Dichlorobenzene, Dichloromethane, Toluene, Ethylbenzene, Xylenes, and Vinyl Chloride.

Note 2: Semi-VOCs: 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, Hexachlorobenzene, Diethylphthalate, Dimethylphthalate, Di-n-butyl phthalate, Phenol, Benzo(a)pyrene, 2,4,6- Trichlorophenol, 2,4-Dichlorophenol, Pentachlorophenol.

Note 3: Metals: Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc.

Note 4: G. Chemistry: Alkalinity, Calcium, Chloride, Conductivity, COD, Nitrate, Nitrite, Magnesium, pH, Potassium, Sodium, Sulphate, Total Dissolved Solids, TKN, Temperature, Turbidity, Total Phosphorus, TSS, Phenols, Dissolved Oxygen.

Table 7 - Groundwater Monitoring Sampling Location: **OW40, OW60 and OW79 - at Annual Frequency** Sampling Location: **OW16, OW61, and OW62 - at Semi-Annual Frequency**		
Parameters	**Parameters**	**Field Parameters**
Alkalinity	Boron	pH
Conductivity	Cadmium	Conductivity
Chloride	Lead	Turbidity
pH	Iron	
Dissolved Organic Carbon	Barium	
Total Dissolved Solids	Benzene	
Total Ammonia	1,4-Dichlorobenzene	
Total Kjeldahl Nitrogen	Dichloromethane	
Sulphate	Ethylbenzene	
Nitrate	Vinyl Chloride	
Calcium	Toluene	
Potassium	Xylenes	
Sodium		
Magnesium		

Table 8 - Trigger Limits for Poplar Plantation Land Irrigation			
Trigger Parameter	**Trigger Level** (mg/L)		
	Active Aquitard	Interstadial Silt and Sand	Interface Aquifer
Chloride	106	116	134
Nitrate	2.3	2.3	2.3
Boron	1.1	2.1	2.6
Cadmium	0.001	0.001	0.001
Lead	0.002	0.002	0.002
Benzene	0.001	0.001	0.001
1,4-Dichlorobenzene	0.001	0.001	0.001
Dichloromethane	0.01	0.01	0.01
Vinyl Chloride	0.0004	0.0004	0.0004

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 3506-7M5PU3 issued on July 9, 2009

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

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

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

The Notice should also include:

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

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

This Notice must be served upon:

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

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

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

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

DATED AT TORONTO this 21st day of August, 2019

Youssouf Kalogo, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

SO/

c: District Manager, MECP Sarnia District Office
Larry Fedec, HDR Corporation

APPENDIX A5:

Amended Permit to Take Water [Surface Water] No. 4682-BLJRYJ, dated November 8, 2021

PERMIT TO TAKE WATER
Ground Water
NUMBER 4682-BLJRYJ

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

Waste Management of Canada Corporation
5768 Nauvoo Rd
Warwick, Ontario, N0M 2S0
Canada

For the water taking from: PS2, PS4, PS6, PS8, SDL, Pond 1, Pond 2, Pond 3, Pond 4.

Located at: Lot 19 and 20, Concession 3, Geographic Township of Warwick
Warwick, County of Lambton

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

(a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34.1, OWRA.

(b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.

(c) "Ministry" means Ontario Ministry of the Environment, Conservation and Parks.

(d) "District Office" means the Sarnia District Office.

(e) "Permit" means this Permit to Take Water No. 4682-BLJRYJ including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means Waste Management of Canada Corporation.

(g) "OWRA " means the *Ontario Water Resources Act,* R.S.O. 1990, c. O. 40, as amended.

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

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated December 19, 2019 and signed by Phil Janisse, and all Schedules included in this Permit.

1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4 This Permit is not transferable to another person.

1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

1.7 The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. General Conditions and Interpretation

2.1 Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act* , R.S.O. 1990, the *Pesticides Act* , R.S.O. 1990, or the *Safe Drinking Water Act,* S. O. 2002.

2.2 Other Approvals

The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act* , and

the *Environmental Protection Act* , and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

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

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **October 31, 2031**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	PS2	Well Dug	Construction	Dewatering Construction	1,325	24	1,907,640	365	17 428500 4757900
2	PS4	Well Dug	Construction	Dewatering Construction	1,325	24	1,907,640	365	17 428505 4758130
3	PS6	Well Dug	Construction	Dewatering Construction	1,325	24	1,907,640	365	17 428505 4758490
4	PS8	Well Dug	Construction	Dewatering Construction	1,325	24	1,907,640	365	17 428500 4758800
5	SDL	Well Dug	Construction	Dewatering Construction	4,921	24	7,085,520	365	17 428500 4758900
6	pond 01	Pond Online	Other - Industrial	Industrial	4,921	24	7,085,520	365	17 429230 4757320
7	pond 02	Pond Online	Other - Industrial	Industrial	4,921	24	7,085,520	365	17 428370 4757850
8	pond 03	Pond Online	Other - Industrial	Industrial	4,921	24	7,085,520	365	17 428380 4758670
9	pond 04	Pond Online	Other - Industrial	Industrial	4,921	24	7,085,520	365	17 429390 4758620
						Total Taking:	42,068,160		

4. Monitoring

4.1 Under section 9 of O. Reg. 387/04, and as authorized by subsection 34(6) of the Ontario Water Resources Act, the Permit Holder shall, on each day water is taken under the authorization of this Permit, record the date, the volume of water taken on that date and the rate at which it was taken. The daily volume of water taken shall be measured by a flow meter or calculated in accordance with the method described in the application for this Permit, or as otherwise accepted by the Director. A separate record shall be maintained for each source. The Permit Holder shall keep all records required by this condition current and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the records required by this condition to the ministry's Water Taking Reporting System.

4.2 Within 180 days of the issuance of this Permit, the Permit Holder shall submit to the

District Manager, a Plan (the "Plan") to investigate the potential impacts of the Water Taking. The Plan shall include two components:

a. An Ecological Study which includes an inventory of the ecosystem in the immediate vicinity of the Gilliand-Geerts Drain between Nauvoo Road and Underpass Road, and an assessment of potential impacts of the water taking on that ecosystem; and
b. A survey of downstream riparian property owners along the Gilliand-Geerts Drain between Nauvoo Road and Underpass Road to determine the extent of any surface water uses by those property owners and assess any impacts of the water taking on those uses.

The Plan shall include timelines for completing the outlined work. Upon acceptance of the Plan by the District Manager, the Permit Holder shall complete the action items outlined with the Plan within the prescribed timelines.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water*

Resources Act , Section 100 (4).

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

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.

2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.

3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written notice served upon me, the Environmental Review Tribunal and the Minister of the Environment, Conservation and Parks, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Minister of the Environment, Conservation and Parks will place notice of your appeal on the Environmental Registry. Section 101 of the Ontario Water Resources Act, as amended provides that the Notice requiring a hearing shall state:

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

In addition to these legal requirements, the Notice should also include:

a. The name of the appellant;
b. The address of the appellant;
c. The Permit to Take Water number;
d. The date of the Permit to Take Water;
e. The name of the Director;
f. The municipality within which the works are located;

This notice must be served upon:

The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 326-5370
Email:
ERTTribunalsecretary@ontario.ca

AND

The Minister of the Environment,
Conservation and Parks
777 Bay Street, 5th Floor
Toronto, Ontario
M7J 2J3

AND

The Director, Section 34.1,
Ministry of the Environment,
Conservation and Parks
733 Exeter Rd
London ON N6E 1L3
Fax: (519) 873-5020

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by Telephone at	by Fax at	by e-mail at
(416) 212-6349	(416) 326-5370	www.ert.gov.on.ca
Toll Free 1(866) 448-2248	Toll Free 1(844) 213-3474	

This instrument is subject to Section 38 of the ***Environmental Bill of Rights*** *that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.*

This Permit cancels and replaces Permit Number 4430-8PLMKV, issued on 2012/01/17.

Dated at London this 8th day of November, 2021.

Jason Lehouillier

Jason Lehouillier
Director, Section 34.1
Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule “A” forms part of Permit To Take Water 4682-BLJRYJ, dated November 8, 2021.

Director
appointed for the purposes of Part II.1 of
the *Environmental Protection Act*

BS/
c: District Manager, MOECC Sarnia
Brad Bergeron, RWDI AIR Inc.

APPENDIX B:
Monitoring Program

APPENDIX B:

Table B-1 2024

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

Beatty, Franz & Associates Limited, 1995. 1994-1995 Monitoring Report, Warwick Landfill. Prepared for Laidlaw Waste Systems (Warwick) Ltd.

Beatty, Franz & Associates Limited, 1996. 1995-1996 Monitoring Report, Warwick Landfill. Prepared for Canadian Waste Services Inc.

Beatty, Franz & Associates Limited, 1997. 1996-1997 Monitoring Report, Warwick Landfill. Prepared for Canadian Waste Services Inc.

Beatty, Franz & Associates Limited, 1997. Hydrogeologic Review Report, Warwick Landfill. Prepared for Canadian Waste Services Inc.

Beatty, Franz & Associates Limited, 1998. 1997-1998 Monitoring Report, Warwick Landfill. Prepared for Canadian Waste Services Inc.

Beatty, Franz & Associates Limited, 1999. 1998-1999 Monitoring Report, Warwick Landfill. Prepared for Canadian Waste Services Inc.

Beatty, Franz & Associates Limited, 2000. 1999-2000 Annual Report Warwick Landfill. Prepared for Canadian Waste Services.

Dames & Moore Canada, 1992. 1991 – 1992 Monitoring Report, Warwick Landfill. Prepared for Laidlaw Waste Systems (Warwick) Ltd.

Dames & Moore Canada, 1993. 1992 – 1993 Monitoring Report, Warwick Landfill. Prepared for Laidlaw Waste Systems (Warwick) Ltd.

Dames & Moore Canada, 1994. 1993 – 1994 Monitoring Report, Warwick Landfill. Prepared for Laidlaw Waste Systems (Warwick) Ltd.

Dames & Moore Canada, 1994. 1994 Hydrogeologic Study, Warwick Landfill. Prepared for Laidlaw Waste Systems (Warwick) Ltd.

GENIVAR Consultants Limited Partnership, 2010. 2010 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Consultants Limited Partnership, 2010. 2010 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

GENIVAR Consultants Limited Partnership, 2010. 2010 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Consultants Limited Partnership, 2010. 2010 Fourth Quarter and Annual Monitoring Report, Volumes 1 to 6, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Consultants Inc, 2011. 2011 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Inc, 2011. 2011 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Inc, 2011. 2011 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Inc, 2011. 2011 Fourth Quarter and Annual Monitoring Report, Volumes 1 to 6, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Consultants Inc, 2012. 2012 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Inc, 2012. 2012 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Inc, 2012. 2012 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Inc, 2012. 2012 Fourth Quarter Annual Monitoring Report, Volumes 1 to 6, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Consultants Inc, 2013. 2013 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

GENIVAR Inc, 2013. 2013 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Henderson, Paddon Environmental Inc., 1992. Geologic Mapping and Cut-Off Wall, Cell 5 Warwick Landfill Site. Prepared for Laidlaw Waste Systems (Warwick) Ltd.

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

Henderson, Paddon Environmental Inc., 1993. Addendum No. 1 – Geologic Mapping and Cut-Off Wall, Cell #5 Warwick Landfill Site. Prepared for Laidlaw Waste Systems (Warwick) Ltd.

Henderson, Paddon Environmental Inc., 1995. Geologic Mapping and Cut-Off Wall, Cell 6 Warwick Landfill Site. Prepared for Laidlaw Waste Systems Ltd.

Henderson, Paddon Environmental Inc., 1997. Development & Operations Report, Canadian Waste Services Inc., Warwick Landfill, Warwick Township. Prepared for Canadian Waste Services Inc.

Henderson, Paddon Environmental Inc., 2000. Leachate Management Plan, Warwick Landfill, Warwick Township. Prepared for Canadian Waste Services Inc.

Jagger Hims Limited, 2000. Warwick Landfill Surface Water Characterization and Containment Pond Discharge Criteria. Prepared for Canadian Waste Services Inc.

Jagger Hims Limited, 2001. 2000/2001 Monitoring Report Warwick Landfill, Township of Warwick, Ontario. Prepared for Canadian Waste Services Inc.

Jagger Hims Limited, 2002. 2001/2002 Monitoring Report Warwick Landfill, Township of Warwick, Ontario. Prepared for Canadian Waste Services Inc.

Jagger Hims Limited, 2003. 2002/2003 Monitoring Report Warwick Landfill, Township of Warwick, Ontario. Prepared for Canadian Waste Services Inc.

Jagger Hims Limited, 2004. 2003/2004 Monitoring Report Warwick Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2005. 2004/2005 Monitoring Report Warwick Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2006. 2005/2006 Monitoring Report Warwick Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2007. 2006/2007 Monitoring Report Warwick Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2008. 2007 Monitoring Report – Addendum (Period from September 1 to December 31), Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

Jagger Hims Limited, 2008. 2008 Quarterly Monitoring Report (Period from January 1 to March 31) Warwick Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2008. 2008 Quarterly Monitoring Report (Period from April 1 to June 30) Warwick Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2008. 2008 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks/Warwick Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2008. 2008 Fourth Quarter and Annual Monitoring Report, Volumes 1 to 3, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2009. 2009 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, 2009. 2009 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, a Division of GENIVAR Consultants Limited Partnership, 2009. 2009 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Jagger Hims Limited, a Division of GENIVAR Consultants Limited Partnership, 2009. 2009 Fourth Quarter and Annual Monitoring Report, Volumes 1 to 6, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Morrison Beatty Limited, 1985. Hydrogeological Study, Warwick Landfill Proposed Expansion. Prepared for Laidlaw Waste Systems Ltd.

Morrison Beatty Limited, 1988. Hydrogeologic Study Warwick Landfill Proposed Expansion Response to MOE Comments. Prepared for Laidlaw Waste Systems Ltd.

Morrison Beatty Limited, 1989. Final Report on a Hydrogeological Study, Warwick Landfill, Proposed Expansion. Prepared for Laidlaw Waste Systems Ltd.

Morrison Beatty Limited, 1990. 1989 Annual Hydrogeologic Monitoring Report Warwick Landfill. Prepared for Laidlaw Waste Systems Ltd.

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

RWDI AIR Inc, 2013. 2013 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2014. 2013 Fourth Quarter and Annual Monitoring Report, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2014. 2014 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2014. 2014 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2014. 2014 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2015. 2014 Fourth Quarter and Annual Monitoring Report, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2015. 2015 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2015. 2015 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2015. 2015 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2016. 2015 Fourth Quarter and Annual Monitoring Report, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2016. 2016 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2016. 2016 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2016. 2016 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

RWDI AIR Inc, 2017. 2016 Fourth Quarter and Annual Monitoring Report, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2017. 2017 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2017. 2017 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2017. 2017 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2018. 2017 Fourth Quarter and Annual Monitoring Report, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2018. 2018 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2018. 2018 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2018. 2018 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2019. 2018 Fourth Quarter and Annual Monitoring Report, Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2019. 2019 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2019. 2019 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation

RWDI AIR Inc, 2019. 2019 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Landfill, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2020. 2019 Fourth Quarter and Annual Monitoring Report, Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

RWDI AIR Inc, 2020. 2020 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2020. 2020 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation

RWDI AIR Inc, 2020. 2020 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2021. 2020 Fourth Quarter and Annual Monitoring Report, Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2021. 2021 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2021. 2021 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation

RWDI AIR Inc, 2021. 2021 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2022. 2021 Fourth Quarter and Annual Monitoring Report, Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2022. 2022 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI Air Inc, 2022. 2022 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2022. 2022 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

TABLE B-1
HISTORIC HYDROGEOLOGIC REPORTS

RWDI AIR Inc, 2023. 2022 Fourth Quarter and Annual Monitoring Report, Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2023. 2023 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI Air Inc, 2023. 2023 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2023. 2023 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2024. 2023 Fourth Quarter and Annual Monitoring Report, Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2024. 2024 Quarterly Monitoring Report (Period from January 1 to March 31) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI Air Inc, 2024. 2024 Quarterly Monitoring Report (Period from April 1 to June 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

RWDI AIR Inc, 2024. 2024 Quarterly Monitoring Report (Period from July 1 to September 30) Twin Creeks Environmental Centre, Township of Warwick, Ontario. Prepared for Waste Management of Canada Corporation.

Water and Earth Science Associates Ltd., 1991. Geologic Site Stratigraphy and Geotechnical Site Characterization, Cell #4 Cut-Off Wall Warwick Landfill Site. Prepared for Laidlaw Waste Systems (Warwick) Limited.

APPENDIX B:

Table B-2 - Monitoring Program 2024

Table B-2
2024 Monitoring Program
Twin Creeks Environmental Centre - 2024 Annual Monitoring Report

Monitoring Locations	Parameters	Frequency
Leachate		
PS1, PS3, PS5, PS7, MH3S, MH4, MH5, MH6, MH7, MH8, MH9, MH10, MH11, MH12, MH16, MH17, MH18, OW22A-10, OW51A-15, OW53-10, Sump, LW1, LW2, LW3, LW4, LW5, LW6	Leachate Levels	May and November
PS1, PS3, PS5, PS7	Leachate Levels	Daily
PS1, PS3, PS5, PS7, South Fill Area (MH18), West Central Fill Area (Sump), Central Fill Area (Composite of MH3, MH4, MH5, MH6, MH7, MH9, MH11)	PLIL-GW, SLIL-GW, PLIL-SW, SLIL-SW, LS	May
Equalization Tank	BOD_5, DOC, phosphorus (total), TKN, BTEX, pH	Quarterly
	PLIL-SW, SLIL-SW, LS	May and November
Treated Leachate Effluent		
Treatment Plant Effluent	Discharge Rates, COD, pH, turbidity	Daily
	Chloride, $CBOD_5$, BOD_5, DOC, BTEX, ammonia, pH	Weekly
	PLIL-GW, SLIL-GW, PLIL-SW, SLIL-SW, LS	Monthly
	PCB, organochlorines	May and November
Treated Leachate Temporary Storage Cells :	Discharge Rates	Daily
Cells 1 and 2		
Cell 1 Inlet, Cells 1 and 2	Chloride, $CBOD_5$, BOD_5, DOC, BTEX, ammonia, pH	Weekly
Cells 1 and 2	DO, pH, alkalinity, DOC	Weekly
Cells 1 and 2	PLIL-GW, SLIL-GW, PLIL-SW, SLIL-SW, LS	Monthly
Cell 1	Biomonitoring	May and November
Secondary Drainage Layer		
PS2, PS4, PS6, PS8	Groundwater Levels	Monthly
Active Aquitard		
OW16-6, OW17-4, OW40E-4, OW54A-4, OW56-4, OW57-4, OW58-6, OW59-6, OW60-4**, OW61-4, OW62-5**, OW67-4, OW68-5, OW69-5, OW70B-5, OW71A-5[†], OW72-6, OW73-6, **OW75-3, OW76-5, OW77-4, OW78-4**, OW79-5, OW80-3, OW81-5, OW82-5, OW83-5, OW84-6, **OW85-5,** P1, P2, P3	Groundwater Levels	May and November
OW16-6, OW17-4, OW54A-4, OW56-4, OW57-4, OW58-6, OW59-6, **OW61-4, OW62-5**, OW67-4, OW68-5, OW69-5, OW70B-5, OW71A-5, OW72-6, OW73-6, **OW75-3, OW76-5, OW77-4, OW78-4**	PLIL-GW, SLIL-GW	May and November
OW40E-4, OW60-4, OW79-5, OW80-3, OW81-5, OW82-5, OW83-5, OW84-6, **OW85-5**	PLIL-GW, SLIL-GW	May
OW16-6, **OW61-4, OW62-5, OW75-3, OW78-4**	Volatiles	May and November
OW17-4, OW40E-4, OW54A-4, OW56-4, OW57-4, OW58-6, OW59-6, OW60-4, OW67-4, OW68-5, OW69-5, OW70B-5, OW71A-5, OW72-6, OW73-6, **OW76-5, OW77-4**, OW79-5, OW80-3, OW81-5, OW82-5, OW83-5, OW84-6, **OW85-5**	Volatiles	May
Interstadial Silt and Sand		
OW16-7, OW40A-7, OW46-7, OW47-6, OW54-10, OW57-15, OW58-17, OW60-8, **OW61-6, OW62-7**, OW67-11, OW72-10, OW73-9, **OW75-7, OW78-6**, OW79-7, OW80-6, OW81-7, OW82-14, OW83-9, OW84-11, **OW85-8**	Groundwater Levels	May and November
OW46-7, OW47-6, OW54-10, OW57-15, OW58-17, OW67-11, OW72-10, OW73-9	PLIL-GW, SLIL-GW	May and November
OW16-7, **OW61-6, OW62-7, OW75-7, OW78-6**	PLIL-GW, SLIL-GW, volatiles	May and November
OW40A-7 OW60-8, OW79-7, OW80-6, OW81-7, OW82-14, OW83-9, OW84-11, **OW85-8**	PLIL-GW, SLIL-GW	May
OW40A-7, OW46-7, OW47-6, OW54-10, OW57-15, OW58-17, OW60-8, OW67-11, OW72-10, OW73-9, OW79-7, OW80-6, OW81-7, OW82-14, OW83-9, OW84-11, **OW85-8**	Volatiles	May
Interface Aquifer		
OW17-30, OW19-29, OW39A-26, OW40A-28, OW49-29, OW60-25, **OW61-26, OW62-30**, OW79-26, OW80-27, OW81-27, OW82-28, OW83-29, OW84-31	Groundwater Levels	May and November
OW19-29, OW39A-26, OW49-29, OW79-26, OW80-27, OW81-27, OW82-28, OW83-29, OW84-31, Cemetery Well	PLIL-GW, SLIL-GW	May
OW19-29, OW39A-26, OW49-29, OW79-26, OW80-27, OW81-27, OW82-28, OW83-29, OW84-31, Cemetery Well	Volatiles	Biennial - 2024
Background Station		
SS10, SS16	Flow Rates	Quarterly after 10 mm precipitation events. Greater than 1 month intervals between sampling.
	PLIL-SW, SLIL-SW, nitrite	
	LS-SW	Spring Precipitation Event
	Biomonitoring	Spring Precipitation Event
Sedimentation Ponds (Discharge Points)		
SP1, SP2, SP3, SP4	Flow Rates	Quarterly after 10 mm precipitation events. Greater than 1 month intervals between sampling.
	PLIL-SW, SLIL-SW, nitrite	
	LS-SW, volatiles, semi-volatiles	Quarterly after 10 mm precipitation events. Greater than 1 month intervals between sampling.
	Biomonitoring	Spring Precipitation Event
Western Site Boundary Compliance Point		
SS1	Flow Rates	Quarterly after 10 mm precipitation events. Greater than 1 month intervals between sampling.
	PLIL-SW, SLIL-SW, nitrite	
	LS-SW, volatiles, semi-volatiles	Quarterly after 10 mm precipitation events. Greater than 1 month intervals between sampling.
	Biomonitoring	Spring Precipitation Event
Poplar Tree Plantation Land Application Area		
SS17A, SS17B, SS18A, SS18B	Flow Rates	Quarterly after 10 mm precipitation events. Greater than 1 month intervals between sampling.
	PLIL-SW, SLIL-SW, nitrite	
	LS-SW, volatiles, semi-volatiles	Quarterly after 10 mm precipitation events. Greater than 1 month intervals between sampling.
	Biomonitoring	Spring Precipitation Event
Compost Facility (if constructed)		
SS19	PLIL-SW, SLIL-SW, nitrite, BOD_5, TSS, Total Coliform, Fecal Coliform, E. Coli	Prior to water use

Monitoring Locations	Parameters	Frequency
Landfill Gas Monitoring		
Landfill Cap	Inspections	Monthly (April to November)
GP1A, GP2, GP3, GP4, GP5, GP6, GP7, GP8, GP9, GP10	Methane Gas	January, February, March, April, July, November, December

Notes:

1) PLIL-GW indicates: chloride, nitrate, boron.

2) SLIL-GW indicates: alkalinity, sulphate, calcium, magnesium, potassium, sodium, barium, cadmium, iron, lead, DOC, TDS, ammonia (total), TKN, pH, conductivity. Field parameters of pH, conductivity, temperature, turbidity.

3) PLIL-SW indicates: chloride, ammonia (total and unionized), phenols, boron, nickel, chromium (total), zinc.

4) SLIL-SW indicates: alkalinity, sulphate, calcium, magnesium, potassium, sodium, total phosphorus, iron, nitrate, TKN, TDS, pH, conductivity. Field parameters of temperature, pH, conductivity, turbidity, DO.

5) LS indicates: arsenic, barium, cadmium, copper, lead, manganese, mercury, nitrite, TSS, volatiles, semi-volatiles, BOD_5, COD.

6) LS-SW indicates: arsenic, barium, cadmium, copper, lead, mercury, nitrite, TSS, BOD_5, COD.

7) Volatiles should include the following at a minimum: benzene, 1,4-dichlorobenzene, dichloromethane, toluene, ethylbenzene, xylenes, and vinyl chloride.

8) Semi-volatiles should include the following at a minimum: 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, hexachlorobenzene, diethylphthalate, dimethylphthalate, di-n-butyl phthalate, phenol, benzo(a)pyrene, 2,4,6-trichlorophenol, 2,4-dichlorophenol, pentachlorophenol.

9) Organochlorines include herbicide and pesticide scan.

10) Biomonitoring indicates toxicity testing for Rainbow Trout and Daphnia Magna.

11) Biennial indicates every second year.

12) QA/QC includes one (1) blind duplicate for each 15 samples or once per event, whichever is greater.

13) Surface water samples shall be collected in a downstream to upstream sequence.

14) OW84(new) denotes monitoring wells to be installed per EMP dated December 20, 2007.

15) Spring denotes: April, May, and June.

16) † indicates that OW71A-5 is not required as part of the monitoring program, however, obtained data is interpolated for the monitoring well OW67-4, which used to show dry conditions.

17) Since the Poplar Plantation is not required to be utilized until a few months prior to the initiation of the treatment plant as operational, monitoring per the EMP and ECA, as well as the Waste and Sewage ECA's that is completed to evaluate the vigour of the Poplar Plantation, is not required. It is recognized that once the Poplar Plantation is initialized, then the required monitoring to evaluate the Poplar Plantation would be reinitiated.

18) Monitoring stations that are currently idle until 2 months prior to the leachate treatment plant being operational, include the following: 1) Surface water stations **SS17A, SS17B, SS18A, SS18B**; and 2) Groundwater monitoring locations **OW61, OW62, OW75, OW76, OW77, OW78, AND OW85.**

APPENDIX B:

Table B-3 - MECP Approved Changes to EMP

Table B-3
MECP Approved Changes to Site EMP
Twin Creeks Environmental Centre - 2024 Annual Monitoring Program

Monitoring Station	Date	MECP Approved Change
Groundwater		
OW80-3	5-Aug-10	Chloride removed as part of Trigger Assessment per MOE letter, dated August 5, 2010, ref # 02970051.34. Chloride still monitored for comparative purposes.
OW80-6	5-Aug-10	Chloride removed as part of Trigger Assessment per MOE letter, dated August 5, 2010, ref # 02970051.34. Chloride still monitored for comparative purposes.
OW61, OW62, OW75, OW76, OW77, OW78, OW85	01-Jun-11 (Waste ECA) 20-Feb-13 (Sewage ECA)	Groundwater monitoring at these locations temporarily idle and will resume 2 months prior to irrigation application and 2 years after cessation of irrigation liquid application. Waste ECA Condition 8.7 (r) and Notice No. 1 of the Sewage ECA.
OW79-7	12-Dec-11	Chloride removed as part of Trigger Assessment per MOE letter, dated December 12, 2011. Chloride still monitored for comparative purposes.
OW58-17	24-Mar-14	Groundwater monitoring well OW58-17 will replace OW58-14 with the following conditions: 1) OW58-14 will continue to be sampled during routine monitoring events along with OW58-17, 2) OW58-14 is not subject re-verification process, however, replacement well OW58-17 is subject to verification requirements, and 3) Following four (4) consecutive acceptable groundwater quality monitoring events for OW58-17, monitoring well OW58-14 may be decommissioned and OW58-17 be utilized as the replacement monitoring well. These conditions are presented in the MECP letter dated March 24, 2014.
OW58-14	10-Aug-16	Monitoring well OW58-14 was decommissioned on October 3, 2016 per MECP written approval.
OW60-4	2-Oct-20	Lead removed as part of Trigger Assessment per MOE letter, dated October 2, 2020. Lead still monitored for comparative purposes.
OW81-7	18-Aug-22	Chloride removed as part of Trigger Assessment per MECP letter, dated August 18, 2022. Chloride still monitored for comparative purposes.
Surface Water		
SS17A, SS17B, SS18A, SS18B	01-Jun-11 (Waste ECA) 20-Feb-13 (Sewage ECA)	Surfacewater monitoring at these locations temporarily idle and will resme 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.
Methane Gas		
None		
Air		
TSP monitoring	26-Oct-11	Total Suspended Particulate (TSP) monitoring revised per MOE letter, dated October 26, 2011. TSP samplers to be run on a 12-day schedule from October 1st to May 31st of each year and continue on the previously approved 6-day cycle from June 1st to September 30th of each year.
Noise		
None		

APPENDIX B:

Table B-4 - Trigger Exceedances

Table B-4
2024 Compliance Point Trigger Concentration Exceedances
Twin Creeks Environmental Centre - Annual Monitoring Program

Task	Monitoring Locations & Dates	Exceedance	Comments
Compliance Monitoring Program			
Q1 Surface Water Monitoring/Sampling	January 10, 2024 - SS1 and SP2 - (routine monitoring for January 9, 2024 precipitation event).	January 10, 2024 - SS1 - Boron, Nickel, Chromium, Zinc SP2 - Boron	The overall surface water quality at compliance monitoring stations SS1 and SP2 was acceptable with the exception of the parameters boron, nickel, chromium and zinc at SS1, and boron at SP2. As part of the verification sampling process for stations SS1 and SP2, verification surface water monitoring was required to be completed.
Q2 Surface Water Monitoring/Sampling	April 12, 2024 - SS1 and SP2 - (routine monitoring for April 11, 2024 precipitation event).	April 12, 2024 - Boron	The overall surface water quality at compliance monitoring stations SS1 and SP2 was acceptable with the exception of the parameter boron. As part of the verification sampling process for stations SS1 and SP2, verification surface water monitoring was required to be completed.
Q2 Ground Water Monitoring/Sampling	May 9, 2024 - OW84-6 - (routine spring semi-annual groundwater monitoring event).	May 9, 2024 - Nitrate	The overall groundwater water quality at groundwater monitoring location OW84-6 was acceptable with the exception of the parameter nitrate. As part of the verification sampling process for station OW84-6, verification groundwater monitoring was required to be completed.
Q3 Surface Water Monitoring/Sampling	July 10, 2024 - SS1 and SP2 - (routine monitoring for Juy 9, 2024 precipitation event).	July 10, 2024 - SS1 - Nickel, Chromium, Zinc SP2 - Boron	The overall surface water quality at compliance monitoring stations SS1 and SP2 was acceptable with the exception of the parameters nickel, chromium, and zinc at SS1 and boron at SP2. As part of the verification sampling process for station SS1 and SP2, verification surface water monitoring was required to be completed.
Q4 Surface Water Monitoring/Sampling	October 14, 2024 - SS1 and SP2 - (routine monitoring for October 13, 2024 precipitation event).	October 14, 2024 - SS1 - Nickel, Chromium, Zinc SP2 - Boron	The overall surface water quality at compliance monitoring stations SS1 and SP2 was acceptable with the exception of the parameters nickel, chromium, and zinc at SS1 and boron at SP2. As part of the verification sampling process for station SS1 and SP2, verification surface water monitoring was required to be completed.

APPENDIX C:

Climatic Data

APPENDIX C:

Table C-1 to C-7

Table C-1
1961-1990 Water Budget (Thornthwaite Method)
Twin Creeks Environmental Centre - Annual Monitoring Program

Month	Mean Temperature	I	E	Daylight Factor	E ADJ.	Mean Precipitation	Surplus	Deficit
(1961 - 1990)	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)
January	-6.2	0.0	0.0	0.8	0.0	57.9	57.9	0.0
February	-5.3	0.0	0.0	0.8	0.0	45.4	45.4	0.0
March	0.5	0.0	1.7	1.0	1.7	37.3	35.6	0.0
April	7.1	1.7	31.4	1.1	35.1	71.4	36.3	0.0
May	13.1	4.3	61.8	1.3	78.5	48.2	0.0	30.3
June	18.3	7.1	89.6	1.3	114.6	70.6	0.0	44.0
July	21.0	8.7	104.3	1.3	135.6	90.4	0.0	45.2
August	20.0	8.1	98.8	1.2	118.6	57.9	0.0	60.7
September	16.0	5.8	77.2	1.0	80.3	59.7	0.0	20.6
October	9.7	2.7	44.3	1.0	42.1	69.0	26.9	0.0
November	3.8	0.7	15.7	0.8	12.7	53.3	40.6	0.0
December	-2.7	0.0	0.0	0.8	0.0	50.8	50.8	0.0
Total	**7.9**	**39.1**			**619.3**	**711.9**	**293.5**	**200.8**
						619.3		
				Water Surplus		**92.6**	**mm**	

NOTES: 1) I = Heat Index
E = Evapotranspiration
2) (°C) - Represents calculated mean of daily temperatures for the month.
3) Data from the Strathroy climatological station located at latitude 42°57'N, longitude 81°39'W.

Table C-2
1971-2000 Water Budget (Thornthwaite Method)
Twin Creeks Environmental Centre - Annual Monitoring Program

Month	Mean Temperature	I	E	Daylight Factor	E ADJ.	Mean Precipitation	Surplus	Deficit
(1981 - 2010)	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)
January	-5.6	0.0	0.0	0.8	0.0	78.5	78.5	0.0
February	-4.8	0.0	0.0	0.8	0.0	58.8	58.8	0.0
March	0.7	0.1	2.4	1.0	2.4	74.2	71.7	0.0
April	7.1	1.7	31.3	1.1	35.1	82.9	47.8	0.0
May	13.9	4.7	66.3	1.3	84.2	71.1	0.0	13.1
June	18.7	7.3	91.9	1.3	117.6	79.9	0.0	37.6
July	21.2	8.8	105.3	1.3	136.8	72.4	0.0	64.4
August	20.1	8.2	99.5	1.2	119.4	78.9	0.0	40.5
September	16.1	5.8	77.7	1.0	80.8	89.3	8.5	0.0
October	9.7	2.7	44.4	1.0	42.2	69.5	27.3	0.0
November	3.8	0.7	15.9	0.8	12.9	90.1	77.3	0.0
December	-2.3	0.0	0.0	0.8	0.0	89.9	89.9	0.0
Total	**8.2**	**40.1**			**631.4**	**935.5**	**459.8**	**155.6**
						619.3		
				Water Surplus		**316.3**	**mm**	

NOTES: 1) I = Heat Index
E = Evapotranspiration
2) (°C) - Represents calculated mean of daily temperatures for the month.
3) Data from the Strathroy climatological station (located at latitude 42°57'N, longitude 81°39'W) from 1971 through to June 1996. Data from the Strathroy-Mullifarry climatological station (located at latitude 42°58'N, longitude 81°38'W) from October 1997 through to 2000

Table C-3
1981-2010 Water Budget (Thornthwaite Method)
Twin Creeks Environmental Centre - Annual Monitoring Program

Month	Mean Temperature	I	E	Daylight Factor	E ADJ.	Mean Precipitation	Surplus	Deficit
(1981 - 2010)	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)
January	-4.9	0.0	0.0	0.8	0.0	74.3	74.3	0.0
February	-4.2	0.0	0.0	0.8	0.0	65.4	65.4	0.0
March	0.8	0.1	2.9	1.0	3.0	65.2	62.3	0.0
April	7.8	1.9	34.7	1.1	38.9	81.7	42.8	0.0
May	14.0	4.7	66.5	1.3	84.5	79.2	0.0	5.3
June	19.0	7.5	93.5	1.3	119.7	78.2	0.0	41.5
July	21.4	9.0	106.5	1.3	138.5	75.6	0.0	62.9
August	20.5	8.4	101.5	1.2	121.7	73.1	0.0	48.6
September	16.6	6.1	80.3	1.0	83.5	94.1	10.6	0.0
October	10.0	2.8	45.7	1.0	43.5	83.0	39.5	0.0
November	4.2	0.8	17.5	0.8	14.2	98.5	84.4	0.0
December	-2.2	0.0	0.0	0.8	0.0	90.9	90.9	0.0
Total	**8.6**	**41.4**			**647.4**	**959.2**	**470.1**	**158.3**
						619.3		
				Water Surplus		**339.9**	**mm**	

NOTES: 1) I = Heat Index
E = Evapotranspiration
2) (°C) - Represents calculated mean of daily temperatures for the month.
3) Data from the Strathroy climatological station (located at latitude 42°57'N, longitude 81°39'W) from 1981 through to June 1996. Data from the Strathroy-Mullifarry climatological station (located at latitude 42°58'N, longitude 81°38'W) from October 1997 through to 2010

Table C-4
1991-2020 Water Budget (Thornthwaite Method)
Twin Creeks Environmental Centre - Annual Monitoring Program

Month	Mean Temperature	I	E	Daylight Factor	E ADJ.	Mean Precipitation	Surplus	Deficit
(1991 - 2020)	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)
January	-5.0	0.0	0.0	0.8	0.0	80.6	80.6	0.0
February	-4.4	0.0	0.0	0.8	0.0	62.3	62.3	0.0
March	0.7	0.0	2.3	1.0	2.4	64.5	62.2	0.0
April	7.4	1.8	32.7	1.1	36.6	87.7	51.1	0.0
May	14.1	4.8	66.9	1.3	85.0	85.7	0.7	0.0
June	19.3	7.7	94.9	1.3	121.4	86.2	0.0	35.2
July	21.5	9.1	107.2	1.3	139.3	77.6	0.0	61.7
August	20.5	8.4	101.5	1.2	121.8	78.9	0.0	42.9
September	17.0	6.3	82.3	1.0	85.6	87.5	1.9	0.0
October	10.4	3.0	47.7	1.0	45.4	85.7	40.3	0.0
November	4.1	0.7	17.1	0.8	13.9	87.7	73.8	0.0
December	-1.6	0.0	0.0	0.8	0.0	77.8	77.8	0.0
Total	**8.7**	**41.8**			**651.4**	**962.1**	**450.6**	**139.8**
						651.4		
				Water Surplus		**310.7**	**mm**	

NOTES: 1) I = Heat Index
E = Evapotranspiration
2) (°C) - Represents calculated mean of daily temperatures for the month.
3) Data from the Strathroy climatological station (located at latitude 42°57'N, longitude 81°39'W) from 1991 through to June 1996. Data from the Strathroy-Mullifarry climatological station (located at latitude 42°58'N, longitude 81°38'W) from October 1997 through to 2020

Table C-5
2022 Water Budget (Thornthwaite Method)
Twin Creeks Environmental Centre - Annual Monitoring Program

Month	Mean Temperature	I	E	Daylight Factor	E ADJ.	Total Precipitation	Surplus	Deficit
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)
January	-7.6	0.0	0.0	0.8	0.0	31.6	31.6	0.0
February	-4.6	0.0	0.0	0.8	0.0	82.6	82.6	0.0
March	1.7	0.2	5.9	1.0	6.1	43.6	37.5	0.0
April	6.1	1.4	25.4	1.1	28.4	58.8	30.4	0.0
May	15.6	5.6	73.9	1.3	93.8	69.4	0.0	24.4
June	19.3	7.7	94.1	1.3	120.5	80.0	0.0	40.5
July	21.5	9.0	106.4	1.3	138.4	29.6	0.0	108.8
August	21.4	9.0	105.9	1.2	127.0	72.4	0.0	54.6
September	17.3	6.5	83.1	1.0	86.4	97.0	10.6	0.0
October	10.2	2.9	45.6	1.0	43.3	67.4	24.1	0.0
November	5.5	1.2	22.6	0.8	18.3	42.0	23.7	0.0
December	-0.9	0.0	0.0	0.8	0.0	72.7	72.7	0.0
Total	**8.8**	**43.4**			**662.2**	**747.1**	**313.2**	**228.3**
						662.2		
				Water Surplus		**84.9**	**mm**	

NOTES: 1) I = Heat Index
E = Evapotranspiration
2) (°C) - Represents calculated mean of daily temperatures for the month.
3) Data from the Strathroy - Mullifarry climatological station (located at latitude 42°58'N, longitude 81°38'W).
4) NA denotes data not available.
5) *Italics* denotes presented values based on incomplete data.

Table C-6
2023 Water Budget (Thornthwaite Method)
Twin Creeks Environmental Centre - Annual Monitoring Program

Month	Mean Temperature	I	E	Daylight Factor	E ADJ.	Total Precipitation	Surplus	Deficit
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)
January	-0.2	0.0	0.0	0.8	0.0	79.8	79.8	0.0
February	-1.1	0.0	0.0	0.8	0.0	41.2	41.2	0.0
March	0.7	0.1	2.3	1.0	2.3	144.8	142.5	0.0
April	8.8	2.4	38.7	1.1	43.4	104.6	61.2	0.0
May	13.2	4.3	61.3	1.3	77.8	23.6	0.0	54.2
June	18.2	7.0	87.9	1.3	112.5	92.4	0.0	20.1
July	20.9	8.7	103.2	1.3	134.1	184.6	50.5	0.0
August	18.7	7.3	90.9	1.2	109.1	162.8	53.7	0.0
September	17.6	6.7	84.7	1.0	88.0	64.4	0.0	23.6
October	11.9	3.7	54.2	1.0	51.4	98.4	47.0	0.0
November	3.4	0.6	13.1	0.8	10.6	51.4	40.8	0.0
December	3.0	0.5	11.3	0.8	8.8	92.4	83.6	0.0
Total	**9.6**	**41.2**			**638.2**	**1140.4**	**600.2**	**98.0**
						638.2		
				Water Surplus		**502.2**	**mm**	

NOTES: 1) I = Heat Index
E = Evapotranspiration
2) (°C) - Represents calculated mean of daily temperatures for the month.
3) Data from the Strathroy - Mullifarry climatological station (located at latitude 42°58'N, longitude 81°38'W).
4) NA denotes data not available.
5) *Italics* denotes presented values based on incomplete data.

Table C-7
2024 Water Budget (Thornthwaite Method)
Twin Creeks Environmental Centre - Annual Monitoring Program

Month	Mean Temperature	I	E	Daylight Factor	E ADJ.	Total Precipitation	Surplus	Deficit
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)
January	-2.0	0.0	0.0	0.8	0.0	136.0	136.0	0.0
February	0.7	0.1	2.2	0.8	1.8	8.8	7.0	0.0
March	3.6	0.6	13.9	1.0	14.3	71.2	56.9	0.0
April	9.6	2.7	42.5	1.1	47.6	96.8	49.2	0.0
May	16.2	5.9	77.1	1.3	98.0	147.8	49.8	0.0
June	20.0	8.1	98.0	1.3	125.5	90.6	0.0	34.9
July	21.4	9.0	105.9	1.3	137.6	230.0	92.4	0.0
August	20.5	8.4	100.8	1.2	121.0	64.2	0.0	56.8
September	18.4	7.2	89.1	1.0	92.7	69.4	0.0	23.3
October	11.7	3.6	53.3	1.0	50.6	59.6	9.0	0.0
November	6.8	1.6	28.7	0.8	23.3	57.8	34.5	0.0
December	0.0	0.0	0.0	0.8	0.0	125.0	125.0	0.0
Total	**10.6**	**47.1**			**712.3**	**1157.2**	**559.8**	**115.0**
						712.3		
				Water Surplus		**444.9**	**mm**	

NOTES: 1) I = Heat Index
E = Evapotranspiration
2) (°C) - Represents calculated mean of daily temperatures for the month.
3) Data from the Strathroy - Mullifarry climatological station (located at latitude 42°58'N, longitude 81°38'W).
4) NA denotes data not available.
5) *Italics* denotes presented values based on incomplete data.

APPENDIX C:

Table C-8 - Envision Rain Gauge Report

Table C-8
Precipitation Event Monitoring - RWDI Envision Rain Gauge Report
Twin Creeks Environmental Centre

Year:	2024											
Month:	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
Day	**Amount Recorded**											
1			3.0			13.2		0.2		8.8		
2				6.8	8.2	0.2		3.6				3.6
3	0.2				2.8							3.8
4				0.8		9.0					0.6	0.4
5			4.0	0.4	0.2		2.2	6.4	2.2		2.0	
6								23.2	25.2		0.2	
7	0.2			1.4	18.0				13.6			0.6
8		0.4	3.6		0.2	11.4						2.4
9	18.4		0.8			2.2	25.8		0.2		1.0	5.4
10	1.2		0.2	8.8	4.6	0.2	31.6				13.4	
11	1.8			15.6	19.0		0.2				1.6	0.2
12	8.6			9.8	2.2					2.4		
13							0.2			21.0		
14			8.0				14.4			0.2	7.8	
15		0.2					79.6			24.6	0.6	0.8
16			1.4	0.2	3.0		6.8	8.2		0.2		6.2
17			0.2	8.4	1.0		2.0	8.0			1.0	
18	1.8		0.2	2.0				6.0			0.2	
19	1.4		0.2	0.4	0.4	3.2						19.0
20	0.2				1.2						10.6	3.4
21	1.0					1.4					2.2	4.0
22	5.4		0.4			0.4			10.2		9.8	1.6
23	6.6						1.8		0.2	1.2		7.4
24	8.2				11.2		0.8		20.6			0.2
25	22.2		9.4		3.6	4.8			0.2		4.8	
26	0.8		3.8	1.0	23.2	21.4						
27	0.2	5.6		2.8	4.4	0.2		13.2				1.2
28	1.2			4.6	1.6	17.6			1.6	9.0		2.0
29				11.6		1.0	18.6					26.4
30	1.8		2.0				0.2	0.4	0.2			0.2
31			0.2									6.4
Subtotals	**81.2**	**6.2**	**37.4**	**74.6**	**104.8**	**86.2**	**184.2**	**69.2**	**74.2**	**67.4**	**55.8**	**95.2**
										Total	**936.4**	

Notes:

1) Units are in millimetres (mm) of liquid and/or liquid equivalent (i.e. snow melt)

2) *Italics* denotes that the climatic data from the local Strathroy-Mullifarry Climatological Station was used as the onsite rain gauge was not operational due to power failure.

APPENDIX C:

Table C-9 - Historical Precipitation Data Summary

Table C-9
Historical Precipitation Data Summary
Twin Creeks Environmental Centre

Year	Climatological Station Precipitation Total (mm/a)	On-site Precipitation Total (mm/a)
30-Year Normal (1961-1990)	711.9	-
30-Year Normal (1971-2000)	935.5	-
30-Year Normal (1981-2010)	959.2	-
30-Year Normal (1991-2020)	962.1	-
1995	868.7	-
1996, 1997	Complete annual data not available	-
1998	788.8	-
1999	805.1	-
2000	1,140.6	-
2001	867.2	-
2002	682.6	472.0
2003	982.8	726.7
2004	954.8	729.2
2005	898.3	577.0
2006	1,245.8	853.3
2007	804.4	699.8
2008	1,241.8	852.2
2009	1,001.8	729.1
2010	927.1	676.7
2011	1255.0	812.3
2012	860.2	592.7
2013	1,194.4	911.4
2014	895.6	829.5
2015	828.0	724.0
2016	1,012.8	816.5
2017	979.2	843.3
2018	1,169.6	951.3
2019	1007.6	808.6
2020	966.6	725.4
2021	1028.4	870.6
2022	747.1	634.8
2023	1140.4	906.2
2024	1157.2	936.4

Notes:

1) Dash (-) denotes climatologial station not operational

2) On-site precipiitation data collected from the automated RWDI Envision climatological station since 2019 instead of manual rain gauge readings, as in years prior.

APPENDIX D:

Borehole Logs

BOREHOLE LOG EXPLANATION FORM

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

DEPTH

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

STRATIGRAPHIC DESCRIPTION

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

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

* Extension of MIT Classification system unless otherwise noted.

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

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

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

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

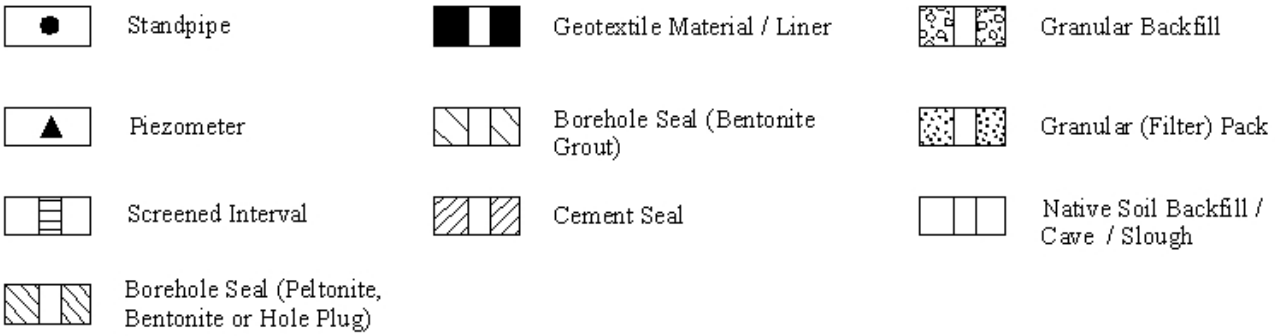
COHESIONLESS SOILS	COHESIVE SOILS		
Dry	DTPL	-	Drier Than Plastic Limit
Moist	APL	-	About Plastic Limit
Wet	WTPL	-	Wetter Than Plastic Limit
Saturated	MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

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

MONITOR DETAILS

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



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

SAMPLE

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

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

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

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

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

TEST DATA

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

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

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

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

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

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

REMARKS

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

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OW16-5
OW16-7

CLIENT LAIDLAW WASTE SYTEMS FILE NO. 400-841

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

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.- MARCH 1984

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

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

Penetrat Test: Blows / 1 — 25 50

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

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OW16-5
OW16-7

CLIENT LAIDLAW WASTE SYTEMS FILE NO. 400-841

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

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.- MARCH 1984

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

NOTES: ALL WELLS ARE IN SEPARATE HOLES

(B) DEEPEST BOREHOLE CONTINUOUSLY SAMPLED

WELL TYPE, SEE CONSTRUCTION DETAILS (end of Appendix)

BOREHOLE NO. OW16-6

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

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

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

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

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

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OW17-4
OW17-5
OW17-12

CLIENT LAIDLAW WASTE SYTEMS FILE NO. 400-841

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

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.- MARCH 1984

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

NOTES: ALL WELLS ARE IN SEPARATE HOLES

(B) DEEPEST BOREHOLE CONTINUOUSLY SAMPLED

WELL TYPE, SEE CONSTRUCTION DETAILS (end of Appendix)

morrison beatty limited

OW17-30

CLIENT LAIDLAW WASTE SYSTEMS FILE NO. 400-841

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

GEOLOGIST/ENGINEER WEC DATE COMPLETED FEB.-MARCH 1984

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

WELL DETAIL: 17-30 — EOH (E)

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

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

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

BOREHOLE NO. OW 19-29

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

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

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

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

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

BOREHOLE NO. OW 19-29

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

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

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

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

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

BOREHOLE - DW22A-10

PROJECT NAME: WARWICK LANDFILL SITE PROJECT NO.: 2970051.13

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

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

BOREHOLE LOG OW39A-26

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

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

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

BOREHOLE LOG OW39A-26

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

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

MONITORING WELL OW40E-4

RWDI AIR Inc.
600 Southgate Drive, Guelph

CLIENT Waste Management of Canada Corporation
PROJECT NAME T.C.E.C Monitoring Well Installation
PROJECT NUMBER 2301515
PROJECT LOCATION Watford, Ontario
DATE STARTED 24/3/20 **COMPLETED** 24/3/20
GROUND ELEVATION 238.075 mASL **HOLE DIAMETER** 206 mm
DRILLING CONTRACTOR Direct Environmental Drilling Inc.
COORDINATES
DRILLING METHOD 8 1/8" Hollow Stem Auger and MC5 Direct Push Sampler
PROJECTION: **ZONE:**
LOGGED BY JMH/JCL/JRA **CHECKED BY**
EASTING:
NOTES
NORTHING:

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
							Top of Well Pipe: 238.6 mASL
						TOPSOIL.	
						0.30 237.78	
						SILTY CLAY Mottled brown-grey silty clay to clayey silt with orange disseminated fine sand, trace angular to subangular gravel, APL, stiff.	Centralizer placed at 0.46 m depth.
1	MC 1	90					Seal: Hole Plug from 0 to 2.44 m depth.
2	MC 2	99					
3			45° Inclined well.				Seal: Baked Clay from 2.44 to 2.74 m depth.
							Centralizer placed at 3.05 m depth.
4	MC 3	100				stiff to firm at 3.84 metres depth.	No. 2 Silica Sand.
5	MC 4	100				0.15 m long fracture at 4.57 metres in depth filled with angular to subangular gravel.	#10 Slot PVC Well Screen.
6						6.08 232.00	

Borehole terminated at 6.08 metre depth.

RWDI GENERAL BH/TP/WELL 20240326 TCECBHLOGS 2402553.GPJ DATA TEMPLATE.GDT 24/3/28

BOREHOLE NO. OW40A-7

PROJECT NAME: TWIN CREEKS / WARWICK LANDFILL

PROJECT NO.: 02-970051.20

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION

DATE COMPLETED: Oct 10, 2008

BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER

SUPERVISOR: BJL

GROUND ELEVATION: 239.2 mASL

REVIEWER: PEJ

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 428873
Northing: 4757002

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

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

BOREHOLE NO. OW40A-28

PROJECT NAME: TWIN CREEKS / WARWICK LANDFILL

PROJECT NO.: 02-970051.20

CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION

DATE COMPLETED: Oct 10, 2008

BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER

SUPERVISOR: BJL

GROUND ELEVATION: 238.2 mASL

REVIEWER: PEJ

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

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

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

BOREHOLE NO. OW40A-28

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

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

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

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

OW46-7

CLIENT: Laidlaw Waste Systems FILE NO. 24729-016

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

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

STRATIGRAPHIC DESCRIPTION:

GROUND ELEVATION 239.8 masl

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

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

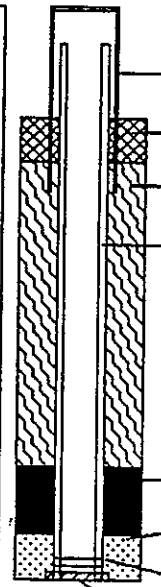
INTERSTADIAL CLAY: Minor silt, grey to red-brown, laminated, cohesive, plastic.

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

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

End of hole 6.55 mbgl.

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



WELL DETAIL

REMARKS

Lockable steel casing

Concrete seal

Bentonite grout

50mm Flush joint PVC casing

Bentonite seal

Grade #2 silica sand

50mm # 10 slot Flush joint PVC screen

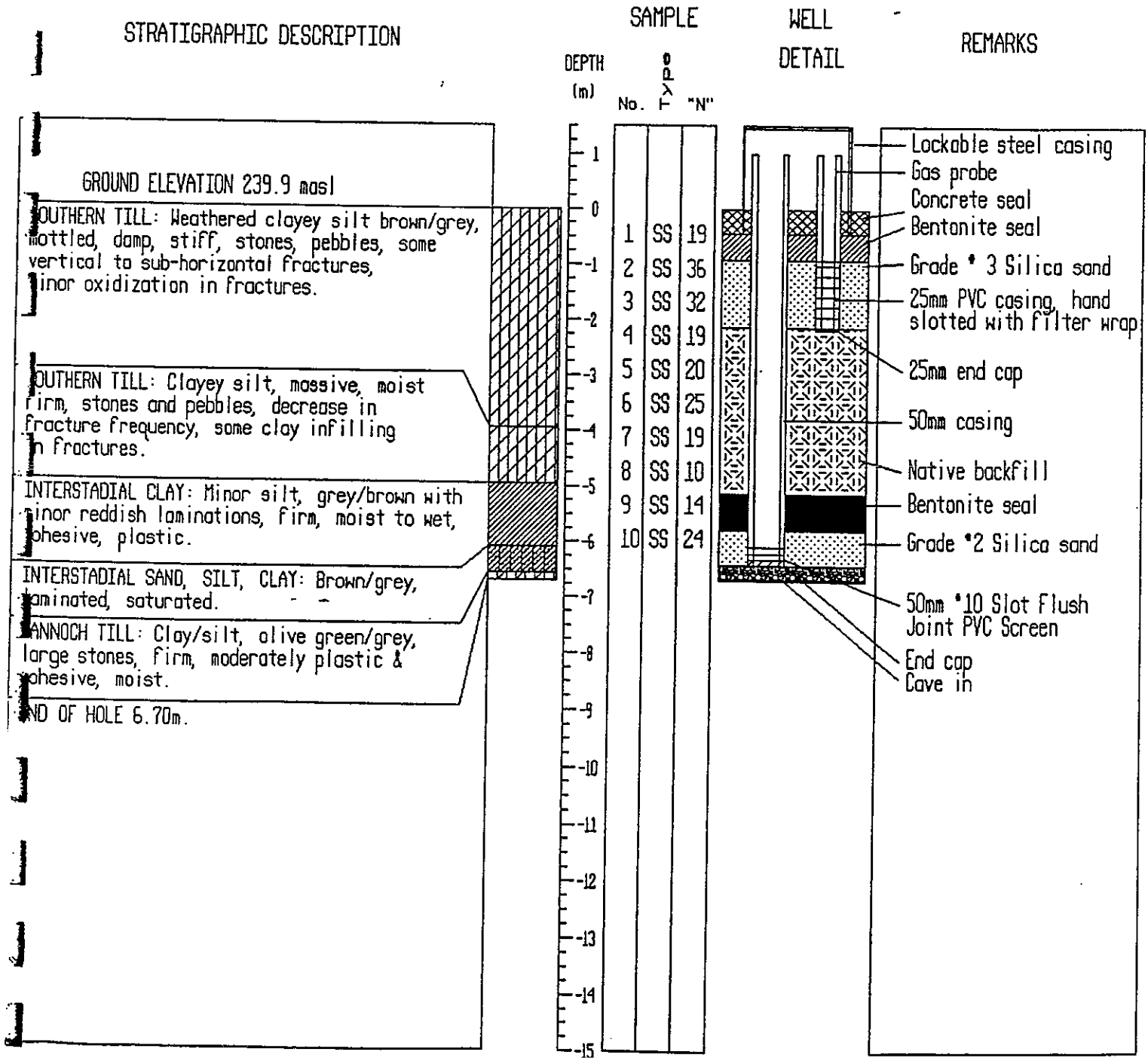
50mm friction fit end cap

OW47-6, GP

CLIENT: Laidlaw Waste Systems FILE NO. 24729-016

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

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



BOREHOLE NO. OW49-29

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 13, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 242.4 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	AGGREGATE FILL: SURFICIAL LAYER OF CRUSHED AGGREGATE FILL.										
0.1	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, TRACE MEDIUM GRAVEL, DAMP, FIRM, TRACE ROOTLETS.			SS1	8	18.2	93				
1.0				SS2	14	18.8	93				
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES FROM 1.1 m THEN BROWN AT 2.3 m BECOMING GREY AT 5.3 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND FINE TO MEDIUM GRAVEL, GREY FRACTURES FROM 1.5 TO 4.6 m, DTPL BECOMING WTPL AT 3.0 m, THEN DTPL AT 3.8 m BECOMING WTPL AT 5.3 m, STIFF BECOMING HARD AT 1.5 m THEN VERY STIFF AT 3.8 m BECOMING STIFF AT 4.6 m TRACE ROOTLETS.			SS3	32	16.8	97				
2.0				SS4	45	18.6	93		45		
3.0				SS5	54	22.6	60		54		
				SS9	11	22.2	12				
4.0				SS6	27	21.9	93				
5.0				SS7	12	25.4	93				
				SS8	7	21	93				
6.0											
7.0				SS10	14	26.2	97				
8.0				SS11	8	19.9	97				
9.0				SS12	13	19.5	90				
9.1	SILT: BROWN SILT, MOIST, DENSE.										
9.4	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL AND SILT NODULES (2 cm IN DIAMETER) FROM 10.1 TO 10.3 m, DTPL BECOMING APL AT 13.0 m.			SS13	49	12.1	93		49		
10.0				SS14	36	12.6	87				
11.0				SS15	36	12.8	93				
12.0				SS16	40	15.3	97				
				SS17	18	18.9	100				
13.0				SS18	15	16.9	100				
14.0				SS19	19	14.6	107				
15.0				SS20	15	16.9	100				

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

BOREHOLE NO. OW49-29

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

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

CONE PENETRATION "N" VALUE 10 20 30 — SHEAR STRENGTH
WATER CONTENT % 10 20 30 — W_P W_L

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

BOREHOLE NO. OW51A-15

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

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

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

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

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	'N' VALUE	% WATER	% RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0	CLAYEY SILT TO SILTY CLAY: BROWN, CLAYEY SILT TO SILTY CLAY CAP TO 1.8 m, DTPL.										
1.8	WASTE: WASTE TO 15.2 m, SATURATED AT 13.7 m.										
2											
4											
6											
8											
10				SS1	32		20				
				SS2	–		–				
				SS3	34		35				
12				SS4	37		50				
				SS5	>50		50		>50		
				SS6	–		–				
14				SS7	13		<5				
				SS8	7		<5				
15.2	CLAYEY SILT TO SILTY CLAY: GREY, CLAYEY SILT TO SILTY CLAY, APL TO WTPL, STIFF, MASSIVE, ORGANIC ODOUR, NO VISIBLE STAINING.			SS8	10		95				
15.8	BOREHOLE TERMINATED AT 15.8 m IN CLAYEY SILT TO SILTY CLAY.										
16											
18											
20											

Revision 2/ Aug 2003

JAGGER HIMS LIMITED

BOREHOLE NO. OW54A-4

PROJECT NAME: TWIN CREEKS/WARWICK LANDFILL

PROJECT NO.: 02-970051.20

CLIENT: WASTE MANAGEMENT CORPORATION OF CANADA

DATE COMPLETED: May 02, 2008

BOREHOLE TYPE: 110 mm GEOPROBE

SUPERVISOR: MOL

GROUND ELEVATION: 242.1 mASL

REVIEWER: BJL

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

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

BOREHOLE NO. OW54-10

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 13, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 242.4 mASL

REVIEWER: PEJ

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

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

BOREHOLE - DW56-4

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

BOREHOLE - OW57-15, OW57-4

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

BOREHOLE - DW58-14, DW58-4

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P, W_L)	REMARKS
0				1CC			60				BOREHOLE CONTINUOUSLY CORED.
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN AND GREY, TO GREY AT 3.5 m; CLAYEY SILT TO SILTY CLAY, TRACE DISSEMINATED FINE SAND AND GRAVEL, SILT TO SANDY SILT AT 6.1 m TO 6.2 m; ROOTLETS TO 1.7 m; DISCOLOURED FRACTURES TO 4.7 m; MASSIVE; DTPL TO WTPL; VERY STIFF TO FIRM. (SOUTHERN TILL)										
2				1SS	25		88				MONITORING WELLS INSTALLED IN SEPARATE BOREHOLES.
				2CC			70				
				2SS	19		100				SHALLOW BOREHOLE INCLINED AT 45 DEGREES.
				3CC			57				
4											
				3SS	10		5				
				4CC			70				
6											
				4SS	7		10				
				5CC			70				
7.6											
8	SILT: GREY; SANDY SILT TO SILT; MASSIVE; SATURATED; COMPACT.			5SS	18		85				
				6CC			75				
8.8											
	CLAYEY SILT: GREY; CLAYEY SILT, TRACE DISSEMINATED FINE SAND AND GRAVEL, SILT AT 12.6 m TO 12.8 m; FISSILE SHALE FRAGMENTS; MASSIVE; DTPL TO APL; VERY STIFF TO STIFF. (RANNOCH TILL)			6SS	21		80				
10				7CC			33				
				7SS	14		100				
				8CC			40				
12											
				8SS	9		100				
				9CC			55				
13.6											
14	SILT: GREY; SANDY TO CLAYEY SILT; COMPACT.										
14.3				10CC			50				
	BOREHOLE TERMINATED AT 14.3 m IN SILT.										
16											
18											
20											

BOREHOLE NO. OW58-6

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

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

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

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

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

Revision 2/ Aug 2003

JAGGER HIMS LIMITED

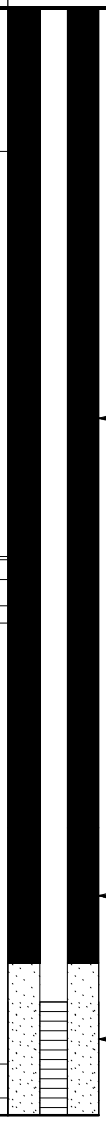
WELL OW58-17

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

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

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			2.13 Brown clayey silt to silty clay with trace sand, blocky, massive, DTP, stiff. Grey faced weathered fractures with black minal nodules ranging < 2mm. No odour, no visible staining.
			Blue-grey sandy clayey sand to sandy clay, homogenous, APL, soft, no odour, no visible staining.
5			
			8.15
			8.20 Blue-grey silty sand to sand silt, saturated, loose, no ocour, no staining.
			8.50 Blue-grey sandy clayey sand to sandy clay, homogenous, APL, soft, no odour, no visible staining.
			8.89 Brown sandy clay with trace gravel, homogenous, DTPL, stiff, no odour or visible staining.
			9.14 Brown sandy clay with trace gravel, homogenous, DTPL, stiff, no odour or visible staining.
10			
			Blue-grey clayey sand to sandy clay, trace of fine to coarse gravel, homogenous, APL, soft to firm, no odour or visible staining.
15			
			15.70
			16.20 Brown silty sand to sandy silt, homogenous, moist, loose to compact, no ocour, no visible staining.
			16.46 Brown sandy clay with trace gravel, homogenous, DTPL, stiff, no odour or visible staining.

Borehole terminated at 16.5 meter depth.



Monitor constructed of 51mm (2") PVC No.10 screen with steel protective casing.

Seal: Bentonite grout.

Seal: Clay

Sand Pack: No. 2 silica sand.

BOREHOLE - DW59-10, DW59-4

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

BOREHOLE NO. OW59-6

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

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

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

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

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

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

PROJECT NAME: WARWICK LANDFILL SITE PROJECT NO.: 297051.01

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

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

PROJECT NAME: WARWICK LANDFILL SITE PROJECT NO.: 297051.01

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

JAGGER HIMS LIMITED

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

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

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

PROJECT NAME: WARWICK LANDFILL SITE PROJECT NO.: 297051.01

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

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

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

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

WATER CONTENT % 10 20 30 — W_P W_L

BOREHOLE - DW62-30, DW62-7, DW62-4

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

BOREHOLE NO. OW62-5

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

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

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

GENIVAR

BOREHOLE - OW67-11, OW67-4

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

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

BOREHOLE TYPE: 108 mm ID HOLLOW STEM AUGER

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

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

BOREHOLE NO. OW68-5

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

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

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

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

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

BOREHOLE NO. OW69-5A

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

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

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

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

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

BOREHOLE NO. OW70B-5

PROJECT NAME: TWIN CREEKS/WARWICK LANDFILL

PROJECT NO.: 02-970051.20

CLIENT: WASTE MANAGEMENT CORPORATION OF CANADA

DATE COMPLETED: May 16, 2008

BOREHOLE TYPE: 168 mm GEOPROBE

SUPERVISOR: MOL

GROUND ELEVATION: 242.0 mASL

REVIEWER: BJL

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

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

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

BOREHOLE NO. OW71A-5

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

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

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

BOREHOLE NO. OW72-6

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

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

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

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

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

Revision 2/ Aug 2003

BOREHOLE NO. OW72-10

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

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

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

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

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0									10 20 30	10 20 30	
	CLAYEY SILT TO SILTY CLAY: GREY, CLAYEY SILT TO SILTY CLAY, DISSEMINATED FINE TO MEDIUM SAND, RUST COLOURED FRACTURES TO 4.4 m, DTPL BECOMING APL BY 4.6 WITH A LAYER WTPL FROM 7.3 m TO 8.0 m, VERY STIFF BECOMING FIRM AT 5.3 m, MASSIVE, SOME RED STAINING VISIBLE FROM 8.7 m TO 8.8 m, NO ODOURS.			SS1	17		50				
2				SS2	22		70				
				SS3	25		90				
4				SS4	20		95				
				SS5	9		95				
				SS6	8		95				
6				SS7	9		95				
				SS8	8		95				
8				SS9	6		95				
	SIITY SAND TO SANDY SILT: GREYISH BROWN, SILTY SAND TO SANDY SILT, DISSEMINATED COARSE SAND AND FINE GRAVEL, TRACE CLAYEY SILT NODULES, VERY LOOSE, SATURATED, NO VISIBLE STAINING, NO ODOURS.			SS10	10		90				
9.1											
9.2	CLAYEY SILT TO SILTY CLAY (TILL): GREY TO GREYISH GREEN, CLAYEY SILT TO SILTY CLAY, TRACE FINE GRAVEL, DTPL, HARD, NO VISIBLE STAINING, NO ODOURS.			SS11	31		–				
10											
10.4				SS12	31		–				
	BOREHOLE TERMINATED AT 10.4 m IN CLAYEY SILT TO SILTY CLAY (TILL).										
12											
14											
16											
18											
20											

Revision 2/ Aug 2003

BOREHOLE NO. OW73-6

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

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

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

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

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

Revision 2/ Aug 2003

BOREHOLE NO. OW73-9

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

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

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

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

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

Revision 2/ Aug 2003

JAGGER HIMS LIMITED

BOREHOLE NO. OW75-3

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: LMS

GROUND ELEVATION: 235.3 mASL

REVIEWER: PEJ

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

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

BOREHOLE NO. OW75-7

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 16, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 234.7 mASL

REVIEWER: PEJ

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

BOREHOLE NO. OW76-5

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 25, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MOL/LMS

GROUND ELEVATION: 237.5 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P — W_L)	REMARKS
0.0											
0.2	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, MOIST, FIRM.										BOREHOLE INCLINED AT 45 DEGREES.
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY AND RUSTY FRACTURES, THEN GREY FROM 3.7 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, TRACE COARSE SAND, DTPL TO APL, STIFF TO VERY STIFF, TRACE ROOTLETS.										
2.0											
3.0											
4.0											NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
4.7											
5.0	SILT: GREY SILT, WET, COMPACT.			CC1		17.9	100				
5.4	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, OCCASIONAL MEDIUM GRAVEL, WTPL, STIFF. BOREHOLE TERMINATED AT 5.4 m IN CLAYEY SILT TO SILTY CLAY.										
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

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

BOREHOLE NO. OW77-4

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: LMS

GROUND ELEVATION: 241.6 mASL

REVIEWER: PEJ

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

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

BOREHOLE NO. OW78-4

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 02, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 239.5 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT, TRACE ROOTLETS.										BOREHOLE INCLINED AT 45 DEGREES.
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, BECOMING BROWN WITH GREY FRACTURES FROM 1.1 m, THEN BROWN FROM 1.7 m, CLAYEY SILT TO SILTY CLAY, APL BECOMING DTPL AT 0.8 m, STIFF BECOMING VERY STIFF AT 0.8 m TO HARD AT 2.3 m, THEN VERY STIFF AT 3.0 m, TRACE ROOTLETS.										
2.0											NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
3.0				CC1		17.6	100				
3.9	BOREHOLE TERMINATED AT 3.9 m IN CLAYEY SILT TO SILTY CLAY.										
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

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

BOREHOLE NO. OW78-6

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 16, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 239.4 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	TOPSOIL: DARK BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT, TRACE ROOTLETS.			SS1	12	24.6	77				
1.0	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY, BECOMING BROWN WITH GREY FRACTURES FROM 1.1 m, THEN BROWN AT 1.7 m BECOMING GREY FROM 4.9 m, CLAYEY SILT TO SILTY CLAY, WITH INCREASED SILT CONTENT FROM 4.3 TO 5.3 m, APL BECOMING DTPL AT 0.8 m, THEN APL AT 4.6 m, STIFF BECOMING VERY STIFF AT 0.8 m TO HARD AT 2.3 m, THEN VERY STIFF AT 3.0 m, THEN STIFF AT 4.6 m BECOMING VERY STIFF AT 5.3 m.			SS2	21	18.8	100				
2.0				SS3	25	21.5	97				
3.0				SS4	50	21.2	57		50		
4.0				SS5	20	22.9	100				
5.0				SS6	17	21	107				
5.5				SS7	13	23.1	107				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
5.6	SAND: BROWN, FINE TO MEDIUM SAND, SUBROUNDED, POORLY SORTED, SATURATED, COMPACT.			SS8	23	19	93				
6.0											
6.3	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, APL, STIFF.										
7.0	BOREHOLE TERMINATED AT 6.2 m IN CLAYEY SILT TO SILTY CLAY.										
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

BOREHOLE NO. OW79-5

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 02, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 237.9 mASL

REVIEWER: PEJ

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

1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0

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

Jagger Hims Limited

BOREHOLE NO. OW79-7

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 25, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 237.8 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL WITH ROOTLETS, DAMP, FIRM.										
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES FROM 1.5 m, THEN BROWN AT 2.7 m, CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, DTPL BECOMING APL AT 3.0 m, STIFF BECOMING VERY STIFF AT 0.6 m THEN STIFF AT 1.8 m, TRACE ROOTLETS.			SS1	5	20.8	27				
				SS2	15	19.8	32				
				SS3	7	18.3	38				
4.1	SILT: BROWN SILT, MOIST, VERY DENSE.										
4.7	CLAYEY SILT TO SILTY CLAY: BROWN SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, FINE BROWN SILT NODULES (5 cm IN DIAMETER) FROM 6.1 TO 6.7 m, DTPL TO WTPL AT 5.5 m, THEN APL AT 6.0 m, STIFF BECOMING VERY STIFF AT 6.0 m.			SS4	5	25.9	42				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
				SS5	6	20.7	50				
6.7											
6.8	SAND: BROWN MEDIUM TO COARSE SAND, POORLY SORTED, SATURATED, COMPACT.			SS6	17	18.1	50				
7.4	CLAYEY SILT TO SILTY CLAY: GREY SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE TO MEDIUM SAND AND GRAVEL, APL, STIFF.										
	BOREHOLE TERMINATED AT 7.4 m IN CLAYEY SILT TO SILTY CLAY.										
15.0											

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

BOREHOLE NO. OW79-26

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 20, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 237.9 mASL

REVIEWER: PEJ

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

BOREHOLE NO. OW79-26

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

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (Wp, WL)	REMARKS
15.0	CLAYEY SILT TO SILTY CLAY: CONTINUED.			SS26	5	21.4	108				
16.0				SS27	11	13.8	75				
17.0				SS28	12	15	88				
				SS29	14	17.9	63				
18.0				SS30	15	14.2	50				
				SS31	19	14.9	83				
19.0				SS32	36	15.3	50				
20.0				SS33	20	17.2	96				
21.0				SS34	20	15.5	83				
				SS35	18	15.1	100				
22.0				SS36	21	15.7	108				
				SS37	24	16.8	108				
23.0				SS38	26	19.2	108				
24.0				SS39	17	16	104				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
				SS40	40	17.7	100				
25.0				SS41	60	11.9	42		60		
26.0				SS42	106	8.6	100		106		
26.2	SHALE:										BOREHOLE CAVED TO 26.2 m DURING WELL INSTALLATION.
26.4	SHALE, WEATHERED, FRACTURED, FISSILE.										
	BOREHOLE TERMINATED AT 26.4 m IN SHALE.										
27.0											
28.0											
29.0											
30.0											

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

BOREHOLE NO. OW80-3

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 03, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 235.4 mASL

REVIEWER: PEJ

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

BOREHOLE NO. OW80-6

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 09, 2006

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 235.5 mASL

REVIEWER: PEJ

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

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

BOREHOLE NO. OW80-27

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 06, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ/LMD

GROUND ELEVATION: 236.6 mASL

REVIEWER: PEJ

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

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

BOREHOLE NO. OW80-27

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

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

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

RWDI
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MONITORING WELL OW81-5

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

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

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

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

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MONITORING WELL OW81-7

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

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

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

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

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MONITORING WELL OW81-27

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

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

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

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

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MONITORING WELL OW81-27

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

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

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

SAMPLE							SUBSURFACE PROFILE			
DEPTH [mbgs] / ELEV. [mASL]	SAMPLE TYPE	NUMBER	"N" VALUE	RECOVERY (%)	RQD	REMARKS	DEPTH [mbgs]	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
15 – 221	SS	20	10	117			15.9		**CLAYEY SILT** Grey clayey silt, trace fine sand and gravel, APL to DTPL, stiff to hard.	Seal: timed-release bentonite pellets from 25.3 to 25.6 m depth. #10 slot PVC well screen. Filter pack: No. 2
16 – 220	SS	21	N/A	117						
17 – 219	SS	22	17	0						
18 – 218										
19 – 217	SS	23	21	100						
20 – 216	SS	24	12	117						
21 – 215										
22 – 214	SS	25	20	54						
23 – 213	SS	26	21	121			23.5		**SANDY CLAY SILT** Brown to grey sandy clay silt, some sandy clay, some fine to medium rounded gravel, trace silt, APL to WTPL, firm to stiff.	
24 – 212										
25 – 211	SS	27	87	0						
26 – 210									- Grey weathered shale encountered at 26.0 m and at 26.5 m. - Auger refusal at 27.4 m at shale bedrock.	
27 – 209	SS	28	32	92			27.4		Borehole terminated at 27.4 m depth.	

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MONITORING WELL OW82-5

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

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

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MONITORING WELL OW82-14

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

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION		WELL DIAGRAM
					FILL Light olive brown with yellowish brown mottled with strong brown silty clay, trace fine to medium sand, homogeneous, DTPL, stiff to very stiff. Presence of organic material and rootlets.		Surface Seal: Bentonite Chips.
					1.70	234.48	
2					**SILTY CLAY** Grey laminated with olive brown mottled with strong brown silty clay, trace fine to medium sand, thinly laminated, DTPL, stiff to very stiff. Presence of rootlets. Becoming olive brown laminated with grey silty clay, trace gravel, thinly laminated, DTPL, stiff to very stiff at 2.2 metres depth.		Hole Plug: Grout
4					Becoming dark grey with light olive brown silty clay, trace subangular gravel, thinly laminated, APL, soft at 3.7 metres depth.		
6					Laminations of light olive silty sand, trace fine sand, wet, loose from 5.0 to 6.7 metres depth.		
8					Lamination of olive brown silty sand to sandy silt, some fine sand, homogeneous, wet, soft at 7.2 metres. Becoming greyish brown laminated with dark greyish brown silty clay, thinly laminated, APL to WTPL at 7.3 metres.		
					8.10	228.08	
					SOUTHERN TILL Dark greyish brown silty clay, some medium to coarse gravel, thinly laminated, APL to DTPL, stiff.		Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
10					Becoming grey to dark grey, DTPL at 9.4 metres.		
12	SS 1	100	3-5-6-7 (11)				
	SS 2	110	1-4-5-6 (9)				Coated Bentonite.
	SS 3	110	7-4-4-3 (8)		13.40 Laminations of silty sand, homogeneous, wet to moist, loose from 13.1 to 13.4 metres.	222.78	No. 2 Silica Sand.
14	SS 4	125	7-8-7-7 (15)		13.60	222.58	
					14.00 **SAND** Dark grey medium to coarse sand, homogeneous, moist to wet, medium dense.	222.18	#10 Slot PVC Well Screen.
					RANNOCH TILL Dark grey to grey silty clay to clay, some medium to coarse subangular gravel, thinly laminated, DTPL, stiff.		
					Borehole terminated at 14.02 metre depth.		

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

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MONITORING WELL OW82-28

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

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

(Continued Next Page)

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

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

MONITORING WELL OW82-28

CLIENT Waste Management of Canada Corporation

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

PROJECT NUMBER 2202274

PROJECT LOCATION Watford, Ontario

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

RWDI AIR Inc.
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MONITORING WELL OW83-5

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

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

RWDI AIR Inc.
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MONITORING WELL OW83-9

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

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

Borehole terminated at 9.45 metre depth.

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

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MONITORING WELL OW83-29

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

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

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RWDI AIR Inc.
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MONITORING WELL OW83-29

CLIENT Waste Management of Canada Corporation

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

PROJECT NUMBER 2202274

PROJECT LOCATION Watford, Ontario

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

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MONITORING WELL OW84-6

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

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
			45° Inclined well.		**FILL** Dark grey mottled with strong brown silty clay, trace fine sand, trace medium gravel, homogeneous, DTPL, soft to firm. Presence of organic material and rootlets.	Monitoring well constructed using 51 mm inside diameter, schedule 40 flush joint PVC casing.
					1.50 / 241.68 **SILTY CLAY** Light grey with olive brown mottled with strong brown silty clay, trace fine sand, trace medium to coarse gravel, thinly laminated, DTPL to APL, stiff. Presence of rootlets..	
2						
4						Hole Plug: Bentonite Hole Plug from 0 to 7.16 m depth.
6	MC 1	100			Becoming dark grey, APL, soft at 7.2 metres depth.	Coated Bentonite from 7.16 to 7.62 m depth.
8	MC 2	100			Becoming very soft at 8.5 metres depth. Laminations of dark grey eith olive brown silt (2 cm thick) encountered at 8.6 to 8.7 metres depth.	Geotextile fabric. No. 2 Silica Sand. #10 Slot PVC Well Screen.
					9.14 / 234.04 Borehole terminated at 9.14 metre depth.	

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

RWDI AIR Inc.
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MONITORING WELL OW84-11

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

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

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MONITORING WELL OW84-31

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

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

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MONITORING WELL OW84-31

CLIENT Waste Management of Canada Corporation

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

PROJECT NUMBER 2202274

PROJECT LOCATION Watford, Ontario

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/20/22

BOREHOLE NO. OW85-5

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 02, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 240.0 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DRY, SOFT TO FIRM.										BOREHOLE INCLINED AT 45 DEGREES.
0.6											
1.0	CLAYEY SILT TO SILTY CLAY: BROWN/GREY BECOMING GREY FROM 4.5 m, CLAYEY SILT TO SILTY CLAY, SOME COARSE SAND, DTPL, STIFF, VERY STIFF FROM 1.8 m TO 2.4 m, FRACTURES WITH CALCIUM DEPOSITS FROM 0.6 m TO 2.4 m.										
2.0											
3.0											NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
4.0				CC1		20.5	100				
4.9											
5.0	BOREHOLE TERMINATED AT 4.9 m IN CLAYEY SILT TO SILTY CLAY.										
6.0											
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											

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

BOREHOLE NO. OW85-8

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 240.1 mASL

REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	TOPSOIL: BROWN, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT TO FIRM.			SS1	4	17.9	67				
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES FROM 1.2 m, THEN BROWN FROM 3.3 m, SILTY CLAY TO CLAYEY SILT WITH DISSEMINATED FINE SAND AND GRAVEL, TRACE COARSE SAND, DTPL BECOMING APL AT 3.7 m, FIRM TO STIFF, OCCASIONAL MINERALIZATION IN FRACTURES FROM 0.6 TO 2.4 m.			SS2	13	16.4	100				
1.0				SS3	15	19	92				
2.0				SS4	18	22.6	92				
				SS5	12	21.1	100				
3.0				SS6	11	19.1	104				
4.0				SS7	8	18.2	104				
4.1	SILT: BROWN BECOMING GREY AT 4.9 m, SILT WITH OCCASIONAL CLAY POCKETS, MOIST BECOMING WET AT 6.3 m, COMPACT.			SS8	14	16.4	108				
5.0				SS9	12	16.7	104				NATIVE CLAY BACKFILL WAS PLACED ABOVE THE FILTER PACK.
				SS10	11	17.8	104				
6.0				SS11	8	20.7	100				
6.9	CLAYEY SILT TO SILTY CLAY: GREY CLAYEY SILT TO SILTY CLAY WITH DISSEMINATED FINE SAND AND GRAVEL, APL TO 11.0 m BECOMING WTPL, STIFF BECOMING FIRM AT 12.8 m.			SS12	11	18.3	104				
7.0				SS13	10	16.7	104				
8.0											BOREHOLE WAS OVERDRILLED AND SUBSEQUENTLY BACKFILLED WITH NATIVE CLAYEY SOIL FOR WELL INSTALLATION.
				SS14	6	16.6	117				
9.0				SS15	11	16.2	104				
				SS16	10	17.1	104				
10.0				SS17	9	17.4	104				
				SS18	8	17.8	104				
11.0				SS19	8	22.5	104				
12.0				SS20	8	16.8	104				
				SS21	6	15.7	96				
13.0				SS22	7	16.8	104				
				SS23	7	16.2	104				
14.0											
14.0	BOREHOLE TERMINATED AT 14.0 m IN CLAYEY SILT TO SILTY CLAY.										
15.0											

BOREHOLE NO. GP1A

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

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

BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER | **SUPERVISOR:** MEQ

GROUND ELEVATION: 238.9 mASL | **REVIEWER:** PEJ

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

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

BOREHOLE NO. GP2

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 25, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 237.9 mASL

REVIEWER: PEJ

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

BOREHOLE NO. GP3

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Mar 09, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 235.5 mASL

REVIEWER: PEJ

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

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

BOREHOLE NO. GP4

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

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

BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: MEQ

GROUND ELEVATION: 237.9 mASL
REVIEWER: PEJ

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

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

BOREHOLE NO. GP5

PROJECT NAME: TWIN CREEKS LANDFILL
PROJECT NO.: 02-970051.32
CLIENT: WASTE MANAGEMENT OF CANADA CORPORATION
DATE COMPLETED: Aug 21, 2009
BOREHOLE TYPE: 168 mm HOLLOW STEM AUGER
SUPERVISOR: MEQ
GROUND ELEVATION: 241.1 mASL
REVIEWER: PEJ

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0.0											
0.2	TOPSOIL: BROWN/GREY, CLAYEY SILT TO SILTY CLAY TOPSOIL, DAMP, SOFT TO FIRM.			SS1	4	18.6	100				GEOTEXTILE FABRIC SEPARATOR INSTALLED AT 0.46 m.
	CLAYEY SILT TO SILTY CLAY: MOTTLED BROWN/GREY BECOMING BROWN WITH GREY FRACTURES AT 1.3 m THEN BROWN AT 2.1 m BECOMING GREY AT 3.7 m, CLAYEY SILT TO SILTY CLAY, WITH DISSEMINATED FINE TO COARSE SAND AND FINE GRAVEL, DTPL TO APL AT 3.7 m, FIRM BECOMING STIFF AT 0.8 m, THEN VERY STIFF AT 1.5 m BECOMING STIFF AT 3.0 m, THEN FIRM AT 3.8 m.			SS2	12	16.8	92				
2.0				SS3	19	23.8	92				
				SS4	20	19.5	100				
3.0				SS5	12	21.8	96				
4.0				SS6	7	22.8	100				
5.0				SS7	6	24.6	92				
5.2	BOREHOLE TERMINATED AT 5.2 m IN CLAYEY SILT TO SILTY CLAY.										
6.0											
7.0											
8.0											
9.0											
10.0											

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

BOREHOLE NO. GP6

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 27, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 241.5 mASL

REVIEWER: PEJ

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

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

BOREHOLE NO. GP7

PROJECT NAME: TWIN CREEKS LANDFILL

PROJECT NO.: 02-970051.13

CLIENT: WASTE MANAGEMENT OF CANADA CORP.

DATE COMPLETED: Feb 26, 2009

BOREHOLE TYPE: 200 mm DIA. HOLLOW STEM AUGER

SUPERVISOR: MEQ

GROUND ELEVATION: 240.6 mASL

REVIEWER: PEJ

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

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

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

GAS PROBE GP8

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

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

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

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

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

MONITORING WELL GP9

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

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

Borehole terminated at 5.50 metre depth.

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/25/22

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

MONITORING WELL GP10

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

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

RWDI GENERAL BH/TP/WELL 20220714 RWDI 2202274 BHLG MONITORINGWELLSANDGASPROBES.GPJ DATA TEMPLATE.GDT 7/25/22

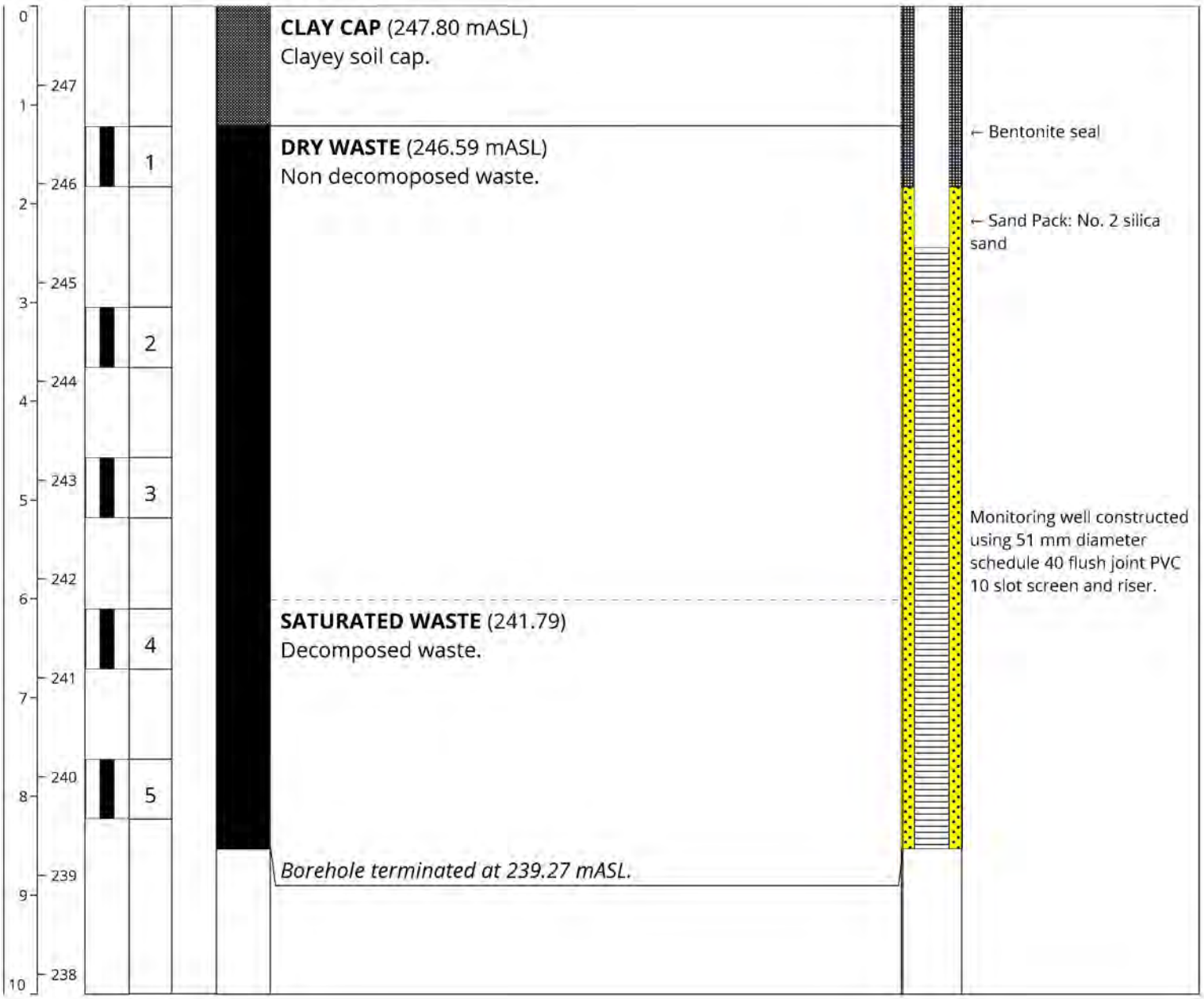
RWDI
530-4510 Rhodes Drive, Windsor, ON N8W 5K5
Tel: 519.823.1311 Fax: 519.823.1316

MONITORING WELL LW1

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

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

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



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MONITORING WELL LW2

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

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

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

0 / 248 — **CLAY CAP** (248.85 mASL)
Clayey soil cap.

1 / 247 — **DRY WASTE** (247.64 mASL)
Non decomoposed waste.

2 / 246 — 1

3 / 245 — 2

4 / 244 — 3

5 / 243 — 4

6 / 242

7 / 241 — 5

8 / 240

9 / 239 — 6 — **SATURATED WASTE** (239.71 mASL)
Decomposed waste.

10 — *Borehole terminated at 239.4 mASL.*

← Bentonite seal

← Sand Pack: No. 2 silica sand

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

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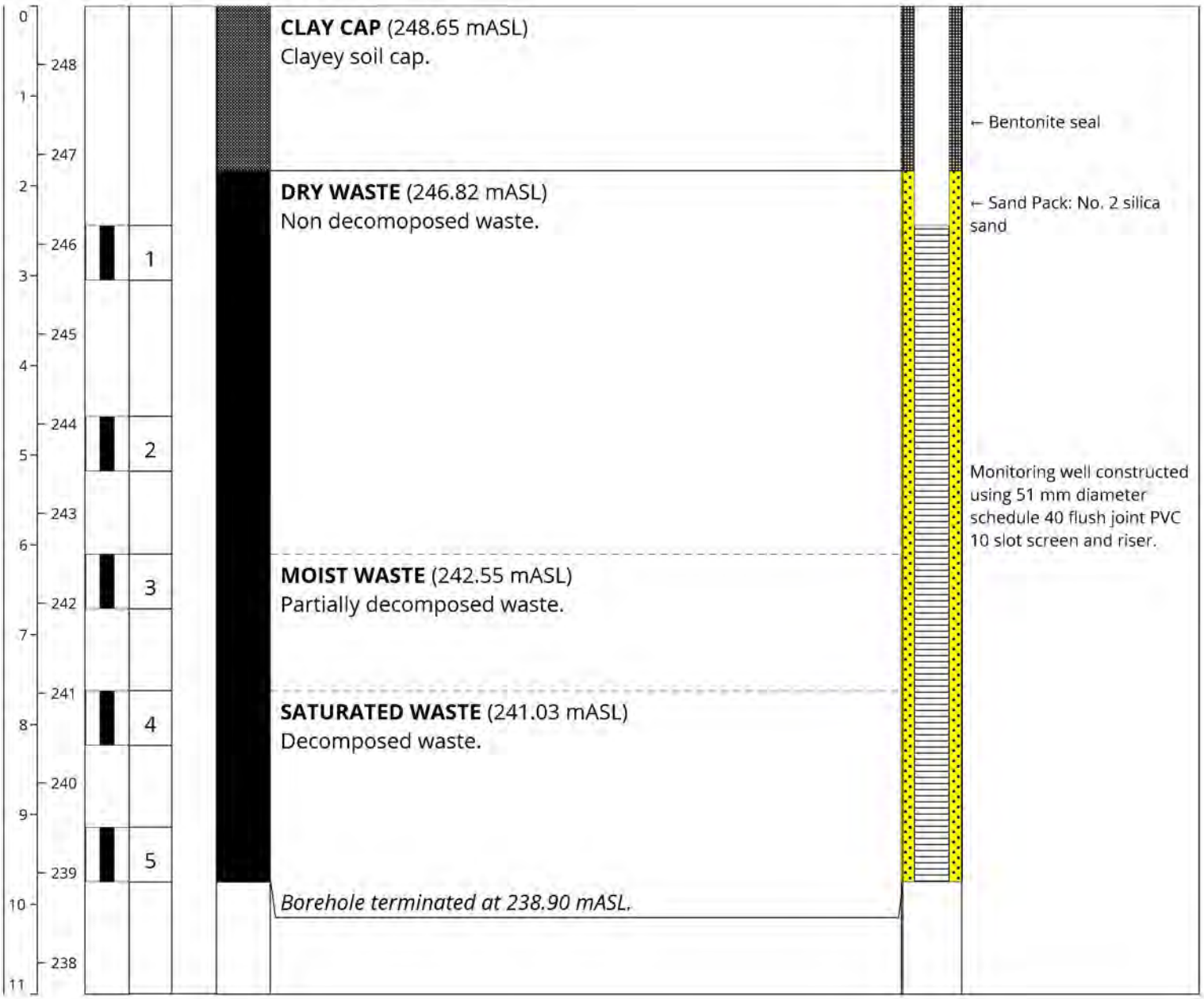
MONITORING WELL LW3

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

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

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



CLAY CAP (248.65 mASL)
Clayey soil cap.

DRY WASTE (246.82 mASL)
Non decomoposed waste.

MOIST WASTE (242.55 mASL)
Partially decomposed waste.

SATURATED WASTE (241.03 mASL)
Decomposed waste.

Borehole terminated at 238.90 mASL.

← Bentonite seal

← Sand Pack: No. 2 silica sand

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

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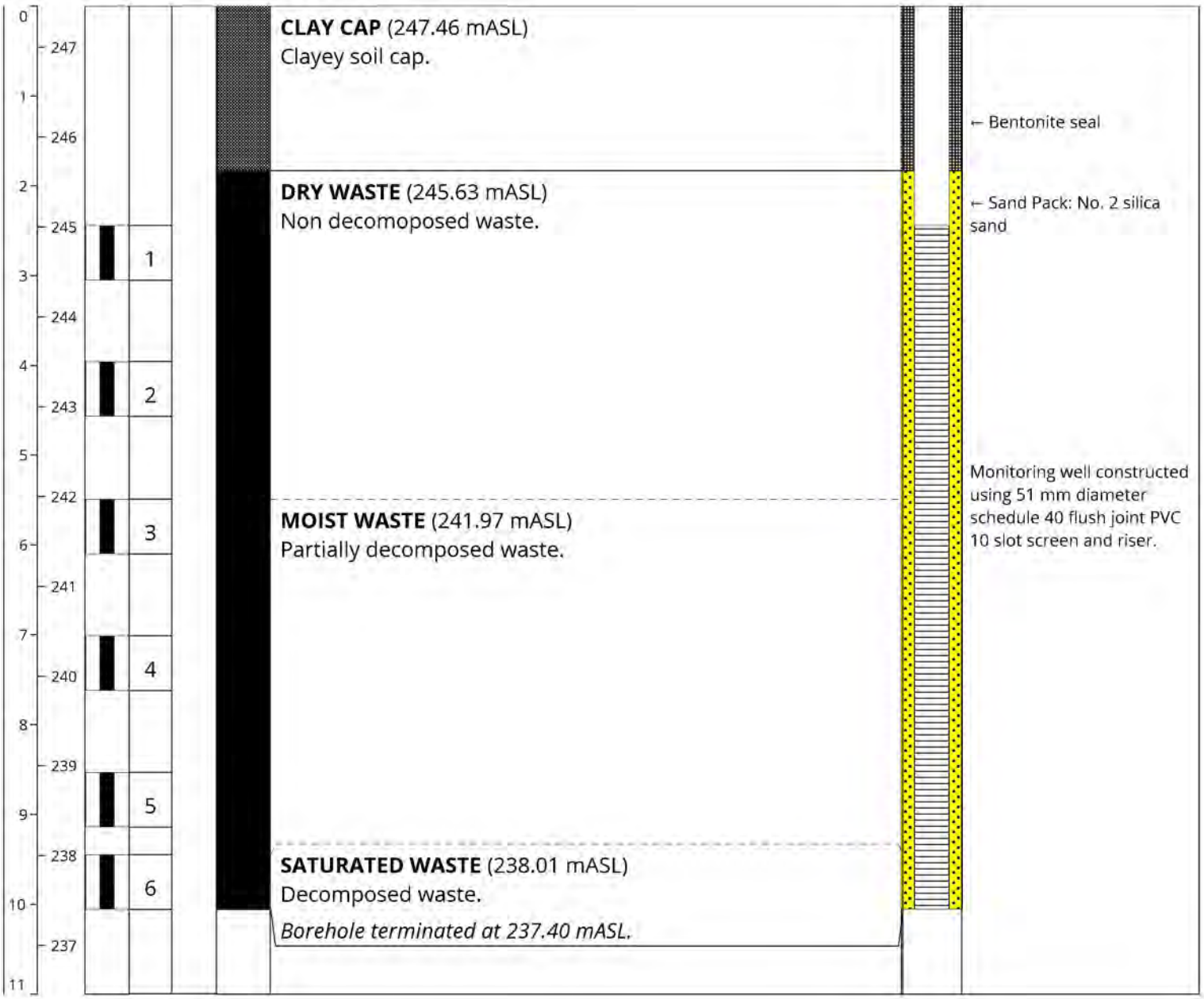
MONITORING WELL LW4

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

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

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



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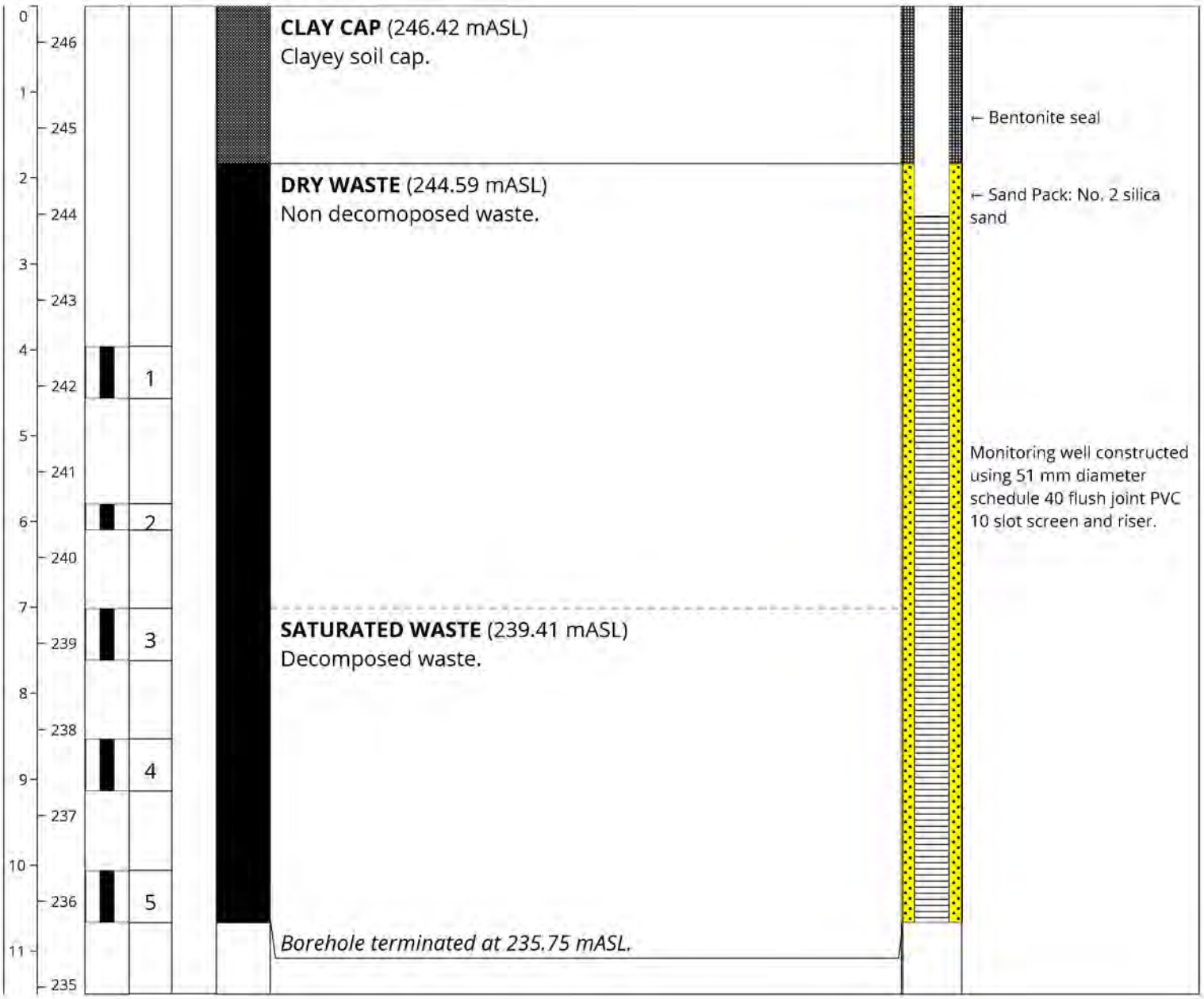
MONITORING WELL LW5

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

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

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



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MONITORING WELL LW6

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

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

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

0 — 247
1 — 246
2 — 245
3 — 244
4 — 243
5 — 242
6 — 241
7 — 240
8 — 239
9 — 238
10 — 237
11 — 236
12 — 235
13 — 234

CLAY CAP (247.00 mASL)
Clayey soil cap.

DRY WASTE (243.04 mASL)
Non decomoposed waste.

MOIST WASTE (236.94 mASL)
Partially decomposed waste.

Borehole terminated at 234.81 mASL.

1 2 3 4 5 6

← Bentonite seal

← Sand Pack: No. 2 silica sand

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

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PIEZOMETER P1

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

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

SAMPLE			SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				**TOPSOIL** (239.17 mASL)	← Bentonite seal
239				**CLAYEY SILT TO SILTY CLAY** (239.02 mASL)	← Geotextile (above sand pack) ← Sand pack: No. 2 silica sand
1					← Piezometer constructed using 51 mm diameter schedule 40 flush joint PVC 10 slot screen and riser.
238				Borehole terminated at 238.00 mASL.	

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

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PIEZOMETER P2

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

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

SAMPLE				SUBSURFACE PROFILE		
DEPTH [mbgs] ELEV. [mASL]	SAMPLE TYPE NUMBER	RECOVERY %	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	
0				**TOPSOIL** (239.34 mASL)		← Bentonite seal
				CLAYEY SILT TO SILTY CLAY (239.19 mASL)		← Geotextile (above sand pack) ← Sand pack: No. 2 silica sand
239						
1						← Piezometer constructed using 51 mm diameter schedule 40 flush joint PVC 10 slot screen and riser.
238				Borehole terminated at 238.00 mASL.		

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

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PIEZOMETER P3

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

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

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

0

TOPSOIL (239.37 mASL)

CLAYEY SILT TO SILTY CLAY (239.22 mASL)

239

1

238

Borehole terminated at 238.00 mASL.

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

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

APPENDIX E:

Field Protocols

REPORT

GENERAL FIELD SAMPLING PROTOCOLS

LAST UPDATED: FEBRUARY 11, 2019

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1 SURFACE WATER MONITORING

Surface water flow is typically precipitation dependent. When sufficient precipitation occurs to produce flowing conditions within the surface water drainage network, flowing water is monitored to assess potential effects from leachate to runoff flowing over the landfill cap and/or waste disposal area. Surface water sampling will typically consist of the general protocols noted below.

- If sampling is occurring within a drainage ditch, the surface water flow rate should be measured in the field. The flow rate may be determined by measuring the approximate width and depth of the ditch and/or channel. To measure velocity, a floating object may be used to measure the time it takes it to travel (float) a specified distance. Thus, the cross-sectional area of the ditch and/or channel (width X depth) times the velocity per distance gives a flow rate. The floating object may be used several times and an average water velocity may be calculated. Care should be taken to account for windy conditions and that the floating object is not influenced by wind or hindered by ancillary vegetative growth and/or debris.
- An unpreserved sampling bottle typically used as part of the sampling suite of bottles may be used to scoop water from the ditch/channel and to fill the required bottle set.
- Field chemical assessment may be completed within the ditch/channel. If the ditch/channel depth does not allow proper submergence of the field equipment, it is recommended that an inert, non-preserved sampling bottle be filled to perform the field testing. Field measurement for dissolved oxygen may not be possible during low flow conditions.
- During water retrieval, care should be taken as to minimize the collection of floating detritus/debris and the disturbance of bottom sediment. If the sampler is able to stand within the ditch/channel to conduct the sampling, water should be collected upstream to minimize impacts from disturbed sediment.
- Sample preservation and volatile organic sampling protocols should adhere to Sections 6.2 and 6.3, respectively, of this protocol.
- Sample handling and sampling equipment decontamination protocols should adhere to Sections 7 and 9, respectively, of this protocol.

1.1 Sampling DOC in Surface Water

- Attach a decontaminated funnel to a new unused piece of Waterra® tubing that is approximately 1 meter in length.
- Connect a QED filter to the Waterra® tubing using a QED discharge tube as a connector.
- Slowly pour sample water into funnel from sampling container and permit approximately 425 mL of water to gravity drain out through the filter and discard.
- Do not force the water through the filter by blowing or using pressurized air since sediment or filter media may be forcibly passed through the filter and affect sample analytical results.
- Collect a sample for DOC into the dedicated preserved bottle (approximately 125 ml) after discarding approximately 425 mL of water through the filter.

2 WELL DEVELOPMENT

Monitoring wells should be developed to remove drilling fluids and sediment introduced during drilling. Development would continue until the discharge water is relatively sediment free. If properly performed, development will improve the hydraulic properties of the filter pack.

The procedure is as noted below.

- Wells will be developed by one of the two methods noted below.
  - Pumping with an inertial lift pump assemblage. The pump consisting of dedicated polyethylene tubing with a check valve at the downhole end.
  - Pumping with a small diameter submersible pump.
- Equipment will be assembled and decontaminated prior to installation in the well. Care will be taken not to introduce sediment or contamination with the equipment during installation.
- Develop the well by purging/pumping water from the well until three (3) well volumes are measured or until purged/pumped to dryness. The effectiveness of the development is monitored at regular intervals by observing the turbidity of the discharge water. Additionally, electrical conductance, temperature and pH measurements will also be taken periodically during development. These measurements along with the volume of water removed will be recorded in the field.

3 LIQUID LEVEL MONITORING

Water level and fluid pressure transducers can be used to determine groundwater flow directions and, when combined with hydraulic gradient data, flow rates. Water levels are measured in wells using a portable water level meter consisting of an electronic probe attached to a coaxial graduated cable. When the probe makes contact with the liquid, a circuit is completed and an alarm sounds.

The depth to water can be read from the probe's graduated cable. Pressure transducer information can be downloaded from the datalogger to a laptop computer on a routine basis.

The procedure for obtaining water level information is as noted below.

- Carefully remove the well cap to avoid introduction of foreign material into the well.
- Lower the pre-cleaned water level probe slowly down the monitoring well until an audible alarm sounds. This indicates that the probe has contacted the liquid.
- Determine the depth to the top of liquid in the monitoring well from the graduated cable. Use the highest point on the well riser to reverence the depth to liquid. Repeat the measurement a second time for confirmation.
- Record the water level to the nearest 0.01 m in the project designated Field Book.
- Check historical liquid level measurements for the well, if available. If liquid level varies more than 0.1 m from the previous reading, re-check liquid level for confirmation.
- Slowly remove the probe from the monitoring well and dry the cable and probe with clean tissue as they are removed. Decontaminate the probe between monitoring wells following the decontamination protocols presented in Section 9.

4 FIELD HYDRAULIC CONDUCTIVITY TESTING

A Hydraulic Conductivity Test (or Slug Test) is a common method used to determine the in-situ hydraulic conductivity of the hydrostratigraphic unit adjacent to a monitoring well screen. This is accomplished by analyzing the water level response with time in the monitor following either an induced decrease (Rising Head Test) or induced increase (Falling Head Test) in water level.

4.1 Rising Head Test

The procedure for completing a Rising Head Test is as noted below.

- Measure and record the static water level as outlined in Section 2. Only wells that have fully recovered to static level conditions should be slug tested.
- Calibrate and setup a pressure transducer into the monitoring well at a point below any inertial lift or submersible pump. If the well is thought to have a high hydraulic conductivity (based on observed lithology during drilling), it is preferable to use a direct read cable so that real time data may be observed during testing. Otherwise, the pressure transducer should be hung on an inert down borehole cable.
- Prepare the apparatus for removing the water column from the monitor. Equipment could include a dedicated inertial lift pump, if previously in place in the well, a bailer or a submersible pump.
- Remove water from the well as quickly as possible.
- Upon removal of the desired volume of water from the well, start a stopwatch, and record the actual time and initial water level.
- Record the water level response versus time at 10 second intervals for the first 5 minutes of the test.
- Examine the collected data and establish an approximate rate of water level recovery. By noting levels and completing the calculations on the Hydraulic Conductivity Field Data Record, estimate the time required for the water level to achieve a pre-determined level. From this estimate, establish a schedule of water level measurements such that a sufficient database is available for analysis.
- Terminate the test the pre-determined head level is attained.

4.2 Falling Head Test

With respect to leachate wells it is preferable not to draw contaminated liquid to surface. In such instances it would be preferable to complete a falling head test where a slug of water is introduced to the well and the rate of liquid level decrease is measured over time.

It should be noted that any leachate characterization work should be completed prior to commencing with a falling head test.

The procedure for completing a Falling Head Test is as noted below.

- Measure and record the static water level as outlined in Section 2. Only wells that have fully recovered to static level conditions should be slug tested.
- Calibrate and setup a pressure transducer into the monitoring well. If the well is thought to have a high hydraulic conductivity (based on observed lithology during drilling), it is preferable to use a direct read cable so that real time data may be observed during testing. Otherwise, the pressure transducer should be hung on an inert down borehole cable.
- Prepare a measured amount of potable water, sufficient enough to raise the head in the well by a minimum of 2 m above the sand pack within the well.
- Introduce water from the well as quickly as possible.
- Upon introduction of the desired volume of water into the well, start a stopwatch, and record the actual time and initial water level.
- Record the water level response versus time at 10 second intervals for the first 5 minutes of the test.
- Examine the collected data and establish an approximate rate of water level recovery. By noting levels and completing the calculations on the Hydraulic Conductivity Field Data Record, estimate the time required for the water level to achieve a pre-determined level. From this estimate, establish a schedule of water level measurements such that a sufficient database is available for analysis.
- Terminate the test when the pre-determined head level is attained.

5 GROUNDWATER AND LEACHATE SAMPLING

5.1 Monitoring Well Purging

Monitoring wells should be purged prior to sampling such that groundwater and leachate samples are representative of the formation being assessed. Purging involves the removal of at least three volumes of liquid in those monitoring wells with moderate yields and at least one well volume from monitoring wells with low yields (slow water level recovery). Purging can be accomplished by a number of methods including pumping with a submersible pump or an individually dedicated inertial lift pump assemblage.

Selection of purging equipment will depend on the anticipated water level recovery rate as outlined in the third step of the procedure noted below.

- Carefully remove the well cap to avoid introducing foreign materials into the well.
- Determine the depth to water in the monitoring well per Section A.8 of this document. Calculate the volume of liquid in the well using the following formula:

$$V_c = \pi\,(D - W) l^2 x\ 1000$$

Where, V_c = Volume in well casing (litres)
l = inside radius of casing (m)
D = well depth (m)
W = depth to water from top of riser (m)
π = 3.1415

- Purge the well by pumping. For deep wells with large volumes of liquid and quick level response, pumping is the most effective method of well purging. Bailing is appropriate for shallow wells with slow liquid level recovery rates.
- Measure the purged volume of liquid using a graduated container and record the volume of water and number of well volumes removed.
- Continue purging until the predetermined volume of liquid is removed. Record electrical conductance, pH, temperature, and turbidity observations during purging. The stability of these measurements with time can be used to guide the decision to discontinue purging.
- Well purging data should be recorded in the project designated Field Notebook on the Development/Purging Record.
- Collect groundwater/leachate samples as soon as there is sufficient volume of liquid in the well, in accordance with the protocol specified in Section 5.2.
- Typically, a dedicated water level tape is used for leachate monitoring wells only.
- Leachate sampling from maintenance holes is typically completed using a dedicated bailer per sampling location.

5.2 Sampling with Inertial Lift Pump

An inertial lift pump can be used to collect groundwater samples from most wells. A typical inertial lift pump consists of a length of high density polyethylene tubing with a foot valve on the downhole end of the tubing.

By rapid up-and-down movement of the tubing, the groundwater is drawn through the foot valve and up the tubing to the surface where it can be collected for chemical analysis.

The procedure is as noted below.

- Wearing disposable nitrile gloves, attach the foot valve to the downhole end of the tubing and test that the connection is tight by pulling vigorously on the foot valve. Only new polyethylene tubing and foot valves should be used. The tubing and foot valve should be dedicated to the monitoring well.
- Place the foot valve and tubing down the monitoring well to the desired sampling depth and cut the tubing approximately 1.2 metres above the top of the well casing.
- Rapidly raise and lower the tubing, thus lifting a water column in the tubing an equal distance to each stroke length. Repeat the up-and-down motion, at a rate of approximately 90 strokes per minute, until water discharges from the tubing.
- If the monitoring well has not been purged, the inertial lift pump can be used for purging prior to sample collection, as outlined in Section 5.1 of this document. Discharge water from the inertial lift pump should be collected into a graduated container to monitor the volume of water removed.
- Once the monitoring well has been purged and recovered sufficiently, repeat the third step to retrieve a sample of groundwater from the monitoring well. Samples should be collected from the pump's discharge directly into sample bottles. Refer to Section 6.1, for the protocol to field filter aqueous metal samples. Refer to Section 6.3 for the protocol to collect volatile organic samples with the inertial lift pump.

The sample handling and collection order should be in accordance with the protocol specified in Section 7.1 of this document.

5.3 Sampling with a Bladder Pump

Groundwater samples at WM sites are collected via QED bladder pumps equipped with high density polyethylene tubing that are dedicated to each individual monitoring well to minimize cross contamination and to encourage the reuse of equipment/supplies and minimize waste. To further minimize cross contamination between wells, clean nitrile gloves should be worn during sample collection activities.

A representative groundwater sample is collected from the groundwater monitoring well locations following the minimal purge sampling method. The minimal purge sampling method requires that a minimum volume of standing water be removed from the pumping system prior to collecting a sample. Thus, the volume of water to be purged consists of one volume of the bladder plus one volume of the discharge tubing.

The field methodology noted below may be utilized to conduct minimal purge groundwater sampling.

- Carefully remove the well cap to avoid introducing foreign materials into the well.
- Before sampling groundwater, determine the depth to water in the monitoring well using a water level contact meter. The meter should be cleaned using phosphate-free detergent between monitoring locations before taking a reading to minimize cross-contamination.
- Calculate the volume of liquid in the discharge line using the following formula:

$$V_d = ((\pi\ (L) r^2) * 1000) + VB$$

Where, V_d = Volume in discharge line (L)
r = inside radius of discharge line (m)
L = length of discharge tubing (m)
VB = volume of bladder in pump (L)
π = 3.1415

- Initiate minimal purge sampling.
- Measure the purged volume of liquid using a graduated container and record the volume of water removed.
- Begin the collection of groundwater samples following the removal of the pre-determined minimal volume as calculated above. The field personnel should be aware of any special sampling procedures prior to initiating the groundwater sampling program (e.g., filtering metals/DOC, parameter order of sampling sequencing, etc.).
- Record electrical conductance, pH, temperature, and turbidity measurements after sample collection.
- Well purging data is recorded in the dedicated WM Sampling Field Sheets provided by the laboratory.

5.4 Potable Water Supply Well Sampling

Samples from potable supply wells are typically collected from a cold water tap as close to the wellhead or pump as reasonably practical. It is critical that the sampling location is upstream of any water treatment processes in the water supply system.

The procedure is as noted below.

- Ensure a clean pair of new, non-powdered disposable nitrile gloves are donned prior to collecting each sample.
- Disconnect any hoses, filters or aerators attached to the tap prior to sampling.
- Purge the water supply by running the tap using a smooth flowing water stream at moderate pressure for at least 15 minutes. Note: it may be necessary to open a separate tap downstream of the sampling location to prevent backflow to the sampling location. Field parameters pH, temperature and electrical conductance should be measured at 5 minute intervals. The well is considered purged following stability of the field parameters. If the field parameters are not stable after 15 minutes discretion should be used in collecting the sample.

- Collect the sample directly from the tap using a laboratory supplied unpreserved sample bottle. Decant the sample aliquot from the unpreserved bottle into all bottles containing preservative (to avoid splashing preservative onto the tap used for sampling). Continue to collect sample in this manner until all laboratory provided bottles are filled.
- Record the field parameters noted below for a sample aliquot immediately following sample collection.
  - Label the water sample with the physical address from which the sample was collected.
  - Record the following information in the field notebook.
  - Name of residents or water supply owner/operator.
  - The physical address from which the sample was collected.
  - Contact information for the resident or water supply owner/operator.
  - Time the sample was collected.
  - Detailed location from where the sample was collected.
- The sample handling and collection order should be in accordance with the protocol specified in Section 7.1 of this document.

5.5 Sampling DOC in Groundwater

This section discusses the methodology for sampling the parameter dissolved organic carbon (DOC) in groundwater and surface water at Waste Management facilities. Prior to sampling for DOC, please verify that a dedicated DOC sampling bottle is used for the sampling event. These bottles are typically a 125 mL amber glass bottle with sulfuric acid preservative.

The procedure is as noted below.

- Attach filter to dedicated well sampling tube and discard approximately 100 mL of water through the filter.
- Do not force the water through the filter by blowing or using pressurized air since sediment or filter media may be forcibly passed through the filter and affect sample analytical results.
- Collect a sample approximately 125 mL for metals into the dedicated preserved bottle after discarding 100 mL of water sample through the filter.
- Discard an additional approximately 200 mL of water through the filter.
- Collect a sample for DOC into the dedicated preserved bottle after discarding the additional 200 mL of water through the filter. However, if the well does not require a sample for metals analyses, then discard approximately 425 mL of sample through the filter then fill the dedicated preserved bottle for DOC with filtered sample.

5.6 Filter Blank Preparation for DOC (if required)

As samples for metals are not field filtered when sampling for a DOC field blank, at least 225 mL of distilled water must pass through the filter prior to the collection of the DOC sample for the filter blank.

Follow procedures noted above in Section 5.5 using the laboratory prepared and supplied field blank sample water.

6 SAMPLING REQUIREMENTS

6.1 Field Filtration

Aqueous samples for analysis of dissolved (soluble) metals should ideally be filtered in the field. If laboratory filtering is required, it should be performed immediately after sample collection (within a few hours of sample collection).

The procedure is as noted below.

- Aqueous metals samples collected with an inertial lift pump will be filtered using an inline 0.45 micron disposable filter assemblage. Attach the filter assemblage to the pump's discharge to collect samples.
- Raise and lower the tubing, thus lifting a column of water in the tubing a distance equal to the stroke length. Repeat the up-and-down motion at a rate of approximately 90 strokes per minute, until water discharges from the filter.
- Collect samples directly from the filter's discharge into sample bottles. Bottles for metals analysis should be pre-charged with preservative by the laboratory prior to receiving the bottles.
- In-line filters will not be reused.

6.2 Sample Preservation

Preservatives for samples are typically pre-charged into the sample bottles provided by the laboratory. Preservatives are used to keep the parameters of interest as close to their sampling conditions as possible until the analysis can be completed.

The preservation requirements for common analytes are summarized below. It is intended as a guide, as each laboratory may use different sample bottles and preservatives.

Parameter	Container Type	Holding Time	Preservation
General Chemistry	HDPE	7 - 28 Days	None
DOC (field filtered)	Glass Amber	10 Days	H_2SO_4 to pH<2
Metals (Total and Dissolved)	HDPE	60 Days	HNO_3 to pH<2
Mercury	Glass	28 Days	$K_2Cr_2O_7$ + HNO_3 to pH<2
Nutrients	HDPE	7 - 14 Days	H_2SO_4 to pH<2
Phenols (4-AAP)	Glass Amber	30 Days	H_2SO_4 to pH<2
VOCs	40 mL Glass Vials	14 Days	HCl to pH<2
PAHs	1 L Glass Amber	14 Days	None

6.3 Sampling for Volatile Organic Compounds

Many organic compounds volatilize readily and thus, added care is required during sample collection to minimize aeration. The steps outlined below when used in conjunction with standard groundwater sampling protocols, enhance the accuracy to determine organic compounds content of a liquid. The protocol presents a method for collecting organic samples with the inertial lift pump. Alternatively, organic samples can be collected using a low flow pumping assemblage (where possible).

- Follow the procedure outlined in Section 5.1 for purging monitoring wells with an inertial lift pump.
- Once the monitoring well has been purged and recovered sufficiently to yield a sample, insert approximately 2 m of narrow diameter clean polyethylene tubing into the inertial lift pump assemblage, leaving about 0.5 m of the narrow tubing extending from the discharge end of the pump.
- Raise and lower the inertial lift pump, thus lifting a water column in both the narrow diameter inner tubing and the inertial lift pump assemblage, a distance equal to each stroke length. Repeat the up-and-down motion until water discharges from both the inner tubing and the inertial lift pump assemblage.
- Once water is discharging from both the inner tubing and the inertial lift pump assemblage stop pumping. Water should continue to discharge from the narrow diameter tubing.
- Collect volatile organic compound samples from the discharge of the narrow tubing directly into the laboratory provided sample containers. Follow protocols identified below and in Section A.6 for sampling handling.
- In addition to the standard sample handling protocols, consider the protocols noted below.
  - Keep sample vials cool prior to and following sampling.
  - Minimize the interval of time that the sample is in contact with the air.
  - Completely fill sample vials, eliminating any air space between the sample and the cap.
  - Seal sample containers tightly and immediately place vials in an upright position in a sample cooler containing ice packs.

6.4 Duplicate Sample Collection

Duplicates are used to assess the reproducibility of the analytical results and assess sampling handling techniques. The typical procedure for duplicate sample collection is detailed below.

- Determine the sample identification that is distinct from all monitoring well identifiers used in the sampling program (e.g., GWDUP2, etc.).
- Record the duplicate sample ID and the primary sample ID in the field notebook.
- Proceed with the sampling sequence provided above, collecting the sample in a laboratory provided unpreserved sample bottle.

- Decant the sample into the primary sample container and the duplicate sample container as noted below.
  - Add sample to the primary sample container to one half of the container volume.
  - Add sample to the duplicate sample container to one half of the container volume.
  - Continue adding sample to each container in increments until the required sample volume is achieved.
- Continue the sample collection sequence noted above for each laboratory provided container.
- To prevent VOC volatilization from the sample during collection, VOC samples should be collected by filling one primary sample vial, followed by any duplicate sample vials, filling in sequential order.

One field-prepared duplicate sample is typically collected for every ten samples collected. The field-duplicate is a split sample from a randomly selected sampling location. The field duplicate analytical results are compared to the original sample results. For the field-prepared duplicate samples, the results for the required parameters of analysis are evaluated for the relative percent difference (RPD) of parameter concentrations using the USEPA National Functional Guidelines (USEPA 540-R-10-011) as a general QA/QC RPD screening mechanism. The RPD screening mechanism is such that for concentrations greater than five times the laboratory reportable detection limit (RDL), a concentration difference of less than or equal to 20% would be deemed acceptable. For concentrations less than or equal to five times the RDL, a concentration difference of equal to or less than the RDL would be deemed acceptable. Where an exceedance of the general QA/QC RPD screening mechanism is identified, the results for the required parameters of analysis are evaluated against the applicable performance standards for sample duplicates noted in Tables 5.1 to 5.15 of the *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, as prepared by the Ministry of the Environment, dated March 8, 2004, and amended to July 1, 2011.

The RPD is calculated as follows:

$$\left| \frac{(X_1 - X_2)}{\left(\frac{(X_1 + X_2)}{2}\right)} \right| * 100$$

X_1 represents a chemical parameter concentration from the original sample, while X_2 represents a chemical parameter concentration from the duplicate sample.

6.5 Field Blanks

During groundwater sampling, a field blank may be prepared at a randomly selected monitoring location. The location in the field should be representative of average sampling conditions (i.e. not at a well near a haul road where that well represents <5% of locations). The field blank is generally prepared as noted below.

- Place a set of bottles identical to that which will be used to collect an original sample, for the sample with the greatest number of parameters in it analytical suite, onto a platform or stable surface. The bottles of the field blank set should be placed away from potential adverse influences (e.g., exhaust pipe of a vehicle, road dust, etc.).
- The bottles of the field blank set are to be opened and filled with distilled water, as provided by the laboratory.
- The bottles of the field blank set will remain opened while sample collection is occurring.
- Upon completion of sample collection, the field blank bottle set should be capped immediately.
- The field blank bottle set should be appropriately labeled and placed into the cooler with the original sample(s).

6.6 Trip Blanks

Trip blanks are utilized to assess whether or not influences to sample bottles occur during transportation from and to the laboratory. Typically, trip blanks are laboratory-prepared solutions of water. The trip blanks are generally provided in 40 ml vials. Upon receipt from the laboratory, a trip blank should be placed immediately on ice or in a refrigerator and held for no more than 14 days prior to its usage. Once sampling is complete, the trip blank may be placed into a cooler along with natural water samples collected (groundwater and surface water) for shipping to the laboratory. A trip blank should not be placed into a cooler with liquids that may have the potential to influence its chemistry (e.g., leachate, sludge, odorous soils, etc.). If a laboratory-prepared trip blank is held more than 14 days, it should be discarded and a new laboratory-prepared solution be requested from the laboratory.

Trip blanks differ from spiked travel blanks. Spiked travel blanks contain one or more chemical parameter(s) (typically VOCs) of known concentration. Similar to the trip blank, the spiked travel blank is placed into a cooler for transport from and to the laboratory. The spiked travel blank is analyzed at the laboratory for the specified chemicals of known concentration to assess whether or not volatile chemicals are released during transport, as identified by a decreased concentration.

The results of the original sample's volatile chemical concentration may be adjusted by the difference in volatile concentration noted for the trip blank and/or spiked travel blank (i.e., if the spiked travel blank VOC concentration increases by 2 ppm during transport, then it is likely that the original sample would be subject to the same increase in concentration during transport).

7 SAMPLE HANDLING

7.1 General Considerations

Groundwater samples are to be collected after the monitoring well has been purged and has recovered sufficiently to yield a sample. Sampling of monitoring wells will be typically performed using an inertial lift pump. The protocol for inertial lift pump is outlined in Section 5.2.

The general procedures used when handling water samples, to help maintain their integrity and representativeness of site conditions, are outlined below.

- Sampling should be completed immediately after purging. If the well recovers slowly and does not yield sufficient quantities to sample immediately, the well may be sampled within 24 hours after purging, or until a sufficient volume of groundwater is recovered to conduct proper sampling at an interval of time that may be determined based on field observations and historic purging records.
- Samples will be placed in laboratory pre-cleaned bottles pre-charged with preservative. Care should be taken to avoid overfilling the bottle thereby diluting the preservative.
- Samples should be collected following an order which accounts for the volatilization sensitivity of the parameters to be analyzed, as noted below.
  - Volatile organic compounds.
  - Semi-volatile organic compounds.
  - Total and dissolved metals.
  - Nutrients.
  - General chemical parameters.
  - Field parameters (pH, conductivity, turbidity, and temperature).
- Prepare labels for sample bottles in accordance with the requirements specified in Section 7.2.
- Affix a security seal to the lid of the sample container. If the bottle is opened after being sealed, it will be evident from the broken seal;
- Take or ship samples to the laboratory within 48 hours of sampling. For shipment, mark sample coolers with “WATER SAMPLES – DO NOT FREEZE”;
- Record well sampling data within a dedicated field book. The order in which wells were sampled should also be recorded in the field.

7.2 Sample Labeling

To prevent the misidentification of environmental samples and to aid in the handling of samples, the protocols outlined below should be followed when labeling samples. Each sample should be assigned an alphanumeric identification code that will appear on the sample bottle label and will be recorded on the Chain of Custody forms and Water Sampling Field Data Sheet.

- Attach a non-removable, water resistant label to each sample container (if not provided by laboratory).
- Assign each sample a unique alphanumeric identification code.
- Secure label with tape as required.
- Record the sample identification code on the Water Sampling Field Data Sheet and the Chain of Custody forms.

7.3 Sample Storage and Shipping

The protocol noted below presents a method for packaging and shipping environmental samples to minimize the potential for sample destruction, loss, and tampering.

- Fill out the Chain of Custody form with all relevant information as outlined in Section 7.4. Place the original form in a plastic bag and secure to the inside of the sample cooler lid. A second completed copy of the Chain of Custody form should be retained by the sampler for inclusion in the project file.
- Place approximately 10 cm of inert cushioning materials (e.g., styrofoam peanuts, bubble pack) in the bottom of the cooler. Place bottles in cooler with volatile organic compound vials near the center of the cooler.
- Cover bottles, especially volatile organic compound vials, with ice in plastic bags, or ice packs. Pack cooler with additional cushioning materials.
- Tape drain shut and wrap cooler with tape to secure lid.
- Place laboratory address on top of cooler. To protect the coolers from tampering, the cooler lid should be taped to the cooler body. Place an initialed chain of custody seal over the tape. A broken seal will indicate that the contents may have been tampered with. Specify that the contents of the cooler are Fragile and place “This Side Up” labels, with the arrow pointing to the cooler lid, on all four sides of the cooler. “This Side Up” labels should not be affixed to the cooler lid or the cooler bottom. Also mark the cooler with “Water Samples – Do Not Freeze”.
- All samples must be shipped or delivered in order to arrive at the laboratory within 48 hours of collection.

7.4 Chain of Custody Procedures

Chain of Custody procedures include the documentation of sample collection methods and the methods used to control the documents. These procedures are used when transporting environmental samples to track sample shipments, to minimize the loss or misidentification of samples, and to minimize unauthorized persons tampering with collected samples. Adherence to chain of custody procedures is essential if sample analytical chemistry results are to be used as evidence in litigation or at administrative hearings held by regulatory agencies.

General procedures to be used are outlined below.

- Sample bottles must be transported to the sampling location by designated personnel. When samples have been collected, completed sample labels must be attached as required to the sample bottles by designated personnel. Each label must be filled out as specified in Section 7.2.
- Once samples have been collected, seal bottles and affix a security seal to the lid. The seal, if broken, will indicate that the bottles have been opened after sampling.
- After sampling, the sample identification code must be recorded on the Chain of Custody form and the Water Sampling Field Data Sheet. Sample information such as difficulties encountered during sampling should also be recorded on the Water Sampling Field Data sheets.
- The original Chain of Custody form must accompany the filled sample bottles to the laboratory. The form, once filled out, should be sealed in a plastic bag and taped to the inside of the sample cooler lid. A second copy of the Chain of Custody should be retained by the sampler for inclusion in the project file.
- Mark the liquid level on the sample container with a grease pencil. A discrepancy in the marked liquid level and the received liquid level may signal sample tampering.
- Pack samples for transport/shipment to the analytical laboratory following the protocol outlined in Section 7.3. Seal the cooler with tape and an initialed Chain of Custody seal. A broken seal will indicate that the cooler contents may have been tampered with.
- Transport/ship samples to the analytical laboratory. The laboratory will be required to sign for the samples and note any evidence of tampering on the Chain of Custody form.

8 FIELD WATER AND LEACHATE QUALITY ANALYSIS

8.1 Collection of Field Quality Analysis Samples

Field analysis of pH, electrical conductance, and temperature should be performed on samples from each monitoring well following the collection of samples for chemical analysis. Field analysis should also be used to monitor the progress of purging and well development.

The procedure is as noted below.

- Samples for field water quality analysis should be collected into a pre-cleaned glass or PET beaker with an approximate volume of 200 mL.
- Sample collection order should be in accordance with the protocol specified in Section 7.1.
- To account for parameter sensitivity, measure field parameters in the following order: electrical conductivity, pH, and temperature.
- For individual parameter measurement procedures, refer to the methodologies listed below.

8.2 Calibration and Maintenance of Field Equipment

Field meters should be checked prior to use in the field such that the batteries are charged and that the meters are functioning properly. Instrument calibration should adhere to the manufacturer-provided maintenance manual for each individual meter to be used. Calibration should occur prior to the day's sampling activities, and may be completed by mid-day during extensive sampling events.

Decontaminate instrument probes between measurements in accordance with manufacturer's specifications.

Record the sample readings on the pertinent form in the Field Notebook.

9 SAMPLING EQUIPMENT DECONTAMINATION

9.1 Sampling Equipment Decontamination

The decontamination of sampling equipment used in the collection of environmental samples is important in minimizing the potential of cross contamination between sampling points. All sampling equipment used must be clean and free from residue of previous samples. Decontaminated equipment must not come in contact with soil and other potential sources of contamination between each use.

General procedures to be used are outlined below.

- Wash equipment thoroughly with non-phosphate detergent (e.g., Liquinox) and deionized water. Use a brush to remove any particulate matter or surface film, if recommended by manufacturer. Rinse with deionized water.
- Rinse equipment again with a deionized water that is demonstrated analyte free.
- Air dry.
- Seal the equipment in plastic bags for transportation and storage.

10 FIELD NOTEBOOK DOCUMENTATION

Cerlox bound Field Notebooks with numbered pages will be provided to record all field work details. Separate notebooks will be established for the tasks noted below.

- Summarize daily activities and equipment/supply usage.
- Document field measurements and sampling activities.
- Record drilling observations and well construction details.

The notebooks will be documents in their own right and will be maintained such that a third party reviewing the notebooks will be able to understand the work practices that were followed in the field.

A variety of forms will be used in the process of the field investigation to record data and observations. The forms will be maintained such that data and observations are presented in an organized and useful manner. The forms required to facilitate the data management process are alphabetically listed below. Example forms and a description of their uses follow.

10.1 Chain of Custody

Sample custody from the time of sample bottle preparation, through sample collection and return of sample to the laboratory for analysis is documented on the Chain of Custody Form. One completed Chain of Custody form is required for each shipment of bottles received from or sent to the laboratory.

10.2 Daily Activity Log Sheet

Completed for each day of investigation the Daily Activity Log summarizes field activities performed, weather, and any other pertinent observations.

10.3 Development / Purging Record

Use to record field parameters measured during development and/or purging a well, as well as the purging/development methodology employed and the volume of water removed.

10.4 Drilling Inventory Sheet

Used to track the usage of materials and supplies.

10.5 Equipment Calibration Record

Used to track the daily calibration of field instruments. This record must be updated as required by the instruments protocols.

10.6 Field Borehole Log

Used during drilling activities to record a variety of information concerning site subsurface conditions including, but not limited to stratigraphy, ease of drilling, water levels, etc. A Field Borehole Log will be completed for each borehole drilled on site.

10.7 Field Monitor Installation Form

This form is used to record the construction details of piezometers, including but not limited to screen length, total depth, thickness of filter, filter material types, etc. The form must be completed at the time of monitor installation.

10.8 Groundwater Level Monitoring Field Record

Used to document water levels observed in wells. Water level data should be recorded for wells as directed in the Study Work Plan.

10.9 Hydraulic Conductivity Testing Field Data Sheet

Used to record observations (time vs. water level measurements) made during a hydraulic conductivity test. The form provides space for noting the type of test performed (rising head or falling head test), equipment use, and field analysis parameters. One form should be filled out per well per hydraulic conductivity test.

10.10 Visitor Log Record

Ensure that each visitor to the site is logged on the visitors' log record and that exact records of all conversations are maintained.

10.11 Water Sampling Field Data Sheet

Used to record sampling times and methods, sample identification codes, sample handling procedures, and field analysis data. One form must be completed per sample location per sample event.

APPENDIX F:

Liquid Level Details

APPENDIX F:

Table F1 - Well Details

Table F-1
Monitoring Well Details Summary
Twin Creeks Environmental Centre - 2024 Monitoring Program

Borehole NO.	Monitor NO.	Monitor Type	Screen Diameter (mm)	Ground Surface (mASL)	Monitor (T.O.P) (mASL)	Screened Interval (m ASL)	Filter Pack (m ASL)	Seal (Granular Bentonite or Dry Benseal) (m ASL)	Seal (Bentonite Grout) (m ASL)	Backfill Elevation (m ASL)	Surface Seal (Concrete) (m ASL)	Unit Description	Monitoring Program Status
OW16	5	S	50	240.68	241.50	236.1 - 239.1	236.1 - 239.2	239.2 - 239.7	NA	NA	239.7 - 240.7	ST(w), ST, IC	Decommissioned
	6	S-ANG	50	240.70	241.36	234.76 - 235.86	234.67 - 236.19	236.62 - 240.70	NA	236.19 - 236.62	NA	ST(w)	Active
	7	P	50	240.56	241.55	234.0 - 234.5	234.0 - 234.6	234.6 - 235.0	NA	235.0 - 239.7	239.7 - 240.7	IC, IS, RT	Active
OW17	4	S	40	240.17	240.64	235.0 - 238.2	235.0 - 238.2	238.2 - 238.6	NA	NA	238.6 - 239.6	ST (w)	Active
	5	P	40	240.03	240.66	234.5 - 234.9	234.5 - 235.0	235.0 - 235.3	NA	235.3 - 238.7	238.7 - 239.7	ST (w), ST	Decommissioned
	12	P	40	240.01	240.50	227.6 - 228.0	227.6 - 228.2	228.2 - 228.4	NA	228.4 - 238.7	238.7 - 239.7	RT	Decommissioned
	30	P	40	240.09	240.72	209.6 - 211.9	209.6 - 212.1	212.1 - 213.0	NA	213.0 - 238.7	238.7 - 239.7	Deep Sand, Shale	Active
OW19	12	P	40	240.97	241.83	229.0 - 229.4	229.0 - 229.4	229.4 - 229.7	NA	229.7 - 240.0	240.0 - 241.0	RT	Inactive
	29	P	51	241.00	241.86	212.2 - 213.7	212.2 - 214.0	214.0 - 214.6	218.1 - 241.0	214.6 - 218.1**	NA	Deep Sand, Silt, Shale	Active
OW39	6	P	50	234.94	235.92	228.3 - 229.2	228.3 - 229.7	229.7 - 230.9	230.9 - 233.9	NA	233.9 - 234.9	ST	Inactive
	12	P	50	234.99	235.72	223.0 - 224.2	223.0 - 226.0	226.0 - 227.2	227.2 - 234.0	NA	234.0 - 235.0	IS	Inactive
	17	P	50	235.03	235.84	219.0 - 220.3	219.0 - 221.0	221.0 - 222.0	222.0 - 234.0	NA	234.0 - 235.0	RT	Inactive
OW39	26	P	51	234.90	235.74	209.3 - 211.8	209.3 - 211.1	211.1 - 212.2	212.2 - 234.9	NA	NA	Deep Sand, Shale	Decommissioned
OW39A	26	P	51	234.90	235.60	209.3 - 210.8	209.3 - 211.3	211.3 - 211.7	211.7 - 234.9	NA	NA	Deep Sand, Shale	Active
OW40A	4	P	50	238.11	239.08	233.54 - 237.02	233.54 - 237.32	237.32 - 238.11	NA	NA	NA	ST(w)	Decommissioned
	7	P	50	238.19	239.13	231.33 - 232.09	231.33 - 232.40	232.70 - 238.19	NA	232.40 - 232.70**	NA	RT	Active
	28	P	50	238.21	239.11	210.12 - 210.93	210.73 - 211.24	237.30 - 238.21	211.62 - 237.3	211.24 - 211.62**	NA	Deep Sand, Shale	Active
OW40B	4	S-ANG	50	238.11	238.74	233.87 - 234.94	233.85 - 235.16	235.39 - 238.11	NA	235.16 - 235.39**	NA	ST(w)	Decommissioned
	4r	S-ANG	50	238.05	238.66	233.74 - 234.93	233.74 - 235.46	235.68 - 238.05	NA	235.46 - 235.68**	NA	ST(w)	Decommissioned
OW40D	4	S-ANG	51	238.13	238.76	233.83 - 235.99	233.83 - 236.41	236.41 - 236.73	NA	236.73 - 238.13**	NA	ST(w)	Decommissioned
OW40E	4	S-ANG	51	238.08	238.60	232.00 - 235.05	232.00 - 235.35	235.65 - 238.08	NA	235.35 - 235.65	NA	ST(w)	Active
OW46	7	P	51	239.93	240.66	233.5 - 233.8	233.5 - 234.2	234.2 - 235.1	235.1 - 239.3	NA	239.3 - 239.8	IC, IS, RT	Active
OW47	GP	GP	25	239.93+	NA	237.7 - 238.9	237.7 - 238.9	238.9 - 239.4	NA	NA	239.4 - 239.9	ST(w)	Inactive
	6	P	51	240.08	240.77	233.5 - 233.8	237.7 - 238.9	238.9 - 239.4	NA	234.8 - 237.7	239.4 - 239.9	IC, IS	Active
							233.5 - 234.2	234.2 - 234.8					
OW49	29	P	51	242.35	243.21	213.51 - 214.27	213.49 - 214.81	242.01 - 242.35	215.33 - 242.01	214.81 - 215.33**	NA	Deep Sand, Shale	Active
OW54	10	P	51	242.41	243.44	232.34 - 233.10	232.33 - 233.72	234.03 - 242.41	NA	233.72 - 234.03**	NA	IS	Active
OW54A	4	S	51	242.10	242.95	237.07 - 238.59	237.07 - 239.36	239.66 - 242.10	NA	239.36 - 239.66	NA	ST(w)	Active
OW56	4	S-ANG	51	240.05	240.46	236.0 - 237.4	236.0 - 237.2	237.5 - 240.0		237.2 - 237.5		ST(w)	Active
OW57	4	S-ANG	51	240.68	241.32	236.9 - 238.0	236.9 - 238.4	238.6 - 240.8		238.4 - 238.6**	NA	ST(w)	Active
	15	P	51	240.68	241.44	228.7 - 230.3	228.7 - 230.6	240.5 - 240.7	231.0 - 240.5	230.6 - 230.7**	NA	RT, Silt	Active
								230.7 - 231.0		225.9 - 228.3			
								228.3 - 228.7					

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

Table F-1
Monitoring Well Details Summary
Twin Creeks Environmental Centre - 2024 Monitoring Program

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

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

Table F-1
Monitoring Well Details Summary
Twin Creeks Environmental Centre - 2024 Monitoring Program

Borehole NO.	Monitor NO.	Monitor Type	Screen Diameter (mm)	Ground Surface (mASL)	Monitor (T.O.P) (mASL)	Screened Interval (m ASL)	Filter Pack (m ASL)	Seal (Granular Bentonite or Dry Benseal) (m ASL)	Seal (Bentonite Grout) (m ASL)	Backfill Elevation (m ASL)	Surface Seal (Concrete) (m ASL)	Unit Description	Monitoring Program Status
OW75	3	S-ANG	51	234.70	235.34	231.38 - 232.54	231.38 - 233.07	233.21 - 234.70	NA	233.07 - 233.21**	NA	ST(w)	Inactive
	7	P	51	234.66	235.65	227.66 - 229.18	227.66 - 228.86	229.17 - 234.66	NA	228.86 - 229.17	NA	IS, IC	Inactive
										227.06 - 227.66			
OW76	5	S-ANG	51	237.53	238.23	232.2 - 233.27	232.14 - 233.67	233.85 - 237.53	NA	233.67 - 233.85**	NA	ST, IC	Inactive
OW77	4	S-ANG	51	241.60	242.31	237.4 - 238.47	237.29 - 238.76	238.91 - 241.6	NA	238.76 - 238.91**	NA	ST(w)	Inactive
OW78	4	S-ANG	51	239.46	240.14	235.66 - 236.74	235.64 - 236.96	237.18 - 239.46	NA	236.96 - 237.18**	NA	ST(w)	Inactive
	6	P	51	239.45	240.45	233.16 - 233.92	233.15 - 234.37	234.7 - 239.45	NA	234.37 - 234.70**	NA	IC, IS	Inactive
OW79	5	S-ANG	51	237.85	238.56	232.99 - 234.06	232.98 - 234.37	234.59 - 237.85	NA	234.37 - 234.59**	NA	ST(w)	Active
	7	P	51	237.83	238.77	230.44 - 231.20	230.44 - 231.73	232.04 - 237.83	NA	231.73 - 232.04**	NA	IS	Active
	26	P	51	237.89	238.95	212.13 - 212.89	212.13 - 213.35	237.29 - 237.89	213.65 237.29	213.35 - 213.65**	NA	RT, Deep Sand	Active
										211.68 - 212.13***			
OW80	3	S-ANG	51	235.44	236.16	231.98 - 233.05	231.96 - 233.26	233.47 - 235.44	NA	233.26 - 233.47**	NA	ST(w)	Active
	6	P	51	235.51	236.59	229.71 - 230.47	229.70 - 230.94	231.24 - 235.51	NA	230.94 - 231.24**	NA	IS	Active
	27	P	51	235.40	236.58	208.78 - 209.54	208.48 - 209.70	235.10 - 235.4	210.02 235.10	209.70 - 210.02**	NA	RT, Deep Sand	Active
OW81	5	S-ANG	51	235.31	236.04	230.30 - 231.40	230.30 - 231.70	232.00 - 235.31	NA	231.70 - 232.00**	NA	ST(w)	Active
	7	P	51	235.84	236.50	228.40 - 229.40	228.40 - 229.80	230.10 - 235.84	NA	229.80 - 230.1****	NA	IS	Active
	27	P	51	235.77	236.55	209.38 - 209.80	209.38 - 210.20	234.87 - 235.77	210.50 - 234.87	210.20 - 210.5****	NA	RT, Deep Sand	Active
OW82	5	S-ANG	51	236.13	236.76	230.72 - 231.48	230.72 - 231.80	232.13 - 236.13	NA	231.80 - 232.1****	NA	ST(w)	Active
	14	P	51	236.19	236.99	222.47 - 223.24	222.47 - 223.54	235.76 236.19	223.85 - 235.76	223.54 - 223.8****	NA	IS	Active
	28	P	51	236.25	236.92	208.21 - 208.97	208.21 - 209.35	235.82 - 236.25	209.73 - 235.82	209.35 - 209.7****	NA	RT, Deep Sand	Active
OW83	5	S-ANG	51	240.01	240.75	234.60 - 235.36	234.60 - 235.68	236.01 - 240.01	NA	235.73 - 236.0****	NA	ST(w)	Active
	9	P	51	240.17	240.89	230.87 - 231.64	230.87 - 231.94	237.73 - 240.17	232.25 - 237.73	231.94 - 232.2****	NA	IS	Active
	29	P	51	240.15	240.82	210.59 - 211.35	210.59 - 211.65	239.72 - 240.15	212.11 - 239.72	211.65 - 212.1****	NA	RT, Deep Sand	Active
OW84	6	S-ANG	51	243.18	243.86	236.70 - 237.45	236.70 - 237.73	238.10 - 243.18	NA	237.77 - 238.1****	NA	ST(w)	Active
	11	P	51	243.34	244.03	232.37 - 233.13	232.37 - 233.43	243.24 - 243.34	233.74 - 243.24	233.43 - 233.7****	NA	IS	Active
	31	P	51	243.26	243.91	212.35 - 213.09	212.35 - 213.45	243.16 - 243.26	213.85 - 243.16	213.45 - 213.8****	NA	RT, Deep Sand	Active
OW85	5	S-ANG	51	240.04	240.58	235.14 - 236.21	235.13 - 236.48	236.68 - 240.04	NA	236.48 - 236.68**	NA	ST(w)	Inactive
	8	P	51	240.08	241.19	232.29 - 233.81	232.28 - 234.58	234.88 - 240.08	NA	234.58 - 234.88**	NA	IS, IC	Inactive
								226.06 - 231.48		231.48 - 232.28**			

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

Table F-1
Monitoring Well Details Summary
Twin Creeks Environmental Centre - 2024 Monitoring Program

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

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

APPENDIX F:

Table F2 - Leachate Elevations SFA and CFA - Existing Landfill

Table F-2
Leachate Level Elevations - Poplar System
Twin Creeks Environmental Centre

Date	South Cell			West Central Fill Area		
	OW22-9	OW22A-10	OW53-10	OW51-10	OW51A-15	SUMP
T.O.P	243.98	243.78	244.49	246.07^	250.45	248.90
23-Mar-84						
14-Apr-84						
3-May-84	233.65					
29-Jun-84						
27-Jul-84	235.54					
10-Sep-84	235.42					
19-Oct-84	235.55					
27-Nov-84	235.67					
17-Dec-84	235.76					
1-Feb-85	236.13					
27-Feb-85	236.19					
26-Mar-85	236.22					
26-Apr-85	236.46					
21-May-85	236.15					
15-Jul-85	235.64					
10-Sep-85	235.75					
13-Mar-86	236.21					
8-Apr-86						
5-Sep-86	236.49					
25-Feb-87	236.67					
25-Mar-87	236.69					
29-Apr-87	236.72					
22-May-87	236.73					
26-May-88	237.23					
18-Aug-88	237.47					
2-Nov-88	237.38					
6-Jun-89	237.41					
25-Oct-89	237.32					
14-May-90	237.45					
14-Aug-90	236.52					
6-Dec-90	237.58					
15-May-91	237.58					
21-Aug-91	237.66					
15-Nov-91	237.58					
25-May-92	237.56					
10-Nov-92	237.67					
19-Apr-93						
13-Jun-93	237.52					
14-Dec-93	237.67					
10-May-94	237.64					
13-Dec-94	237.65					
9-Jun-95	237.87					
6-Nov-95	237.74					
6-May-96	237.85		236.50	235.53		
9-Dec-96			236.14	235.44		

NOTES: 1) Blank denotes data not available.

2) Elevations in metres above sea level.

3) + denotes elevation reported is below elevation of well screen.

4) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

5) ^ denotes pre 2004 T.O.P. elevation.

6) * elevation determined to be anomalous

7) T.O.P. elevations adjusted based on updated elevation survey in 2016

Table F-2
Leachate Level Elevations - Poplar System
Twin Creeks Environmental Centre

Date	South Cell			West Central Fill Area		
	OW22-9	OW22A-10	OW53-10	OW51-10	OW51A-15	SUMP
T.O.P	**243.98**	**243.78**	**244.49**	**246.07^**	**250.45**	**248.90**
12-May-97	238.48		236.31	235.44		
4-Dec-97	238.54		236.24	235.45		
12-May-98	238.89		236.37	235.41		
18-Dec-98						
13-Jan-99	238.93		236.28			
30-Mar-99						
1-Jun-99						
10-Nov-99			236.51			
21-Dec-99			236.63			
28-Mar-00			236.8			
19-Jun-00						
28-Nov-00			236.76			
20-Jun-01	239.94					
26-Nov-01	240.11					
18-Apr-02	238.50					
21-May-02	238.35		237.27			239.16
5-Jun-02	238.36		237.39			239.37
22-Oct-02	237.98		237.10			239.48
16-May-03	238.05		237.36			240.10
12-Nov-03	238.00		237.59			239.86
25-May-04		236.72	237.78			239.68
26-Nov-04		237.45	236.12			
6-Apr-05						239.40
12-May-05		237.63	237.54			239.27
29-Nov-05		237.64	237.68		235.97	239.40
27-Mar-06						239.15
17-May-06		238.04	237.75		236.16	239.45
22-Nov-06		237.86	237.58		236.40	239.38
4-Apr-07						239.54
3-May-07		237.84	237.75		235.98	239.15
15-Nov-07		237.96	237.72		235.78	239.31
15-May-08		237.69	237.95		235.93	239.51
4-Nov-08		237.38	237.80		237.98*	239.47
12-May-09		237.80	237.95		236.18	239.40
16-Nov-09		237.97	237.77		236.03	239.15
14-May-10		237.61	237.67		235.85	239.59
2-Nov-10		237.76	237.78		235.90	239.63
9-May-11		238.05	238.49		236.03	240.20
1-Nov-11		238.08	238.26		235.91	238.83
7-May-12		238.27	238.26		236.07	239.89
5-Nov-12		237.73	238.42		235.98	238.69
6-May-13		238.18	238.75		236.05	240.91
4-Nov-13		237.84	238.57		236.47	239.03
5-May-14		238.45	239.11		236.71	240.86
23-May-14		237.72	238.94		236.50	238.99
17-Nov-14		237.77	238.39		236.32	238.65
11-May-15		238.06	238.23		236.23	238.34
10-Nov-15		238.14	238.20		236.23	237.31
24-May-16		237.96	238.27		236.03	241.40
14-Nov-16		237.84	238.02		236.05	240.26
15-May-17		237.75	238.10		236.02	242.01
6-Nov-17		237.65	237.80		236.27	242.05

NOTES: 1) Blank denotes data not available.
2) Elevations in metres above sea level.
3) + denotes elevation reported is below elevation of well screen.
4) T.O.P. denotes 'top of pipe'. Elevations as of July 2016 for active wells.
5) ^ denotes pre 2004 T.O.P. elevation.
6) * elevation determined to be anomalous

Table F-2
Leachate Level Elevations - Poplar System
Twin Creeks Environmental Centre

Date	South Cell			West Central Fill Area		
	OW22-9	OW22A-10	OW53-10	OW51-10	OW51A-15	SUMP
T.O.P	**243.98**	**243.78**	**244.49**	**246.07^**	**250.45**	**248.90**
7-May-18		237.97	238.22		236.05	243.26
5-Nov-18		238.15	238.27		236.04	244.12
13-May-19		238.60	238.52		236.26	245.14
4-Nov-19		238.24	238.28		236.20	242.54
4-May-20		238.40	238.32		236.14	240.37
2-Nov-20		238.11	238.09		236.34	241.03
17-May-21		238.33	238.31		236.47	241.92
1-Nov-21		238.23	238.28		236.29	242.66
2-May-22		238.43	238.53		236.30	242.43
1-Nov-22		238.47	238.36		236.58	242.56
1-May-23		238.73	238.76		237.67	245.45
1-Nov-23		238.57	238.47		236.94	244.08
1-May-24		238.70	238.74		238.05	245.58
1-Nov-24		238.46	238.56		238.47	244.61

NOTES: 1) Blank denotes data not available.
2) Elevations in metres above sea level.
3) + denotes elevation reported is below elevation of well screen.
4) T.O.P. denotes 'top of pipe'. Elevations as of July 2016 for active wells.
5) ^ denotes pre 2004 T.O.P. elevation.
6) * elevation determined to be anomalous
7) T.O.P. elevations adjusted based on updated elevation survey in 2016

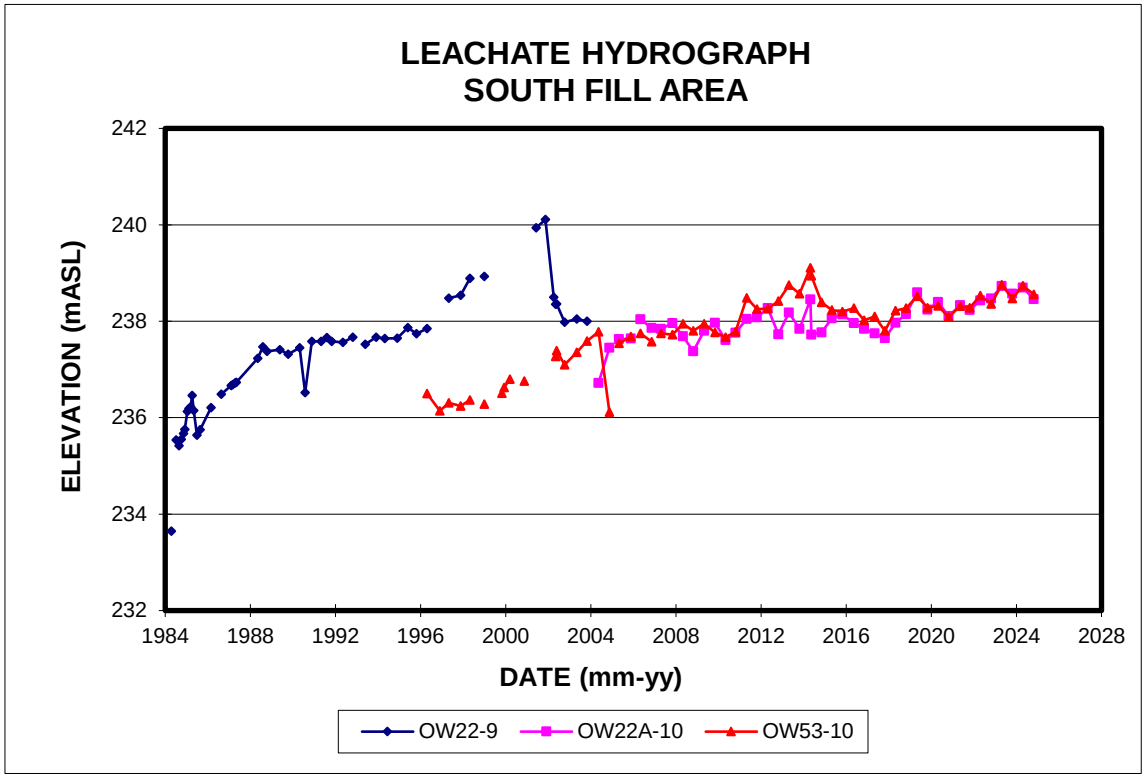


FIGURE F-1

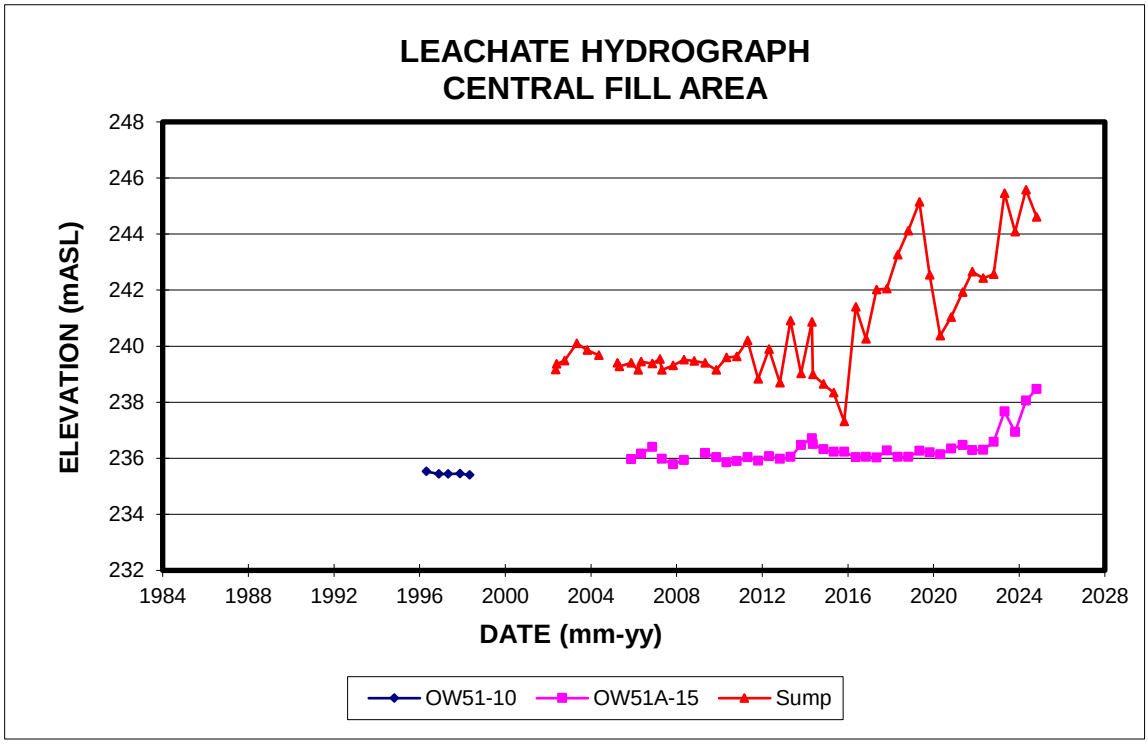


FIGURE F-2

APPENDIX F:

Table F3 - Existing Landfill Leachate Elevations - MHs

Table F-3
Leachate Management System Liquid Levels - Existing Site
Twin Creeks Environmental Centre

Date	MH3SA	MH3SB	MH3SC	MH3SD	MH3SE	MH3SF	MH4A	MH4B	MH5A	MH5B	MH6A	MH6B
T.O.P.	**241.27**	**241.36**	**239.80**	**239.90**	**249.99**	**249.02**	**241.07**	**245.64**	**244.87**	**242.29**	**243.90**	**241.75**
Approximate Invert	**237.20**	**237.15**	**235.80**	**235.75**	**236.45**	**236.50**					**235.29**	**235.20**
21-May-02	Dry	Dry	236.56	236.54	237.81	239.50	239.46	238.78	240.23	240.22	237.57	237.73
15-Jun-02	Dry	Dry	236.49	236.46	237.71	239.13	238.15	238.75	238.78	238.71	237.76	237.90
22-Oct-02	Dry	Dry	236.11	236.22	237.57	238.82	238.42	238.93	239.66	239.66	238.47	238.55
13-May-03	Dry	Dry	236.92	237.03	238.61	241.87	239.65	239.02	240.15	240.27	238.48	238.57
12-Nov-03	237.59	Dry	236.78	236.79	239.66	242.40	238.56	238.85	240.50	241.04	239.71	239.67
25-May-04	238.34	Dry	236.75	236.76			239.86	238.89	240.59	241.06	239.60	239.56
26-Nov-04	238.20	238.04	235.89	235.44	239.85	242.34	238.36	238.87	240.75	240.81	237.93	237.88
6-Apr-05				236.93			239.19			240.84		238.86
12-May-05	239.14	238.73	236.82	236.83	241.85	244.56	239.15	239.15	241.09	240.90	237.78	237.74
29-Nov-05	Dry	Dry	236.68	236.60	246.08	246.80	237.59	239.19	239.24	239.29		240.26
27-Mar-06			236.75				238.26			239.17		238.04
17-May-06	237.65	Dry	236.35	236.36	242.00	245.02	238.66	239.68	240.05	240.12	237.75	237.69
22-Nov-06	237.47	Dry	236.90	237.03	242.46	244.99	238.19	240.08	239.17	239.25	237.37	237.51
4-Apr-07				236.90			238.89			240.71		237.85
3-May-07	237.82	238.09	236.64	236.75	242.69	244.93	238.68	238.63	240.89		237.70	237.84
15-Nov-07	237.54	<237.18	236.90	236.93	241.07	243.17	237.71	238.98	237.52	237.57	238.80	238.76
15-May-08	237.87	237.85	236.65	236.77	242.61	244.2	238.51	240.29	239.12	239.16	237.99	237.99
4-Nov-08	237.63	237.73	236.86	237.82	242.49	245.14	237.52	238.40	236.38	236.61	236.32	237.36
27-Nov-08												
12-May-09	238.47	237.92	236.56	236.72	240.44	243.79	237.87	240.62	238.29	238.31	237.90	237.86
16-Nov-09	237.83	Dry	236.07	236.07	241.34	243.39	236.34	240.61	236.24	236.32	237.24	237.27
14-May-10	237.73	Dry	233.17	Dry		243.38	238.06	240.33	237.26	237.12	237.03	237.12
2-Nov-10	237.67	Dry	233.38	235.59	240.85	243.20	238.06	240.39	239.27	239.29	237.37	237.39
9-May-11	237.96	237.41	234.43	235.64	242.79	244.89	238.29	241.56	236.29	236.42	237.51	237.60
1-Nov-11	237.86	Dry	234.83	234.97	242.38	244.45	236.52	237.12	238.39	238.37	237.15	237.14
7-May-12	238.19	237.41	233.09	Dry	242.43	244.31	238.38	237.57	237.39	237.38	237.16	237.18
5-Nov-12	237.95	237.19	234.83	Dry	241.86	243.53	238.19	237.57	238.88	239.02	237.81	237.80
6-May-13	238.88	238.67	232.95	Dry	243.04	245.01	238.54	238.35	239.77	239.79	237.71	237.71
4-Nov-13	237.99	237.16	234.79	235.29	242.68	242.72	238.37	237.66	238.97	239.17	237.98	238.27
5-May-14	238.89	238.76	233.00	<235.32	242.97	245.06	238.60	238.38	239.72	239.74	237.70	237.70
23-May-14	237.91	237.24	234.61	235.31	242.70	242.82	238.24	237.73	239.03	239.14	237.86	237.85
17-Nov-14	238.18	<237.29	234.21	<233.65	243.58	243.08	237.27	238.80	236.27	236.32	236.41	235.38
11-May-15	238.60	237.72	233.90	<234.67	244.08	241.34	237.99	240.32	235.99	235.98	236.59	236.49
10-Nov-15	238.05	237.05	233.64	<234.67	242.82	242.97	237.71	238.74*	236.28	236.21	236.04	235.95
24-May-16	238.30	237.05	233.72	<234.69	243.19	244.04	238.39	239.61	238.15	238.14	236.38	236.38
14-Nov-16	238.78	237.44	233.72	<234.69	242.78	242.88	237.64	239.66	237.71	237.61	237.10	236.99
15-May-17	238.99	237.32	234.46	234.36	243.35	244.04	238.38	239.63	239.70	239.69	235.91	235.89
6-Nov-17	238.56	238.00	236.01	234.36	243.99	242.01	235.92	239.58	236.92	236.92	236.69	236.68
7-May-18	239.53	239.32	236.03	235.74	243.98	244.04	234.58	238.91	236.23	236.18	236.98	236.94
5-Nov-18	240.25	240.30	234.83	234.36	243.89	243.92	234.48	239.74	239.47	239.43	236.82	236.82
13-May-19	239.01	239.60	237.44	237.11	243.89	243.92	238.49	239.62	239.74	239.63	240.11	240.00
4-Nov-19	239.00	238.57	237.40	238.11	243.90	243.92	238.79	238.93	236.11	236.06	240.33	240.30
4-May-20	237.93	238.06	235.54	235.51	243.94	243.99	239.24	239.32	239.68	239.63	238.59	238.56
2-Nov-20	238.67	237.99	233.69	235.55	243.43	243.66	235.89	239.43	236.11	236.00	237.92	237.83
17-May-21	239.43	239.51	236.79	236.49	243.88	243.90	238.59	239.44	238.50	238.46	238.50	238.47
1-Nov-21	239.74	239.58	236.82	237.97	243.88	243.92	239.92	239.95	239.95	239.91	240.44	240.45
2-May-22	240.09	239.99	235.57	235.37	244.01	244.05	238.50	239.46	239.73	239.62	240.16	240.30
1-Nov-22	238.77	238.52	237.15	236.84	243.65	243.70	238.38	239.37	236.79	236.71	240.23	240.23
1-May-23	239.45	239.42	236.05	235.99	244.00	244.00	240.11	240.20	240.20	240.22	240.17	240.16
1-Nov-23	238.91	238.84	236.45	236.08	243.81	243.48	240.09	240.31	236.37	236.31	239.75	240.11
1-May-24	239.05	239.04	234.50	235.78	243.90	243.91	240.18	240.18	240.17	240.18	240.05	240.52
1-Nov-24	238.74	238.73	234.43	235.76	243.66	242.83	237.32	239.28	236.66	236.65	238.55	240.69

Notes: 1) * denotes liquid level at MH4B was collected on November 5, 2015.
2) T.O.P. denotes 'top of pipe'.
3) Select historical T.O.P. elevations adjusted based on updated elevation survey in 2016
4) + denotes elevation interpreted to be anomolous

Table F-3
Leachate Management System Liquid Levels - Existing Site
Twin Creeks Environmental Centre

Date	MH7A	MH7B	MH8A	MH8B	MH9A	MH9B	MH10	MH11A	MH11B	MH12A	MH12B
T.O.P.	**245.68**	**243.23**	**243.13**	**245.89**	**246.45**	**242.52**	**244.43**	**246.35**	**242.92**	**244.39**	**242.37**
Approximate Invert											
21-May-02											
15-Jun-02											
22-Oct-02											
13-May-03											
12-Nov-03											
25-May-04											
26-Nov-04	239.24			-							
6-Apr-05	238.93			-							
12-May-05	238.35	237.80	237.81	238.53							
29-Nov-05	237.64	237.66	237.70	236.90							
27-Mar-06		238.58	237.71								
17-May-06	238.88	238.94	238.36	238.19							
22-Nov-06	236.91	237.53	239.06	238.91							
4-Apr-07				239.03							
3-May-07	238.19	238.65	239.90	239.72							
15-Nov-07	239.03	239.54	237.42	238.24							
15-May-08	239.21	239.84	239.23	239.09	240.72	240.75		241.32	241.22		
4-Nov-08	239.04	239.62	237.34	237.13	240.87	240.00		241.14	239.54		
27-Nov-08											
12-May-09	239.09	239.70	237.23	237.37	240.72	240.75		240.74	240.78		
16-Nov-09	237.82	237.82	236.91	236.94	239.77	239.77		240.64	240.58		
14-May-10	238.57	238.55	237.07	237.08	239.45	239.81		240.51	240.67		
2-Nov-10	238.91	238.91	237.22	237.14	240.10	240.11	237.53	240.08	240.11	237.54	237.48
9-May-11	237.89	238.89	238.30	238.33	239.86	239.82	239.46	238.73	239.58	239.48	239.42
1-Nov-11	238.48	238.48	238.74	238.66	239.66	239.66	237.90	239.32	239.35	237.93	237.83
7-May-12	239.01	239.01	239.64	239.55	238.66	238.66	239.30	239.89	239.92	239.32	239.25
5-Nov-12	238.61	238.61	237.19	237.12	238.22	238.22	236.81	239.56	239.59	236.82	236.75
6-May-13	236.86	236.95	239.29	239.30	238.46	238.45	*237.20*	239.71	239.69	238.17	238.21
4-Nov-13	238.77	238.70	237.42	237.31	238.44	238.37	237.13	239.79	239.92	237.08	237.19
5-May-14	236.93	236.84	239.35	239.36	238.53	238.53	237.26	239.61	239.65	238.11	238.23
23-May-14	237.23	237.08	237.56	237.46	238.46	238.40	237.17	239.82	239.76	237.13	237.24
17-Nov-14	238.70	238.69	236.96	237.55	237.95	237.96	237.16	239.15	239.15	237.19	237.14
11-May-15	238.81	238.79	239.34	237.19	238.66	238.59	237.62	240.12	240.16	237.57	237.59
10-Nov-15	237.93	237.94	239.51	239.41	238.37	238.35	238.22	239.44	239.36	238.22	238.23
24-May-16	237.76	238.27	238.35	238.34	238.25	238.27	240.25	240.90	240.80	240.24	240.22
14-Nov-16	238.88	238.90	239.14	239.03	238.59	238.58	240.81	239.17	238.09	240.81	240.78
15-May-17	238.98	238.99	239.53	239.42	239.22	239.18	241.00	240.64	240.56	241.00	241.01
6-Nov-17	237.90	237.89	239.31	239.01	238.78	237.77	238.20	238.84	238.97	238.19	238.18
7-May-18	238.20	238.19	238.96	239.27	237.64	237.64	240.20	240.47	240.60	240.19	240.18
5-Nov-18	237.87	237.88	239.00	239.31	238.12	238.12	240.93	240.82	240.75	240.93	240.92
13-May-19	239.59	239.58	240.55	240.68	240.06	240.03	241.01	241.11	241.01	241.09	241.00
4-Nov-19	237.02	237.03	237.61	237.92	238.52	238.51	236.46	238.76	238.91	236.43	236.44
4-May-20	238.34	238.35	240.64	240.93	239.40	239.40	237.11	239.29	239.11	237.12	237.11
2-Nov-20	236.56	236.57	237.61	237.83	237.71	237.72	236.27	238.39	238.30	236.27	236.23
17-May-21	237.92	237.92	239.66	239.97	239.17	239.08	237.13	240.15	240.27	237.12	237.12
1-Nov-21	237.08	237.11	238.87	239.05	238.78	238.79	236.75	238.77	238.78	236.74	236.75
2-May-22	237.15	237.03	239.03	239.22	239.24	239.06	236.68	238.73	238.69	236.69	236.55
1-Nov-22	236.60	236.48	238.62	238.90	237.75	237.73	236.81	239.81	240.12	236.83	236.86
1-May-23	238.00	237.99	240.92	241.23	239.33	239.25	239.92	241.02	241.00	239.96	239.93
1-Nov-23	236.66	236.68	237.81	238.14	238.25	238.20	237.89	238.55	238.43	237.76	237.75
1-May-24	238.66	238.66	240.80	240.96	239.91	239.89	240.91	241.00	241.12	240.88	240.90
1-Nov-24	236.43	236.44	237.80	237.86	238.10	238.12	236.37	238.92	238.79	236.34	236.50

Notes: 1) * denotes liquid level at MH4B was collected on November 5, 2015.
2) T.O.P. denotes 'top of pipe'.
3) Select historical T.O.P. elevations adjusted based on updated elevation survey in 2016
4) + denotes elevation interpreted to be anomolous

Table F-3
Leachate Management System Liquid Levels - Existing Site
Twin Creeks Environmental Centre

Date	MH16	MH17	MH18	LW1	LW2	LW3	LW4	LW5	LW6
T.O.P.	**239.71**	**239.63**	**239.28**	**248.53**	**249.99**	**249.42**	**248.24**	**247.20**	**247.76**
Approximate Invert	**235.41**	**235.10**	**234.93**						
21-May-02	237.06	237.06	237.05						
15-Jun-02	237.28	237.31	237.29						
22-Oct-02	237.05	237.04	237.03						
13-May-03	237.45	237.46	237.48						
12-Nov-03	237.22	237.26	237.24						
25-May-04	237.27	237.30	237.28						
26-Nov-04	237.50	237.06	236.60						
6-Apr-05			237.23						
12-May-05	237.28	237.30	237.28						
29-Nov-05	237.20	237.22	237.20						
27-Mar-06			237.45						
17-May-06	237.52	237.49	237.51						
22-Nov-06	237.62	237.63	237.60						
4-Apr-07			237.55						
3-May-07	237.10	237.09	237.11						
15-Nov-07	237.65	237.66	237.63						
15-May-08			237.28						
4-Nov-08			237.12						
27-Nov-08	236.95	236.97	236.96						
12-May-09	237.47	237.49	237.49						
16-Nov-09	237.65	237.71	237.69						
14-May-10	237.11	237.13	237.06						
2-Nov-10	237.54	237.54	237.49						
9-May-11	237.85	237.86	237.87						
1-Nov-11	237.83	237.85	237.77						
7-May-12	237.90	237.92	237.89						
5-Nov-12	237.54	237.54	237.49						
6-May-13	237.89	237.89	237.83						
4-Nov-13	237.66	237.66	237.40						
5-May-14	237.84	237.93	237.77						
23-May-14	237.63	237.60	237.46						
17-Nov-14	236.32	236.30	236.28						
11-May-15	237.77	237.78	237.79						
10-Nov-15	237.93	237.96	237.96						
24-May-16	237.31	237.29	237.31						
14-Nov-16	237.10	237.12	237.12						
15-May-17	237.13	237.14	237.14						
6-Nov-17	236.97	237.00	236.99						
7-May-18	237.56	237.56	237.56	244.95	242.44	242.34	240.44	239.82	237.89
5-Nov-18	237.77	237.77	237.76	244.87	241.94	242.15	240.29	239.78	238.02
13-May-19	238.28	238.30	238.28	245.81	242.98	242.49	240.54	240.05	238.64
4-Nov-19	237.71	237.72	237.71	244.42	241.87	243.21	240.49	239.85	239.68
4-May-20	238.02	238.04	238.01	245.01	243.10	242.81	240.96	239.96	238.60
2-Nov-20	237.70	237.69	237.70	244.19	241.99	242.94	241.39	239.68	237.89
17-May-21	237.82	237.83	237.81	244.93	243.10	243.01	241.90	239.77	238.63
1-Nov-21	238.01	238.00	237.99	244.45	242.72	243.14	242.01	239.58	238.74
2-May-22	238.03	238.09	237.92	244.55	242.43	243.25	242.27	240.03	239.01
1-Nov-22	238.07	238.07	238.08	244.42	242.38	243.29	242.10	239.78	238.85
1-May-23	238.05	238.02	238.07	245.73	243.38	243.63	242.41	240.10	238.93
1-Nov-23	238.10	238.09	238.06	244.59	243.14	243.46	242.18	239.85	238.56
1-May-24	238.39	238.06	238.09	245.38	243.67	243.72	242.54	240.12	238.95
1-Nov-24	238.27	237.96	237.99	244.47	243.25	243.62	242.48	239.64	238.60

Notes: 1) * denotes liquid level at MH4B was collected on November 5, 2015.
2) T.O.P. denotes 'top of pipe'.
3) Select historical T.O.P. elevations adjusted based on updated elevation survey in 2016
4) + denotes elevation interpreted to be anomolous

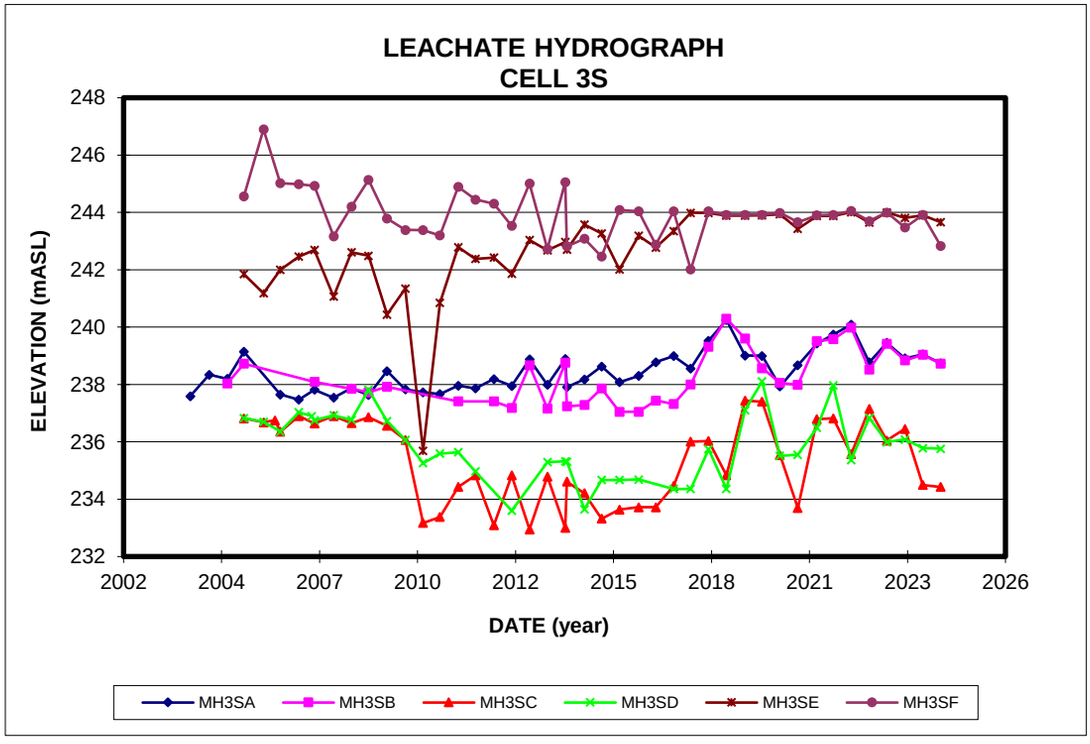


FIGURE F-3

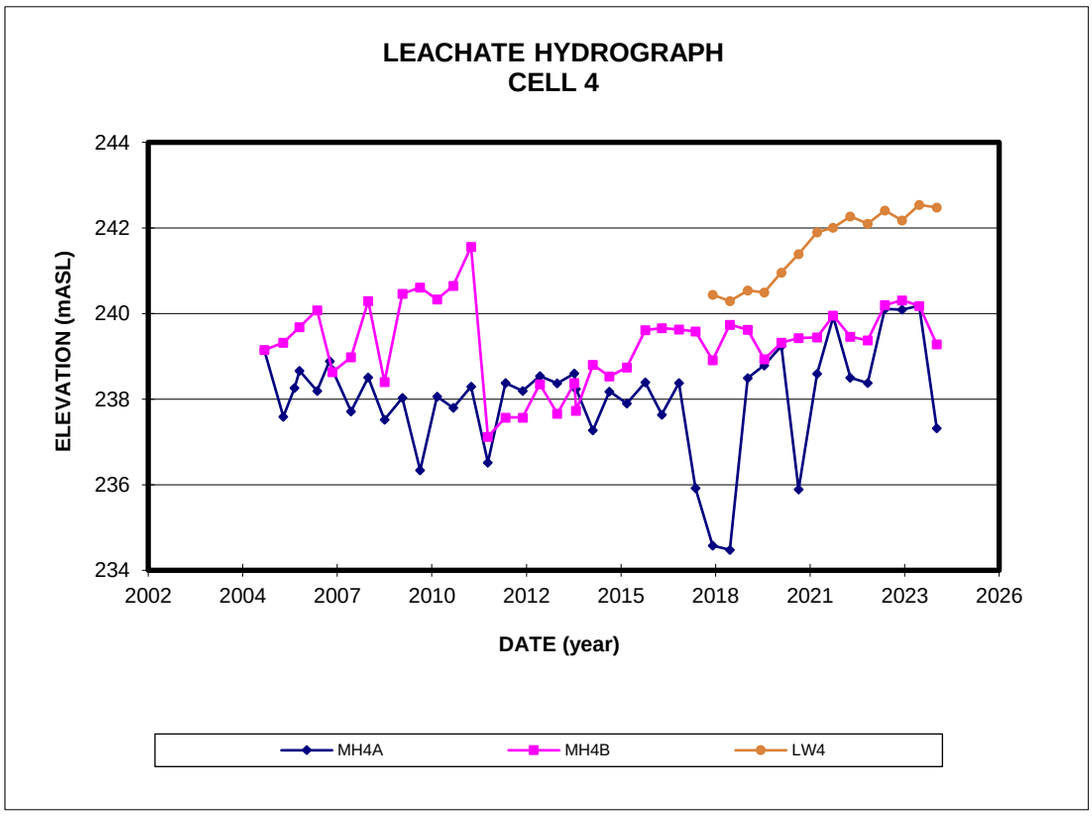


FIGURE F-4

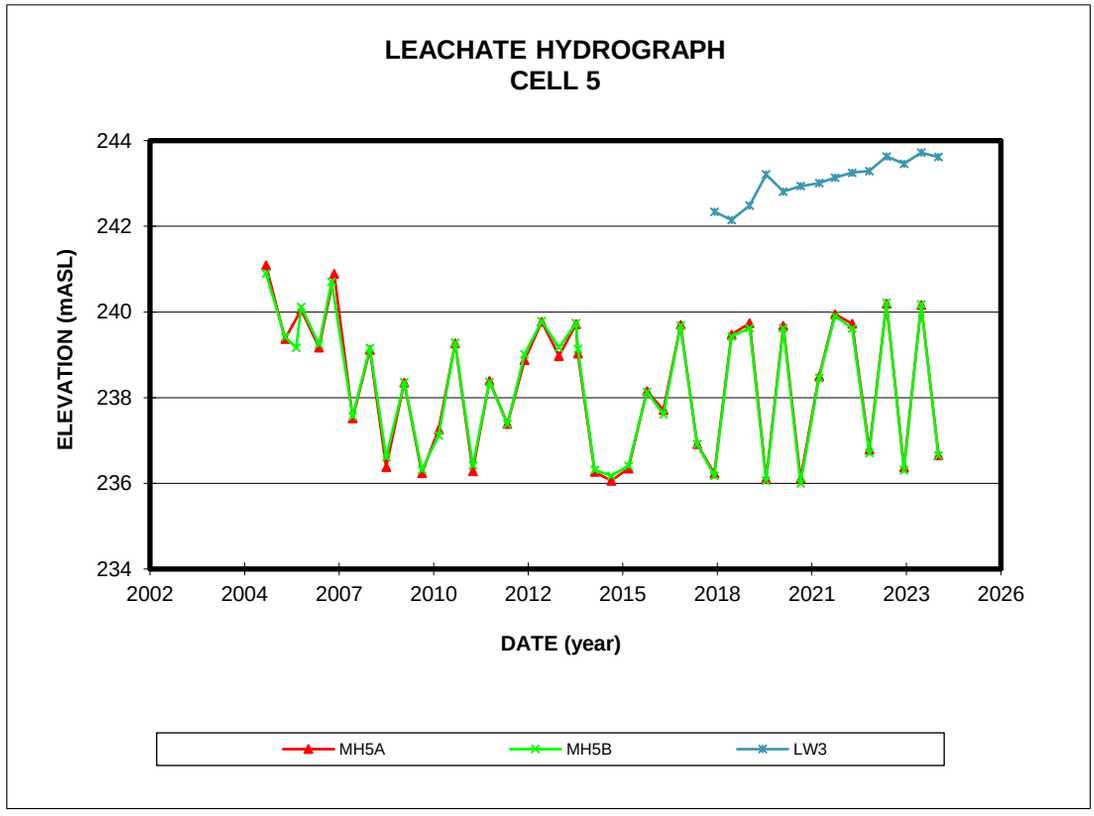


FIGURE F-5

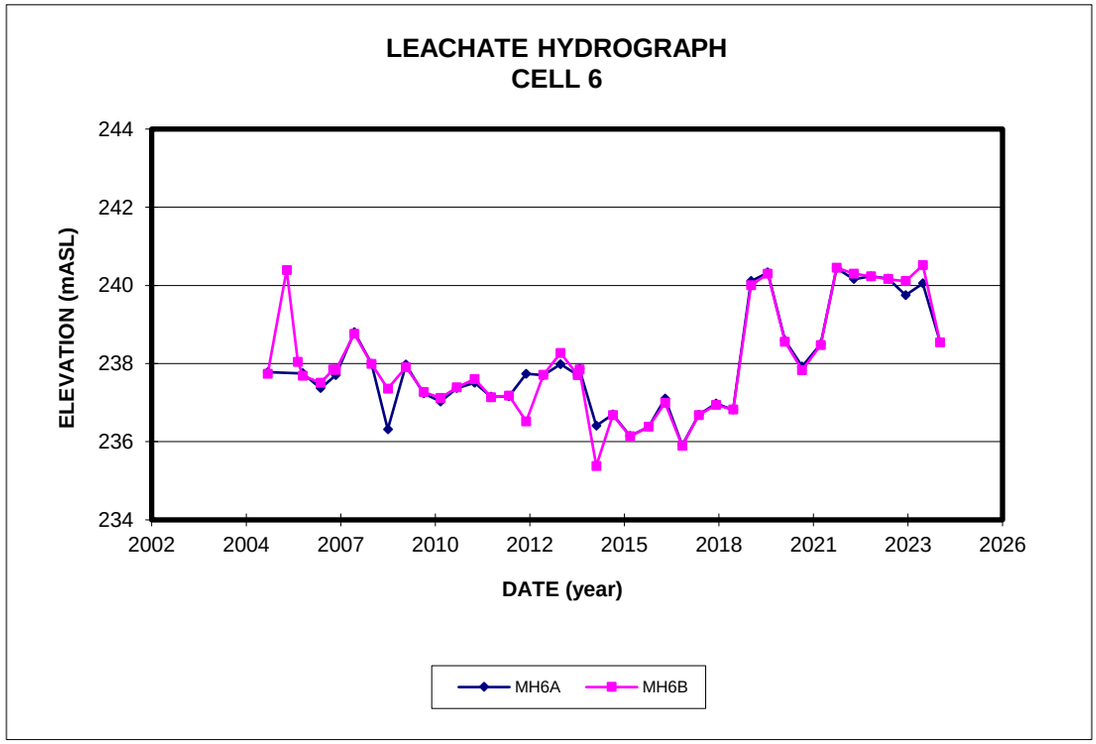


FIGURE F-6

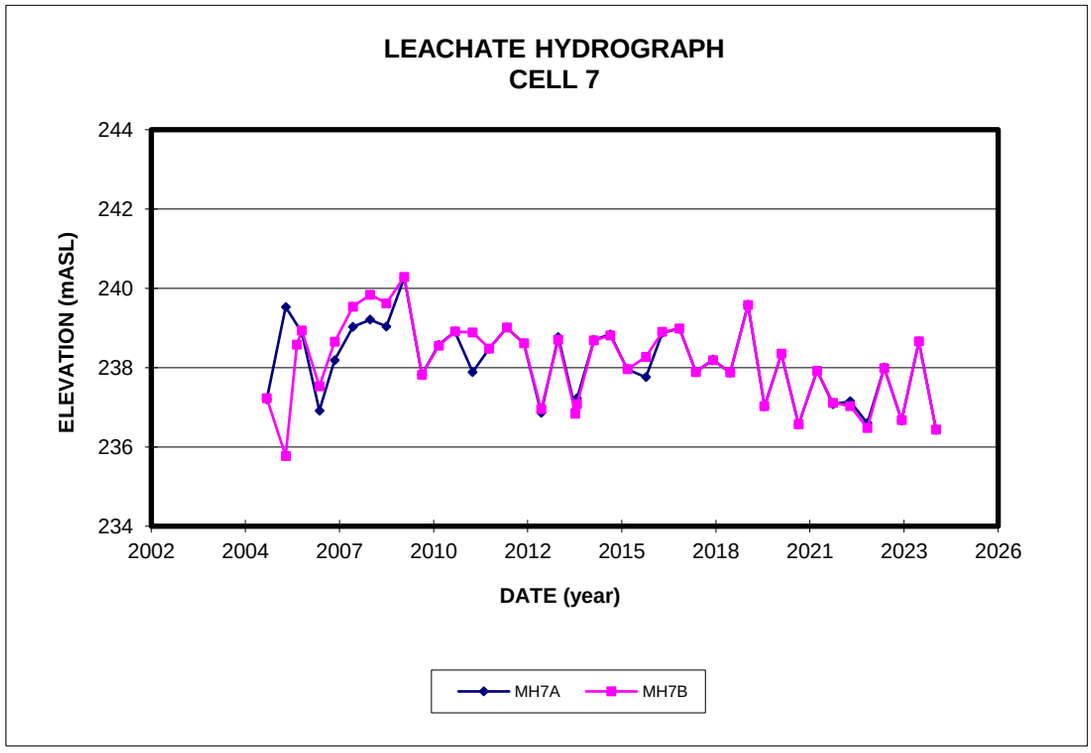


FIGURE F-7

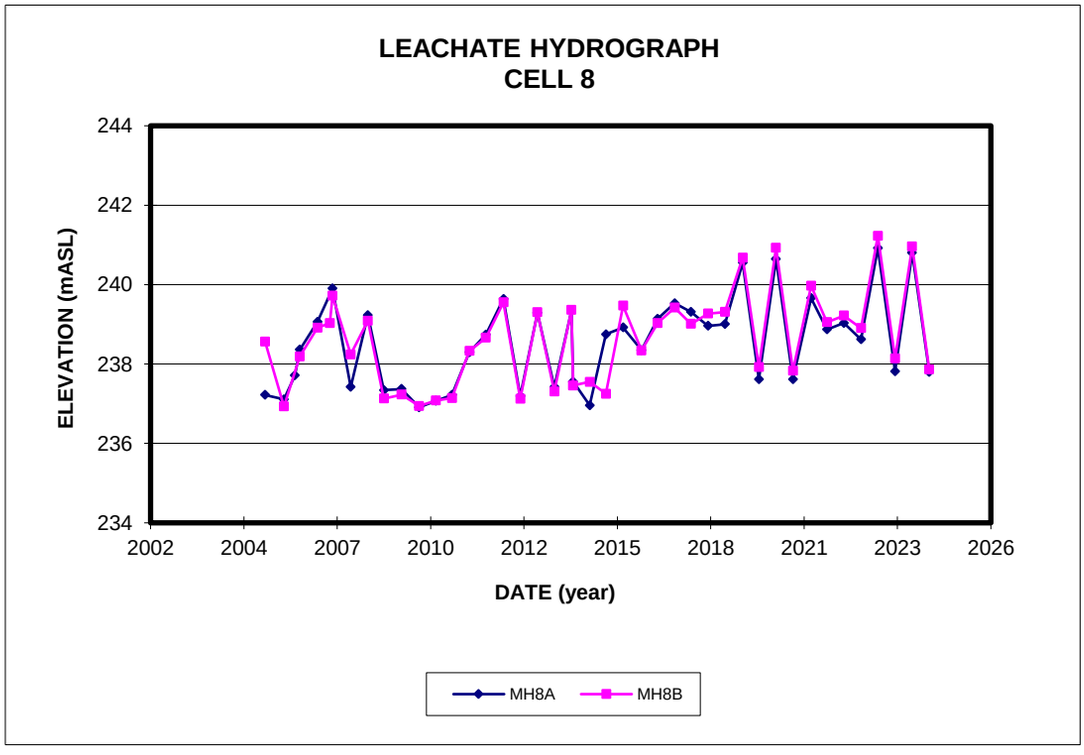


FIGURE F-8

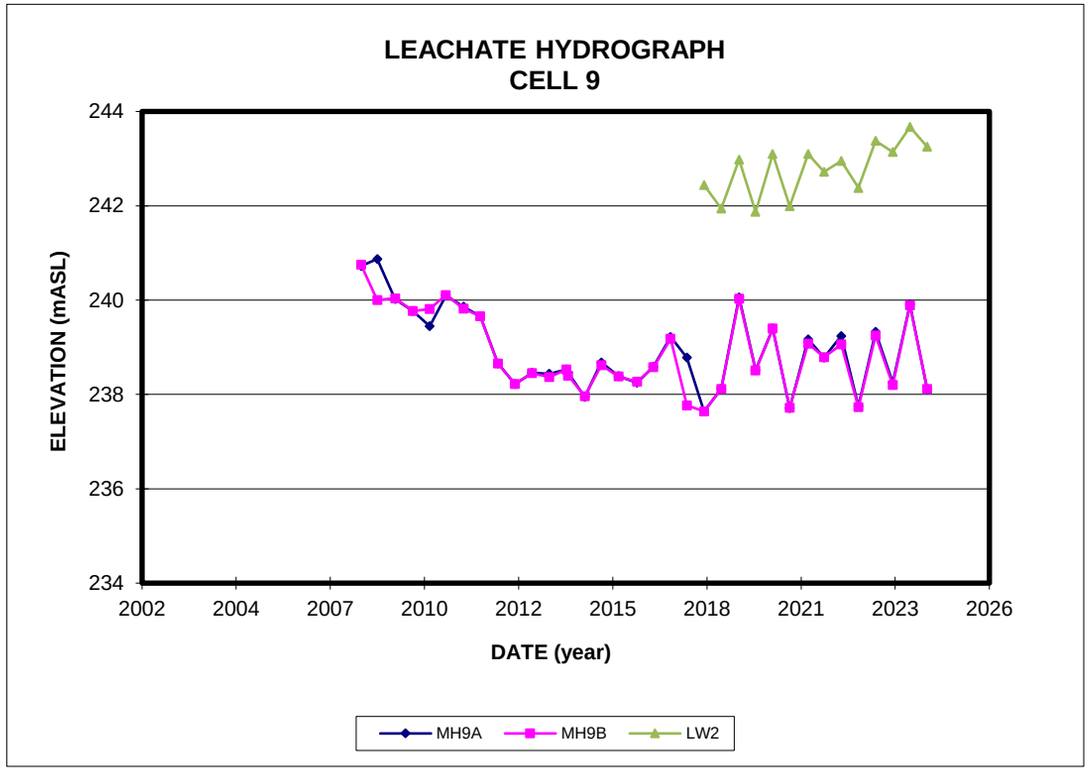


FIGURE F-9

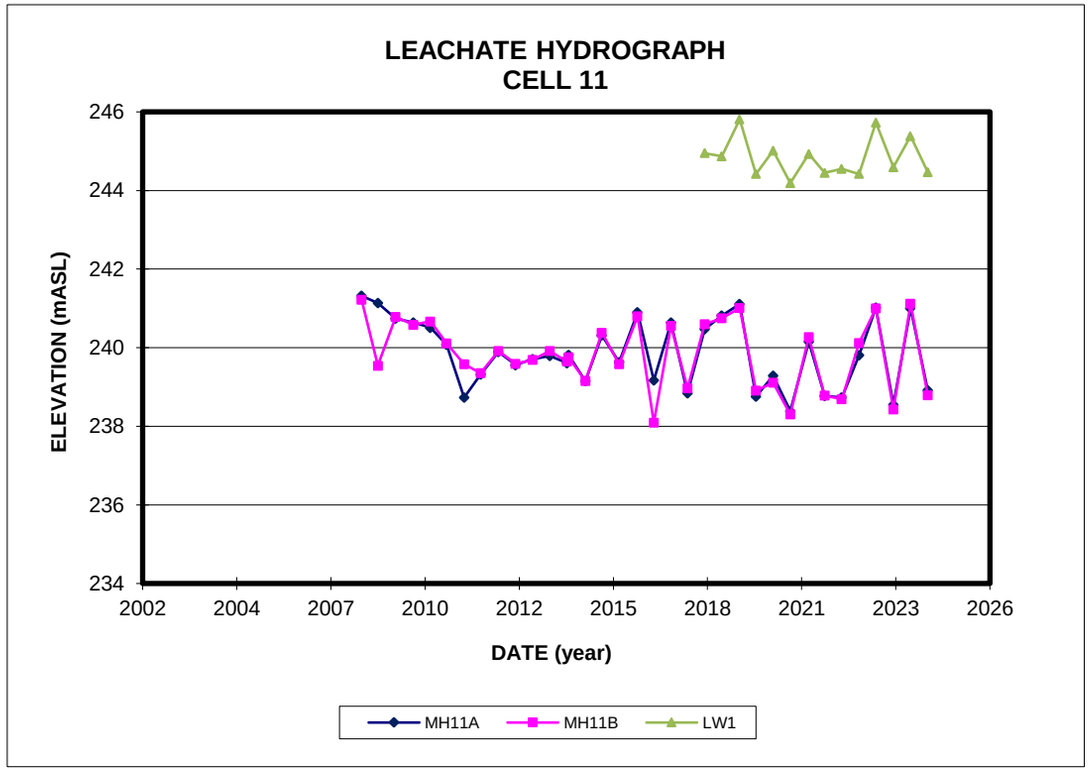


FIGURE F-10

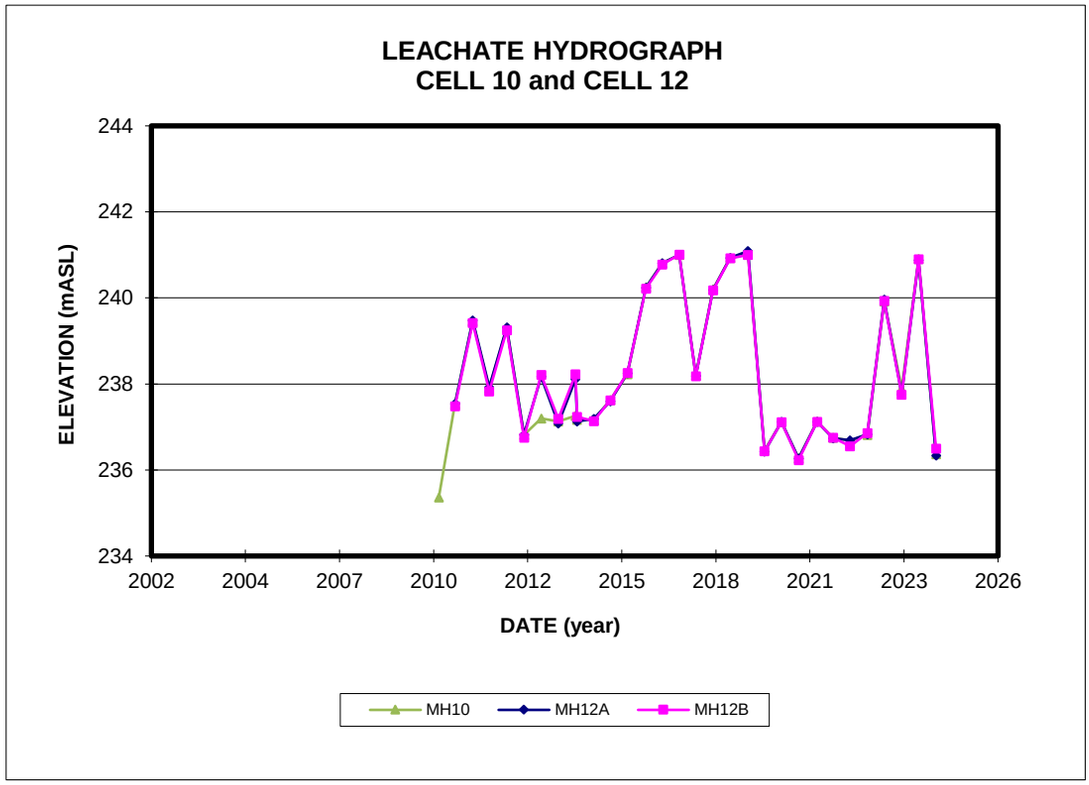


FIGURE F-11

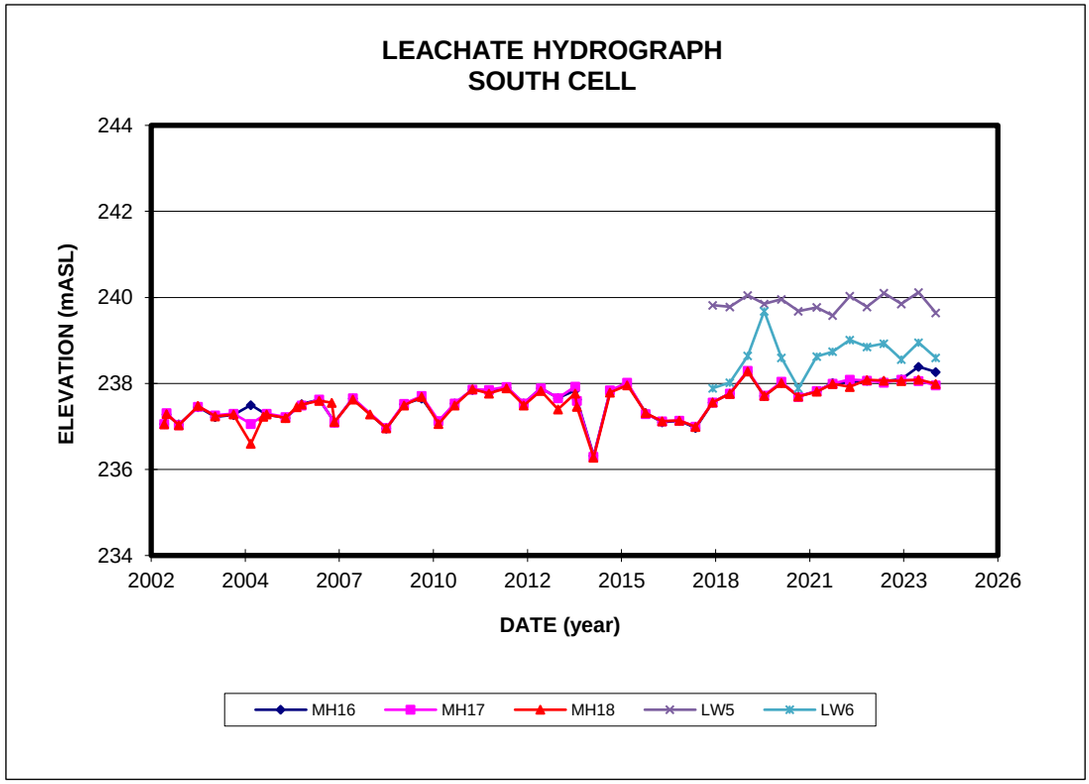


FIGURE F-12

APPENDIX F:

Table F4 - Groundwater Elevations

Table F-4
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW16-5*	OW16-6*	OW16-7	OW17-4	OW17-30	OW19-29	OW39-26	OW39A-26	OW40-6	OW40A-4	OW40B-4	OW40B-4r	OW40D-4*	OW40E-4*	OW40A-7	OW40-28	OW40A-28
T.O.P.	**241.50**	**241.36**	**241.55**	**240.64**	**240.72**	**241.83**	**235.74**	**235.60**	**239.14**	**239.08**	**238.74**	**238.66**	**238.76**	**238.60**	**239.13**	**239.09**	**239.11**
23-Mar-84	238.57		238.73	235.65	232.27												
12-Apr-84	240.08		238.97	237.88	232.80												
3-May-84	239.97		238.85	238.67	232.88												
29-Jun-84	239.83		238.75	238.86	233.26												
27-Jul-84	239.31		238.29	238.48	233.43												
10-Sep-84	239.02		238.25	238.35	233.30												
19-Oct-84	238.84		238.25		233.28												
27-Nov-84	239.16		238.60		233.35												
17-Dec-84	239.49		238.62	238.60	233.38												
1-Feb-85	239.31		238.40	238.54	233.44												
27-Feb-85	239.45		238.37	238.80	237.14												
26-Mar-85	239.81		238.75	238.97	235.58												
26-Apr-85	239.87		238.80	238.98	236.51												
21-May-85	239.36		237.86	238.66	236.40												
15-Jul-85	238.71		237.68	238.02	233.17												
10-Sep-85	238.30		237.69	237.38	232.97												
13-Mar-86				238.66	235.13												
8-Apr-86	239.68		238.59														
5-Sep-86	237.88		238.17	238.19	235.80												
25-Feb-87	240.01		238.73	238.35	235.88												
25-Mar-87	240.07		238.92	238.45	233.85												
29-Apr-87	240.04		238.94	238.64	233.95												
22-May-87	239.63		238.71	238.36	233.78												
26-May-88	239.34		238.45	237.66	233.67												
18-Aug-88	238.77		237.92	237.42	232.68												
2-Nov-88	238.72		238.14	236.86	232.71												
6-Jun-89				237.10	233.02												
25-Oct-89	238.38		237.64	237.16	232.38				233.58							230.35	
14-May-90	239.52		238.57	238.16	234.00				237.15							230.66	
14-Aug-90	238.85		238.02	238.10	233.70				236.86							230.71	
6-Dec-90	239.56		238.61	237.83	234.13				237.19							230.87	
15-May-91	239.92		238.90	238.13	233.66				237.33							231.10	
21-Aug-91	238.69		237.72	238.85	233.56				236.50							230.76	
15-Nov-91	237.54		236.80	237.41	233.36				234.96							230.73	
25-May-92	238.88		238.56	237.86	234.09				236.79							230.84	
10-Nov-92	239.26		238.52	238.36	234.50				237.14							231.02	
19-Apr-93																	
13-Jun-93	239.34		238.54	237.65	234.22				237.20							231.21	
4-Dec-93	237.60		238.06	237.72	234.50				234.36							231.03	
10-May-94	239.39		238.65	238.43	234.34				236.58							230.97	
13-Dec-94	236.88		236.84	236.80	234.25				236.92							230.74	

Table F-4
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW16-5*	OW16-6*	OW16-7	OW17-4	OW17-30	OW19-29	OW39-26	OW39A-26	OW40-6	OW40A-4	OW40B-4	OW40B-4r	OW40D-4*	OW40E-4*	OW40A-7	OW40-28	OW40A-28
T.O.P.	**241.50**	**241.36**	**241.55**	**240.64**	**240.72**	**241.83**	**235.74**	**235.60**	**239.14**	**239.08**	**238.74**	**238.66**	**238.76**	**238.60**	**239.13**	**239.09**	**239.11**
9-Jun-95	239.25		238.59	238.00	234.00				235.39							230.73	
6-Nov-95	237.25		236.86	237.84	234.24												
6-May-96	238.90		238.78	238.86	234.49												
9-Dec-96	238.91		238.50	238.77	232.93												
12-May-97	239.70		238.97	239.05	235.05												
4-Dec-97	237.61		238.31	237.71	234.60												
3-Mar-98			239.03		234.98											231.60	
12-May-98	239.70		239.08	239.15	234.69												
21-Jul-98					234.53	234.16	231.28									230.55	
18-Dec-98	236.36		237.31	237.65	233.84												
13-Jan-99	236.37		237.49	237.06	233.86	233.04	231.26		236.09							230.58	
30-Mar-99	238.80		238.60	238.69	233.45												
1-Jun-99	238.70		238.44	238.06	233.32	233.92	231.31		236.94							230.46	
10-Nov-99	Dry		236.49	237.29	232.96	233.63	231.45		235.17							230.12	
21-Dec-99	Dry		237.22	238.05	233.10												
28-Mar-00	237.69		238.11	238.21	233.20												
19-Jun-00	238.59		238.42	238.72	233.06	233.71	230.90		237.18							230.15	
28-Nov-00	237.90		237.99	238.33	233.25	234.06	230.82		237.04							230.30	
5-Dec-00	237.70		238.21	238.74	233.36												
10-Apr-01	239.94		238.88	238.35	233.75												
20-Jun-01	238.89		238.49	239.03	233.74	234.28	231.37		237.42							230.65	
26-Nov-01	238.46		238.35	239.08	233.52	234.14	231.45		237.22							230.57	
21-May-02	239.75		238.82	239.86	233.80	234.32	231.78		237.33							230.73	
5-Jun-02	239.33		238.94	239.70	233.86	234.38	231.49		237.30							230.76	
22-Oct-02	236.47		237.37	238.57	233.39	233.86											
13-May-03	238.78		238.62	239.82	233.00	233.45											
12-Nov-03	<237.24**		237.80	239.95													
25-May-04	239.53		238.50	239.28													
21-Jun-04																	
27-Sep-04	237.25		237.22	238.93	233.71	234.25											
26-Nov-04	<237.24**		236.80	238.51													
12-May-05	239.11		238.30	238.94	233.12	234.29											
29-Nov-05		234.98	236.79	237.39													
17-May-06		238.36	238.20	238.61	233.30	234.46											
22-Nov-06		237.05	238.00	239.64													
3-May-07		239.22	238.62	239.44													
15-Nov-07		<235.29**	236.23	238.40													
15-May-08		235.44	237.37	239.04	232.85	234.21	**228.77**										
4-Nov-08		237.68	237.66	238.99	233.05	234.36	231.00			235.53					236.41		230.12
12-May-09		239.36	238.61	239.39	233.54	234.85	231.48			235.99	235.99				237.11		230.54
16-Nov-09		237.54	237.74	238.84	233.35	234.62	231.51				236.28				236.63		230.52

Table F-4
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW16-5*	OW16-6*	OW16-7	OW17-4	OW17-30	OW19-29	OW39-26	OW39A-26	OW40-6	OW40A-4	OW40B-4	OW40B-4r	OW40D-4*	OW40E-4*	OW40A-7	OW40-28	OW40A-28
T.O.P.	**241.50**	**241.36**	**241.55**	**240.64**	**240.72**	**241.83**	**235.74**	**235.60**	**239.14**	**239.08**	**238.74**	**238.66**	**238.76**	**238.60**	**239.13**	**239.09**	**239.11**
14-May-10		238.57	238.37	239.72	233.39	234.61	231.61				237.52				236.99		230.55
9-Nov-10		236.23	236.31	239.20	233.08	234.35	230.80				235.43				236.63		230.33
9-May-11		239.27	238.54	239.64	233.16	234.48	230.64				237.92				237.01		230.37
1-Nov-11		237.89	237.76	239.71	233.18	234.47	230.76				237.27				236.79		230.44
7-May-12		238.65	238.29	239.39	233.50	234.78	230.94				237.96				237.10		230.68
5-Nov-12		236.18	236.07	239.73	233.01	234.32	230.47					234.45			235.93		230.28
6-May-13		238.88	238.18	238.93	232.95	234.26	230.47					237.10			236.77		230.11
4-Nov-13		236.39	236.30	239.52	233.04	234.41	230.52					235.77			235.80		**231.12**
5-May-14		239.52	238.77	239.26	233.17	234.56	230.93					237.54			237.15		230.42
23-May-14				239.45													
27-May-14																	
17-Nov-14		238.77	238.41	239.06	233.18	234.58	230.38						234.68		236.89		230.46
11-May-15		239.27	238.65	239.19	233.18	234.57	230.54						236.51		237.10		230.46
10-Nov-15		236.85	236.85	239.53	232.95	234.30	230.25						236.07		236.80		230.28
24-May-16		238.99	238.48	239.55	233.02	234.33	230.23						237.60		237.46		230.40
14-Nov-16		236.68	236.87	239.40	232.64	234.07							235.77		236.67		230.06
15-May-17		238.97	238.34	239.29	232.77	234.15		229.71					237.49		237.43		230.16
6-Nov-17		236.88	236.56	239.67	232.50	233.93		229.61					235.91		236.22		229.89
7-May-18		239.32	238.53	239.54	232.60	234.08		229.25					237.07		237.14		229.94
5-Nov-18		238.74	238.36	239.85	232.42	233.94		229.17					237.26		237.21		229.85
13-May-19		239.80	239.01	239.69	232.85	234.29		229.76					237.82		237.46		230.19
4-Nov-19		238.08	237.98	239.33	232.63	234.07		229.64					237.70		237.07		229.96
4-May-20		239.48	238.91	239.63	232.90	234.24		230.15					237.80		237.32		230.24
2-Nov-20		236.97	237.14	239.09	232.47	233.94		229.38					235.90		236.34		229.89
17-May-21		238.89	238.76	239.36	232.57	233.53		230.43					235.86		237.56		229.88
1-Nov-21		239.38	238.62	239.50	232.50	233.63		230.65					238.02		237.22		229.75
2-May-22		239.68	238.95	239.72	232.64	233.91		230.87					238.01		237.27		229.88
1-Nov-22		239.08	237.84	239.24	232.54	233.68		230.61					236.19		236.66		229.80
1-May-23		239.54	238.77	239.58	232.66	233.78		230.69					238.07		237.18		229.87
1-Nov-23		238.65	238.22	239.36	232.46	233.73		230.59					236.41		236.96		229.76
1-May-24		239.85	239.20	239.71	232.85	234.12		229.93						236.16	237.29		230.14
1-Nov-24		238.64	238.60	239.38	232.46	233.64		230.58						236.74	237.00		229.76

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended ECA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

11) OW39-26 noted to have been damaged during the fall 2016 monitoring event.

12) OW40D-4 noted to have been damaged in January 2024. OW40D-4 decomissioned in January 2024. Replacement OW40E-4 installed in March 2024.

Table F-4
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW46-7	OW47-6	OW49-29	OW54-4	OW54A-4	OW54-10	OW56-4*	OW57-4*	OW57-15	OW58-4*	OW58-6*	OW58-14	OW58-17	OW59-4*	OW59-6*	OW59-10
T.O.P.	**240.66**	**240.77**	**243.21**	**242.71**	**242.95**	**243.44**	**240.46**	**241.32**	**241.44**	**241.71**	**241.62**	**241.53**	**242.17**	**241.79**	**241.84**	**242.03**
23-Mar-84																
12-Apr-84																
3-May-84																
29-Jun-84																
27-Jul-84																
10-Sep-84																
19-Oct-84																
27-Nov-84																
17-Dec-84																
1-Feb-85																
27-Feb-85																
26-Mar-85																
26-Apr-85																
21-May-85																
15-Jul-85																
10-Sep-85																
13-Mar-86																
8-Apr-86																
5-Sep-86																
25-Feb-87																
25-Mar-87																
29-Apr-87																
22-May-87																
26-May-88																
18-Aug-88																
2-Nov-88																
6-Jun-89																
25-Oct-89																
14-May-90																
14-Aug-90																
6-Dec-90	237.78	237.94														
15-May-91	238.21	238.45														
21-Aug-91	238.37	238.26														
15-Nov-91	237.41	237.59														
25-May-92	236.99	237.64														
10-Nov-92	237.28	237.70														
19-Apr-93																
13-Jun-93	237.49	238.06														
4-Dec-93	238.04	237.42														
10-May-94	237.93	237.72														
13-Dec-94	236.69	236.87														

Table F-4
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW46-7	OW47-6	OW49-29	OW54-4	OW54A-4	OW54-10	OW56-4*	OW57-4*	OW57-15	OW58-4*	OW58-6*	OW58-14	OW58-17	OW59-4*	OW59-6*	OW59-10
T.O.P.	**240.66**	**240.77**	**243.21**	**242.71**	**242.95**	**243.44**	**240.46**	**241.32**	**241.44**	**241.71**	**241.62**	**241.53**	**242.17**	**241.79**	**241.84**	**242.03**
9-Jun-95	237.27	237.42														
6-Nov-95	237.18	236.80														
6-May-96		236.79														
9-Dec-96	237.47	237.20														
12-May-97	237.91	237.68														
4-Dec-97	237.78	237.34														
3-Mar-98	238.38	237.83														
12-May-98	238.71	238.20														
21-Jul-98																
18-Dec-98	237.60	236.81														
13-Jan-99	237.89	236.74					236.89	237.10		Dry				Dry		
30-Mar-99	237.80	237.19					237.61									
1-Jun-99		238.11					238.34	237.10	237.87	Dry		237.03		238.79		
10-Nov-99	236.92	235.78					236.26	237.32	237.70	Dry		236.48		Dry		235.33
21-Dec-99	237.10			240.50			Dry	237.16	237.40	Dry		233.96		Dry		
28-Mar-00	237.65			240.09			Dry	237.15	237.43	237.37		236.06		Dry		
19-Jun-00	237.24	237.96					236.74	238.78	237.86	Dry		236.39		Dry		236.54
28-Nov-00	238.09	237.19					237.76	237.83	238.49	237.39		237.10		237.52		236.82
5-Dec-00	236.94	238.27		240.72			236.19	237.81	238.46	237.36		237.11		Dry		236.77
10-Apr-01	238.35	237.72		241.58			237.21	237.84	238.55	Dry		236.06		237.83		237.30
20-Jun-01	238.57	238.19					238.75	238.24	238.80	Dry		237.55		238.95		237.54
26-Nov-01	238.16	237.88		240.88			238.94	238.59	238.96	238.97		235.46		237.80		236.77
21-May-02	238.83	238.21		241.18			239.08	238.53	239.05	237.43		238.07		237.51		237.59
5-Jun-02	238.90	238.26		241.03			237.43	237.63	238.99	237.55		238.13		237.62		237.64
22-Oct-02	238.13	237.75		238.55			237.99	239.10	238.86	238.51		238.00		237.45		236.29
13-May-03	237.82	237.34		240.48			238.61	238.05	237.66	<237.96**		237.24		237.39		235.33
12-Nov-03	238.37	237.61		240.78			239.81	238.58	238.31	238.98		237.89		237.41		236.79
25-May-04	238.87	238.38		240.95			239.12	238.80	238.82	<237.75**		238.23		Dry		238.22
21-Jun-04																
27-Sep-04	238.62	238.00		239.36			238.53	239.32	238.93	238.95		238.40		237.72		238.88
26-Nov-04	238.03	237.45		238.57			239.72	238.62	238.61	238.68		237.86		237.60		238.56
12-May-05	238.41	237.99		240.55			238.79	238.35	238.45	238.52		238.37		237.48		238.42
29-Nov-05	237.79	236.92		240.44			239.47	238.07	238.30		235.48	238.28			238.04	238.52
17-May-06	238.39	237.47		240.97			238.01	238.09	238.64		235.98	238.53			239.57	237.13
22-Nov-06	238.27	237.39		240.30			238.45	238.36	238.73		237.07	238.47			238.56	238.83
3-May-07	238.81	238.22		240.92			238.83	238.73	239.00		238.09	238.87			238.69	239.06
15-Nov-07	237.44	236.47		239.03			236.42	238.12	238.02		237.89	238.29			238.29	238.36
15-May-08	237.43	236.54			237.44		237.24	237.76	237.55		237.39	238.05			238.04	238.35
4-Nov-08	237.94	237.35			239.72		237.92	238.44	238.36		238.57	238.26			238.98	239.05
12-May-09	238.43	238.35	234.25		239.45	240.98	239.10	239.02	238.79		239.32	238.58			239.56	239.27
16-Nov-09	238.25	237.92	233.99		239.72	240.54	238.42	238.79	238.70		238.64	238.67			239.25	238.95

Table F-4
Groundwater Level Elevations
Twin Creeks Environmental Centre

	OW46-7	OW47-6	OW49-29	OW54-4	OW54A-4	OW54-10	OW56-4*	OW57-4*	OW57-15	OW58-4*	OW58-6*	OW58-14	OW58-17	OW59-4*	OW59-6*	OW59-10
T.O.P.	**240.66**	**240.77**	**243.21**	**242.71**	**242.95**	**243.44**	**240.46**	**241.32**	**241.44**	**241.71**	**241.62**	**241.53**	**242.17**	**241.79**	**241.84**	**242.03**
14-May-10	238.46	237.91	234.06		239.63	240.02	238.75	238.90	238.50		239.17	239.28			239.42	239.53
9-Nov-10	237.68	237.28	233.62		239.67	239.50	237.36	238.39	238.37		237.99	238.44			238.93	238.71
9-May-11	238.16	237.78	233.85		239.88	239.47	238.86	238.61	238.43		237.66	238.35			239.29	239.71
1-Nov-11	238.32	237.95	233.83		239.94	239.63	238.45	238.96	238.75		238.56	238.64			239.33	239.90
7-May-12	238.31	238.23	234.16		240.05	239.46	238.87	239.38	238.34		238.56	238.58			239.83	239.91
5-Nov-12	237.70	237.38	233.49		240.14	238.75	237.37	238.46	238.47		237.59	238.53			238.42	239.59
6-May-13	237.64	237.02	233.63		240.41	238.83	238.24	238.10	238.06		237.15	238.30			238.93	239.46
4-Nov-13	237.58	237.26	233.80		240.20	238.89	237.55	238.34	238.35		237.51	238.39			238.51	239.64
5-May-14	238.46	238.12	233.91		240.46	238.99	238.91	238.95	238.67		237.64	238.14			239.55	239.01
23-May-14					240.67		238.97	239.02			237.77					
27-May-14												237.13	234.77			
17-Nov-14	237.56	238.28	233.85		240.72	238.98	238.69	238.85	238.89		238.03	238.71	237.33		239.44	239.20
11-May-15	238.66	238.03	233.86		240.95	238.85	239.36	239.36	238.75		238.12	238.80	237.84		239.95	238.91
10-Nov-15	238.20	237.94	233.49		240.01	238.53	237.99	238.60	238.59		238.03	238.65	237.88		239.15	238.80
24-May-16	238.42	238.20	233.65		241.12	238.69	238.97	238.85	238.50		237.59	238.59	237.52		239.56	238.71
14-Nov-16	238.38	237.66	233.22		240.52	238.30	237.87	238.50	238.43		237.99		236.60		238.66	238.75
15-May-17	238.30	237.51	233.46		241.36	238.30	238.93	238.93	238.47		237.67		237.35		239.46	238.75
6-Nov-17	238.30	237.58	233.00		239.88	238.42	238.47	238.80	238.58		238.66		237.66		239.25	238.90
7-May-18	238.70	237.76	233.19		241.46	238.23	239.29	239.90	238.93		239.87		237.67		240.16	239.06
5-Nov-18	238.94	237.93	233.01		241.07	238.46	238.85	239.28	238.98		239.44		237.85		239.70	239.24
13-May-19	239.15	239.52	233.43		241.79	238.63	239.61	240.25	239.30		240.50		237.98		240.56	239.41
4-Nov-19	239.02	238.30	232.41		240.79	238.19	239.00	239.06	239.05		239.18		238.02		239.61	239.04
4-May-20	239.28	238.64	233.29		241.80	238.38	239.53	240.24	239.33		240.42		237.98		240.41	239.14
2-Nov-20	238.71	237.97	232.99		239.62	237.96	238.68	238.89	238.71		240.17		237.73		238.92	238.52
17-May-21	238.99	238.10	233.07		240.95	237.89	239.09	240.04	239.07		240.01		237.39		239.91	238.55
1-Nov-21	239.21	238.14	232.88		241.34	238.19	238.84	239.42	239.18		240.92		237.77		239.40	238.50
2-May-22	239.20	238.54	233.14		241.90	238.48	239.43	239.60	239.23		240.88		237.85		240.28	238.66
1-Nov-22	238.89	238.11	232.64		240.16	238.22	238.37	238.80	238.72		239.18		237.35		239.66	237.73
1-May-23	239.02	238.35	232.85		241.69	238.59	239.46	240.13	239.26		240.55		237.75		240.39	238.70
1-Nov-23	239.09	238.10	232.64		241.25	238.55	238.56	239.45	239.01		240.69		237.50		239.71	238.77
1-May-24	239.41	238.86	233.17		242.00	238.89	239.60	240.37	239.41		240.71		237.69		240.59	238.96
1-Nov-24	239.00	238.31	232.54		241.48	238.50	239.07	239.59	239.09		240.01		237.96		239.94	238.87

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended ECA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW60-4*	OW60-8	OW60-25	OW67-4*	OW67-11	OW68-5	OW69-5*	OW70-5*	OW70B-5	OW71-5*	OW71A-5*	OW72-6*	OW72-10	OW73-6*	OW73-9	OW79-5*
T.O.P.	235.73	235.76	235.74	243.26	243.1	241.68	240.66^	242.53^	242.84	242.79	242.75	242.72	243.09	242.43	242.88	238.559
23-Mar-84																
12-Apr-84																
3-May-84																
29-Jun-84																
27-Jul-84																
10-Sep-84																
19-Oct-84																
27-Nov-84																
17-Dec-84																
1-Feb-85																
27-Feb-85																
26-Mar-85																
26-Apr-85																
21-May-85																
15-Jul-85																
10-Sep-85																
13-Mar-86																
8-Apr-86																
5-Sep-86																
25-Feb-87																
25-Mar-87																
29-Apr-87																
22-May-87																
26-May-88																
18-Aug-88																
2-Nov-88																
6-Jun-89																
25-Oct-89																
14-May-90																
14-Aug-90																
6-Dec-90																
15-May-91																
21-Aug-91																
15-Nov-91																
25-May-92																
10-Nov-92																
19-Apr-93																
13-Jun-93																
4-Dec-93																
10-May-94																
13-Dec-94																

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW60-4*	OW60-8	OW60-25	OW67-4*	OW67-11	OW68-5	OW69-5*	OW70-5*	OW70B-5	OW71-5*	OW71A-5*	OW72-6*	OW72-10	OW73-6*	OW73-9	OW79-5*
T.O.P.	**235.73**	**235.76**	**235.74**	**243.26**	**243.1**	**241.68**	**240.66^**	**242.53^**	**242.84**	**242.79**	**242.75**	**242.72**	**243.09**	**242.43**	**242.88**	**238.559**
9-Jun-95																
6-Nov-95																
6-May-96																
9-Dec-96																
12-May-97																
4-Dec-97																
3-Mar-98																
12-May-98																
21-Jul-98																
18-Dec-98																
13-Jan-99	235.00	234.11	231.19													
30-Mar-99																
1-Jun-99	234.51	**230.91**	231.65													
10-Nov-99	231.60	**228.19**	231.49	241.09	238.38											
21-Dec-99				240.88	238.71											
28-Mar-00				241.67	239.18											
19-Jun-00	235.14	234.63		242.18	239.58											
28-Nov-00	235.14	234.46	231.73	241.88	239.65											
5-Dec-00				241.83	240.57											
10-Apr-01				242.37	239.96											
20-Jun-01	234.55	234.84	232.04	241.70	239.94											
26-Nov-01	234.99	234.47	231.88	242.44	239.47											
21-May-02	234.48	235.06	232.01	242.10	239.97	239.32	238.55	241.69								
5-Jun-02	234.49	235.02	232.06	241.97	239.97	239.18	238.57	239.18								
22-Oct-02				239.75	238.59	236.79	238.25	239.52								
13-May-03				242.35	238.31	239.54	237.23	241.44								
12-Nov-03				242.43	238.32	237.48	237.49	240.67								
25-May-04				242.69	239.32	239.77	238.34	241.81								
21-Jun-04										241.58						
27-Sep-04				240.57	238.77	237.42	238.49	240.22		240.28						
26-Nov-04				239.94	238.23	<237.30**	237.99	239.50		239.22						
12-May-05				242.00	238.77	239.11	237.63	241.60		241.57						
29-Nov-05				242.69	238.12	237.33	237.69	238.84		238.52		236.19	237.14	237.35	238.65	
17-May-06				242.72	239.28	239.59	237.66	241.38		241.50		236.53	237.84	239.52	236.01	
22-Nov-06				242.52	239.00	238.56	237.90	241.52		241.46		237.30	239.05	238.26	239.05	
3-May-07				242.31	239.58	239.63	238.33	241.74		241.97		238.22	240.09	238.10	239.16	
15-Nov-07				<239.54**	236.34	<237.30**	237.44			238.48		239.33		238.82	239.82	
15-May-08	234.82	233.97	**229.04**	239.64	238.39	238.13	236.71		DRY	240.19		238.92	240.90	238.47	239.32	
4-Nov-08	234.51	233.77	230.88	242.53	238.38	238.78	237.80		238.66	239.42		240.08	241.49	239.04	239.70	
12-May-09	235.15	235.05	231.94	242.52	240.82	239.62	237.78		238.27	240.12		239.62	240.88	238.65	239.44	237.31
16-Nov-09	234.73	234.09	231.78	242.05	239.31	237.72	238.14		239.84	240.48		240.03	240.45	238.98	239.17	233.17

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW60-4*	OW60-8	OW60-25	OW67-4*	OW67-11	OW68-5	OW69-5*	OW70-5*	OW70B-5	OW71-5*	OW71A-5*	OW72-6*	OW72-10	OW73-6*	OW73-9	OW79-5*
T.O.P.	**235.73**	**235.76**	**235.74**	**243.26**	**243.1**	**241.68**	**240.66^**	**242.53^**	**242.84**	**242.79**	**242.75**	**242.72**	**243.09**	**242.43**	**242.88**	**238.559**
14-May-10	235.16	234.94	231.92	242.64	239.31	239.76	237.78		239.91	**242.10**		238.65	239.86	238.39	238.87	235.77
9-Nov-10	234.62	230.76	231.59	242.55	238.41	<237.30**	237.82		240.25			239.77	239.72	238.82	238.95	DRY
9-May-11	235.14	234.86	231.75	242.39	239.14	239.66	237.47		241.54		241.05	238.95	239.41	238.18	238.74	236.42
1-Nov-11	234.98	234.27	231.76	241.86	238.95	238.26	238.15		240.86		241.14	239.60	239.55	238.77	238.99	<233.74**
7-May-12	235.10	234.94	232.10	241.68	239.24	238.91	238.62		241.35		241.46	239.10	239.29	238.39	238.87	236.60
5-Nov-12	232.45	231.28	231.56	242.44	237.95	237.35	238.09		240.44		239.61	239.30	238.91	239.74	238.73	233.74
6-May-13	235.14	234.72	**229.55**	242.13	238.71	239.29	237.44		241.85		241.57	238.36	238.65	237.98	238.38	236.54
4-Nov-13	232.68	231.25	231.71	242.53	238.08	237.79	237.97		240.71		239.77	239.45	239.10	239.79	238.79	233.87
5-May-14	235.11	234.92	231.94	242.48	239.03	239.63	238.54		241.94		242.18	238.49	238.70	238.12	238.58	237.35
23-May-14							237.97					238.70		238.24		
27-May-14																
17-Nov-14	235.19	234.78	231.94	242.28	239.11	239.37	238.45		241.35		242.01	239.11	238.75	238.80	238.96	235.04
11-May-15	235.18	235.06	231.89	242.27	239.00	239.46	238.23		241.73		241.99	238.63	238.56	238.33	238.66	236.96
10-Nov-15	232.42	232.42	231.59	242.19	238.10		238.23		240.64		240.30	239.17	238.53	238.77	238.67	233.16
24-May-16	235.01	234.83	231.77	242.06	238.75	239.35	238.03		241.80		242.04	238.38	238.39	238.08	238.44	236.79
14-Nov-16	<232.44	231.81	231.38	241.96	237.71	237.43	238.02		240.87		241.27	238.96	238.51	238.72	238.68	233.77
15-May-17	234.95	234.78	231.55	242.19	237.80	238.98	237.90		241.82		242.04	236.49	238.39	238.17	238.49	236.93
6-Nov-17	232.44	231.29	231.22	242.51	237.51	237.34	238.12		240.96		241.86	238.92	238.26	238.70	238.70	233.77
7-May-18	235.14	234.73	231.36	242.49	237.81	239.32	238.47		241.95		242.27	240.06	238.38	239.40	238.83	236.85
5-Nov-18	235.03	234.52	231.24	242.56	238.04	239.32	238.58		241.29		242.14	240.09	238.53	239.67	238.83	235.61
13-May-19	235.03	235.06	231.63	242.60	238.04	239.91	239.15		242.04		242.30	240.54	238.82	240.20	239.17	237.36
4-Nov-19	234.98	233.99	231.34	242.53	237.77	239.05	238.84		241.34		241.97	239.99	238.46	239.71	239.01	<233.74**
4-May-20	235.15	235.01	231.57	242.32	237.93	239.43	239.32		241.90		242.14	240.61	238.58	240.73	239.06	237.01
2-Nov-20	232.45	231.00	231.27	242.47	237.67	238.05	238.77		241.27		241.20	239.81	238.16	239.26	238.71	233.73
17-May-21	234.74	234.78	231.23	241.86	237.87	238.91	239.08		241.30		241.80	240.50	238.29	240.71	238.78	236.06
1-Nov-21	235.24	234.77	230.99	242.50	237.96	239.86	239.07		241.62		242.24	240.46	238.33	240.17	238.77	235.53
2-May-22	235.21	234.72	231.40	242.47	238.11	239.66	239.24		242.02		242.09	240.90	238.60	240.68	238.76	235.75
1-Nov-22	235.00	233.97	230.98	242.39	237.76	238.20	238.75		240.28		240.88	240.89	238.59	240.08	239.06	234.56
1-May-23	235.04	235.00	231.08	242.75	238.25	239.51	239.18		242.12		242.31	240.82	238.74	241.21	239.04	236.90
1-Nov-23	235.03	234.55	230.95	242.55	238.19	239.33	238.89		241.52		241.99	240.61	239.06	240.20	239.31	234.22
1-May-24	235.08	235.12	231.47	242.64	238.46	239.62	239.49		242.12		242.29	241.09	239.13	241.41	239.34	237.12
1-Nov-24	234.92	234.66	231.01	241.92	238.31	238.89	239.22		241.52		241.73	240.78	238.53	240.39	239.07	234.19

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended CofA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW79-7	OW79-26	OW80-3*	OW80-6	OW80-27	OW81-5*	OW81-7	OW81-27	OW82-5	OW82-14	OW82-28	OW83-5	OW83-9	OW83-29
T.O.P.	238.773	238.954	236.156	236.59	236.58	236.04	236.5	236.55	236.76	236.99	236.92	240.75	240.89	240.82
23-Mar-84														
12-Apr-84														
3-May-84														
29-Jun-84														
27-Jul-84														
10-Sep-84														
19-Oct-84														
27-Nov-84														
17-Dec-84														
1-Feb-85														
27-Feb-85														
26-Mar-85														
26-Apr-85														
21-May-85														
15-Jul-85														
10-Sep-85														
13-Mar-86														
8-Apr-86														
5-Sep-86														
25-Feb-87														
25-Mar-87														
29-Apr-87														
22-May-87														
26-May-88														
18-Aug-88														
2-Nov-88														
6-Jun-89														
25-Oct-89														
14-May-90														
14-Aug-90														
6-Dec-90														
15-May-91														
21-Aug-91														
15-Nov-91														
25-May-92														
10-Nov-92														
19-Apr-93														
13-Jun-93														
4-Dec-93														
10-May-94														
13-Dec-94														

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW79-7	OW79-26	OW80-3*	OW80-6	OW80-27	OW81-5*	OW81-7	OW81-27	OW82-5	OW82-14	OW82-28	OW83-5	OW83-9	OW83-29
T.O.P.	238.773	238.954	236.156	236.59	236.58	236.04	236.5	236.55	236.76	236.99	236.92	240.75	240.89	240.82
9-Jun-95														
6-Nov-95														
6-May-96														
9-Dec-96														
12-May-97														
4-Dec-97														
3-Mar-98														
12-May-98														
21-Jul-98														
18-Dec-98														
13-Jan-99														
30-Mar-99														
1-Jun-99														
10-Nov-99														
21-Dec-99														
28-Mar-00														
19-Jun-00														
28-Nov-00														
5-Dec-00														
10-Apr-01														
20-Jun-01														
26-Nov-01														
21-May-02														
5-Jun-02														
22-Oct-02														
13-May-03														
12-Nov-03														
25-May-04														
21-Jun-04														
27-Sep-04														
26-Nov-04														
12-May-05														
29-Nov-05														
17-May-06														
22-Nov-06														
3-May-07														
15-Nov-07														
15-May-08														
4-Nov-08														
12-May-09	236.25	231.68	234.94	235.45	230.99									
16-Nov-09	232.48	231.71	234.32	234.41	231.06									

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW79-7	OW79-26	OW80-3*	OW80-6	OW80-27	OW81-5*	OW81-7	OW81-27	OW82-5	OW82-14	OW82-28	OW83-5	OW83-9	OW83-29
T.O.P.	**238.773**	**238.954**	**236.156**	**236.59**	**236.58**	**236.04**	**236.5**	**236.55**	**236.76**	**236.99**	**236.92**	**240.75**	**240.89**	**240.82**
14-May-10	233.55	231.39	235.18	235.13	230.79									
9-Nov-10	232.31	230.98	234.54	233.85	230.41									
9-May-11	234.94	230.82	235.01	235.46	230.29									
1-Nov-11	233.83	230.97	234.93	235.10	230.33									
7-May-12	235.62	231.14	234.78	235.05	230.51									
5-Nov-12	232.40	230.69	234.87	233.32	230.03									
6-May-13	235.67	230.46	234.78	235.24	229.89									
4-Nov-13	232.25	230.83	234.85	233.34	230.01									
5-May-14	236.35	230.92	235.54	235.54	230.33									
23-May-14														
27-May-14														
17-Nov-14	235.17	230.39	235.02	235.31	229.88									
11-May-15	236.15	230.54	234.67	235.14	230.05									
10-Nov-15	233.16	230.28	234.68	234.15	229.76									
24-May-16	236.13	230.20	234.93	235.17	229.74									
14-Nov-16	233.29	229.71	234.73	234.57	229.30									
15-May-17	236.28	229.91	234.86	235.27	229.53									
6-Nov-17	232.89	229.83	234.82	234.29	229.37									
7-May-18	236.19	229.46	235.08	235.42	229.10									
5-Nov-18	234.82	229.38	235.18	235.37	228.98									
13-May-19	236.59	229.97	235.25	235.56	229.50									
4-Nov-19	233.88	229.88	235.32	235.12	229.39	234.64	234.38	229.42						
4-May-20	236.17	230.35	234.84	235.21	229.87	235.12	235.11	229.88						
2-Nov-20	232.57	229.59	235.20	234.05	229.19	234.75	234.54	229.27						
17-May-21	235.38	230.60	234.49	234.85	230.11	234.91	234.90	230.15						
1-Nov-21	235.34	230.84	235.33	235.39	230.36	235.16	235.05	230.42						
2-May-22	235.75	231.09	235.20	235.44	229.64	235.23	235.15	229.88						
1-Nov-22	232.72	230.76	234.88	234.62	230.28	234.76	234.56	230.37	235.07	234.56	231.24	237.52	235.31	230.39
1-May-23	236.16	230.82	234.38	235.38	230.39	235.26	235.26	230.51	235.39	234.39	231.10	238.42	235.93	230.83
1-Nov-23	234.36	230.20	235.22	235.21	229.83	235.15	235.10	229.90	235.22	234.52	230.60	238.07	236.16	229.04
1-May-24	235.78	230.13	235.26	235.36	229.84	235.35	235.42	229.94	235.30	234.49	231.62	238.37	236.52	230.31
1-Nov-24	234.20	230.23	234.88	235.03	229.77	235.23	235.01	229.81	235.29	234.49	230.39	238.53	236.19	229.11

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended CofA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

11) OW81-5, OW81-7 and OW81-27 installed in June 2019.

12) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, and OW84-31 installed in June 2022.

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW84-6	OW84-11	OW84-31	P1	P2	P3
T.O.P.	243.86	244.03	243.905	240.38	240.58	240.62
23-Mar-84						
12-Apr-84						
3-May-84						
29-Jun-84						
27-Jul-84						
10-Sep-84						
19-Oct-84						
27-Nov-84						
17-Dec-84						
1-Feb-85						
27-Feb-85						
26-Mar-85						
26-Apr-85						
21-May-85						
15-Jul-85						
10-Sep-85						
13-Mar-86						
8-Apr-86						
5-Sep-86						
25-Feb-87						
25-Mar-87						
29-Apr-87						
22-May-87						
26-May-88						
18-Aug-88						
2-Nov-88						
6-Jun-89						
25-Oct-89						
14-May-90						
14-Aug-90						
6-Dec-90						
15-May-91						
21-Aug-91						
15-Nov-91						
25-May-92						
10-Nov-92						
19-Apr-93						
13-Jun-93						
4-Dec-93						
10-May-94						
13-Dec-94						

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW84-6	OW84-11	OW84-31	P1	P2	P3
T.O.P.	243.86	244.03	243.905	240.38	240.58	240.62
9-Jun-95						
6-Nov-95						
6-May-96						
9-Dec-96						
12-May-97						
4-Dec-97						
3-Mar-98						
12-May-98						
21-Jul-98						
18-Dec-98						
13-Jan-99						
30-Mar-99						
1-Jun-99						
10-Nov-99						
21-Dec-99						
28-Mar-00						
19-Jun-00						
28-Nov-00						
5-Dec-00						
10-Apr-01						
20-Jun-01						
26-Nov-01						
21-May-02						
5-Jun-02						
22-Oct-02						
13-May-03						
12-Nov-03						
25-May-04						
21-Jun-04						
27-Sep-04						
26-Nov-04						
12-May-05						
29-Nov-05						
17-May-06						
22-Nov-06						
3-May-07						
15-Nov-07						
15-May-08						
4-Nov-08						
12-May-09						
16-Nov-09						

Table F-4
Groundwater - Liquid Level Elevations
Twin Creeks Environmental Centre

	OW84-6	OW84-11	OW84-31	P1	P2	P3
T.O.P.	**243.86**	**244.03**	**243.905**	**240.38**	**240.58**	**240.62**
14-May-10						
9-Nov-10						
9-May-11						
1-Nov-11						
7-May-12						
5-Nov-12						
6-May-13						
4-Nov-13						
5-May-14						
23-May-14						
27-May-14						
17-Nov-14						
11-May-15						
10-Nov-15						
24-May-16						
14-Nov-16						
15-May-17						
6-Nov-17						
7-May-18						
5-Nov-18				239.11	239.32	239.31
13-May-19				239.14	239.37	239.36
4-Nov-19				239.13	239.34	239.34
4-May-20				238.85	238.95	239.03
2-Nov-20				237.98	238.20	238.20
17-May-21				238.69	238.76	238.85
1-Nov-21				239.11	239.11	239.27
2-May-22				239.08	239.15	239.29
1-Nov-22	239.59	239.71	232.46	239.59	239.95	240.01
1-May-23	242.25	239.41	232.49	239.08	238.96	239.09
1-Nov-23	241.36	239.48	231.96	239.04	238.98	239.14
1-May-24	242.22	239.76	232.30	239.11	239.13	239.34
1-Nov-24	241.20	239.64	231.82	238.70	238.78	238.88

NOTE: 1) Blank denotes data not available.

2) T.O.P. denotes 'top of pipe'. Elevations as of July 2004.

3) Elevations in metres above sea level.

4) + denotes elevation reported is below elevation of well screen.

5) * denotes angled monitoring well.

6) ^ denotes pre 2004 T.O.P. elevation.

7) ** denotes level below top of pump.

8) NR denotes not required for the 2008 Second Quarter Monitoring Program.

9) Liquid level monitoring for OW59-10 is no longer required under the amended CofA for Waste, but continues to be monitored for changes in potentiometric pressures near Cell 7 of the Existing Site.

10) Bold denotes datum is anamlous and is excluded from the interpretations.

11) OW81-5, OW81-7 and OW81-27 installed in June 2019.

12) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, and OW84-31 installed in June 2022.

12) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, and OW84-31 installed in June 2022.

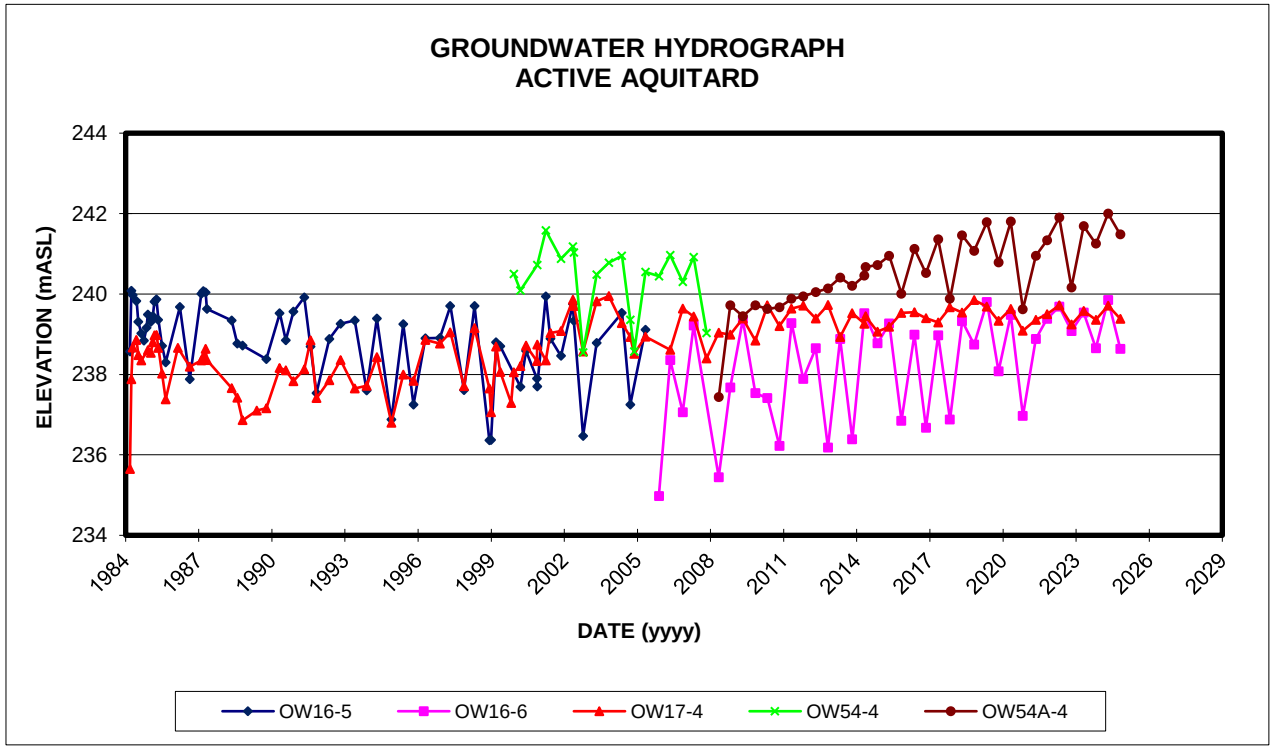


FIGURE F-13

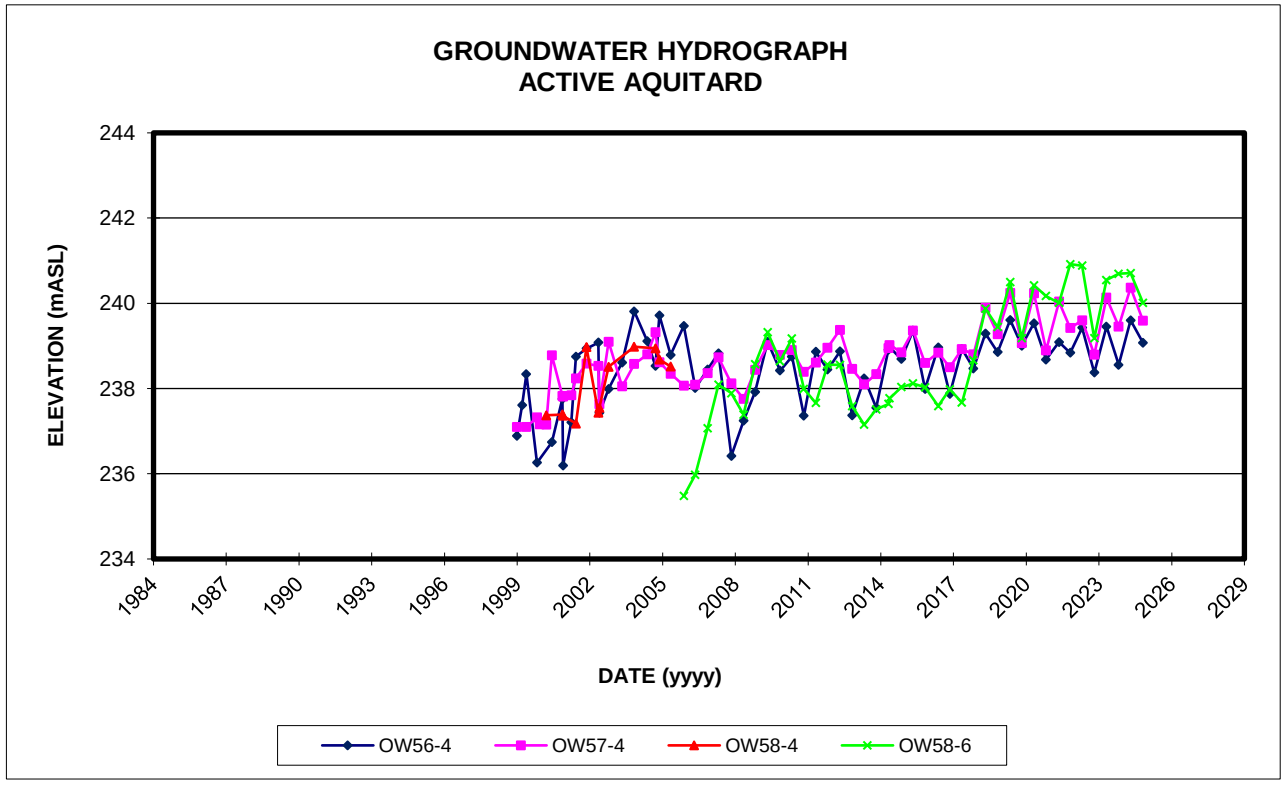


FIGURE F-14

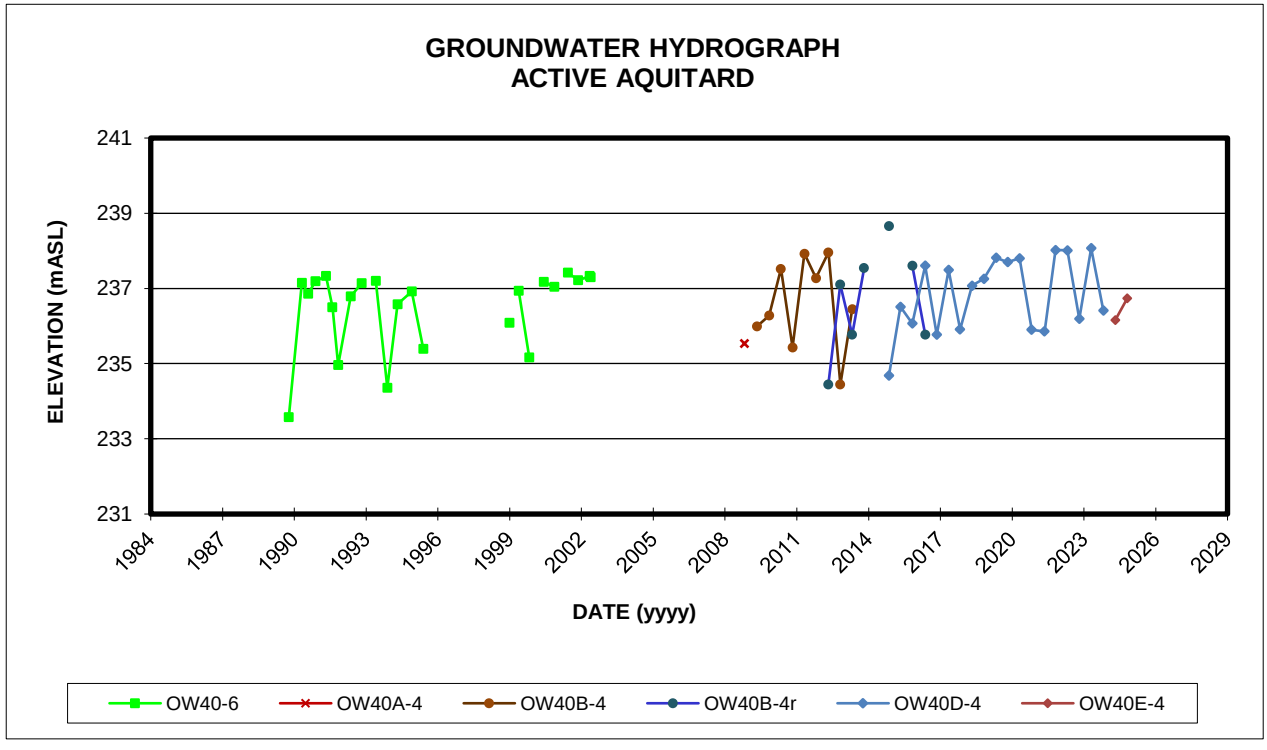


FIGURE F-15

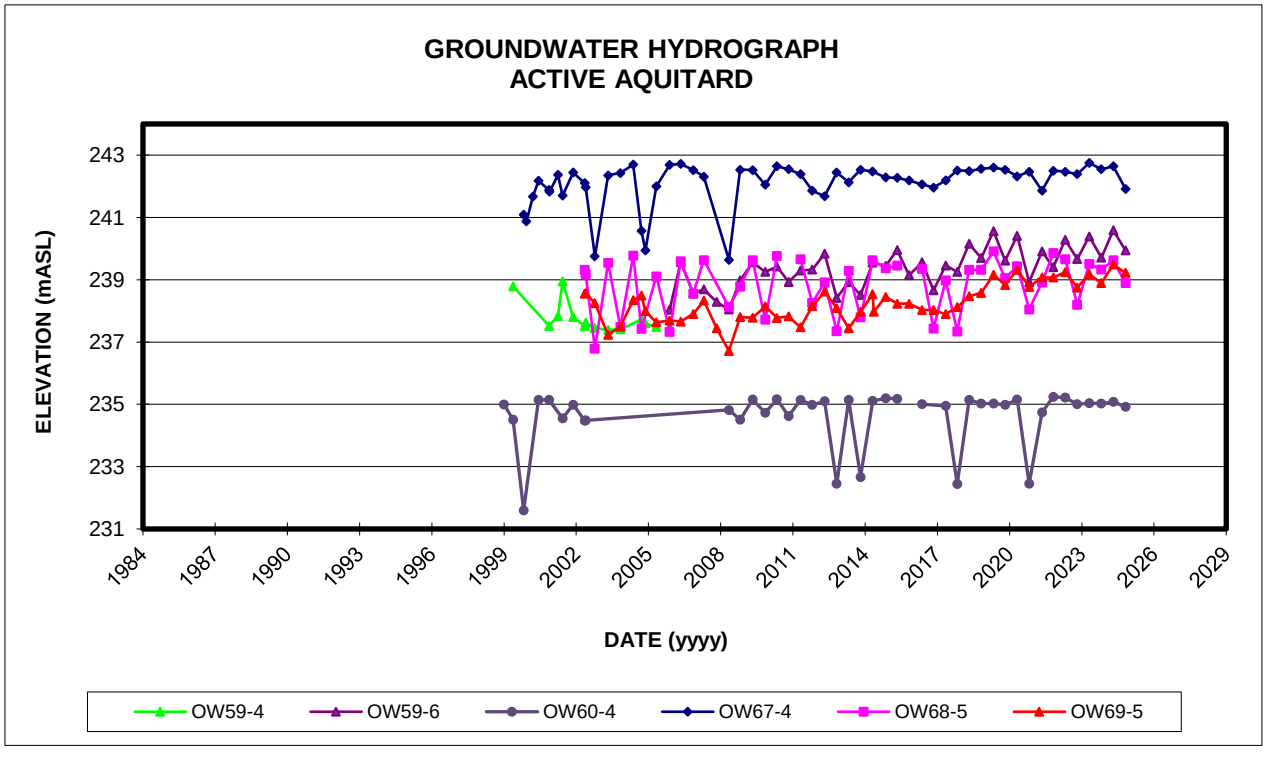


FIGURE F-16

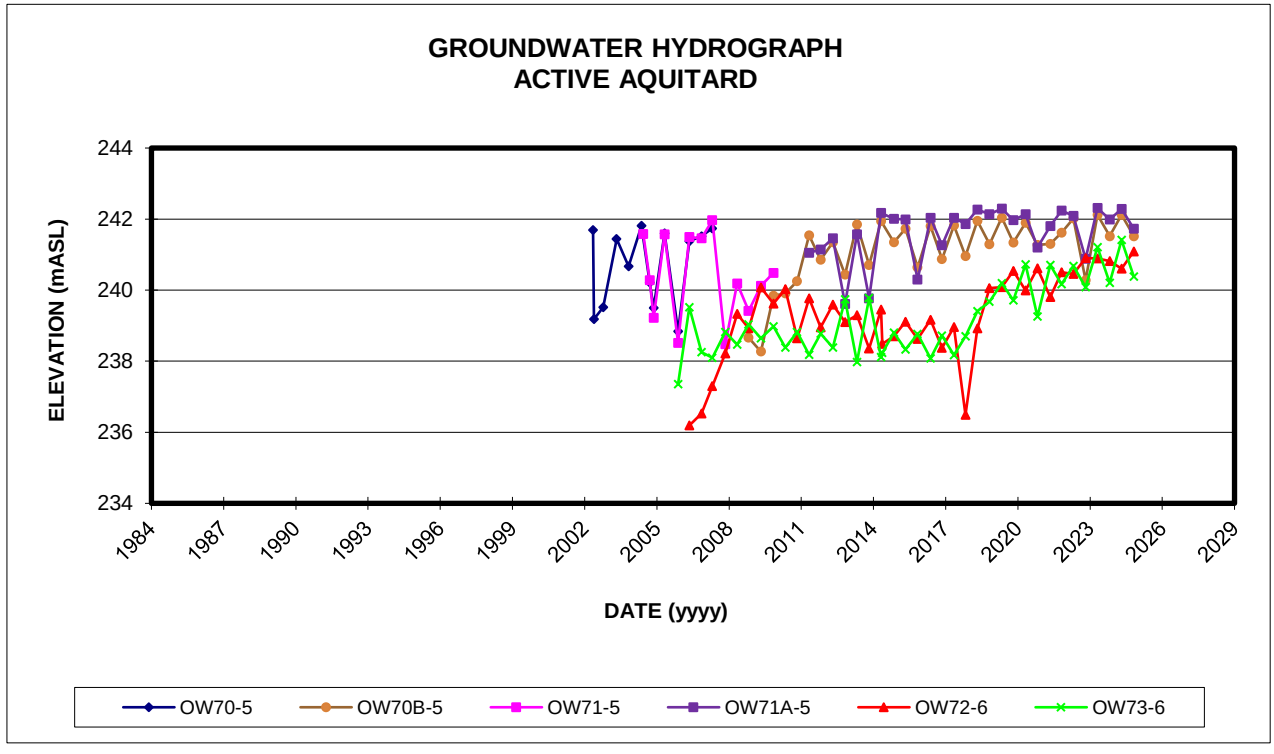


FIGURE F-17

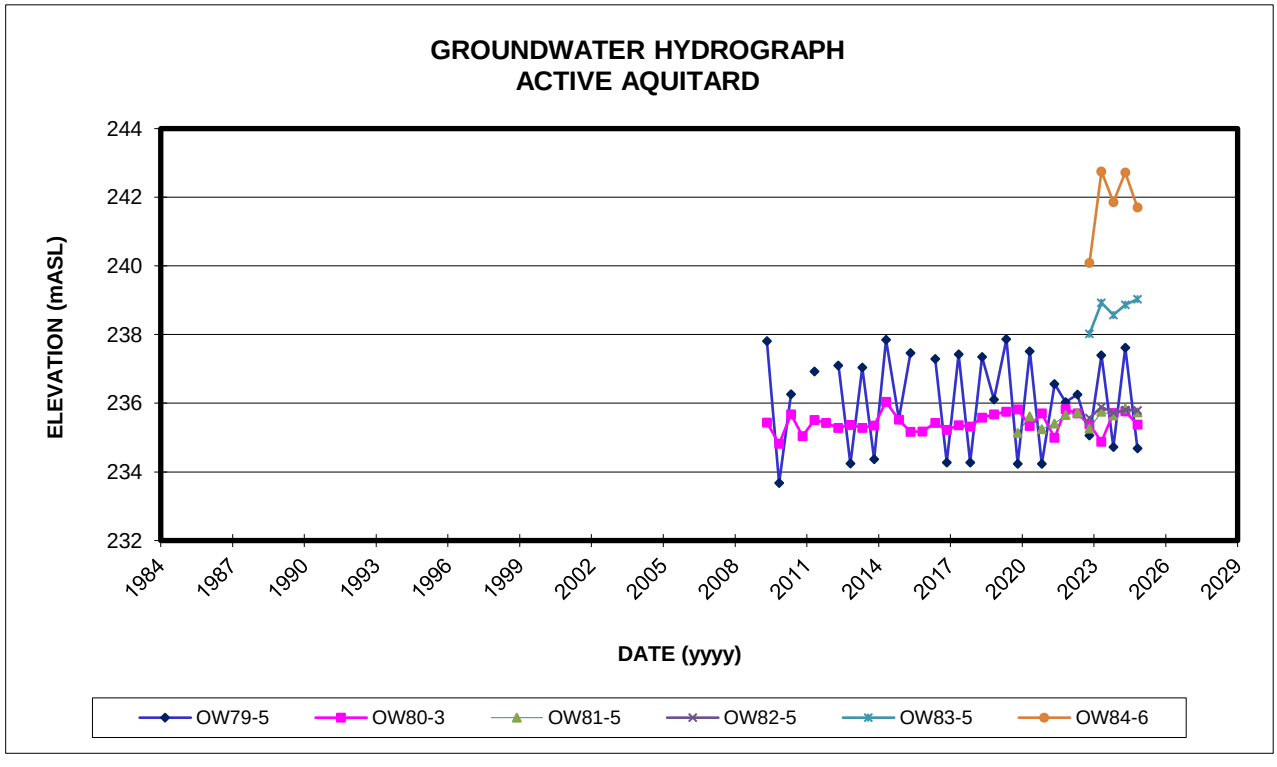


FIGURE F-18

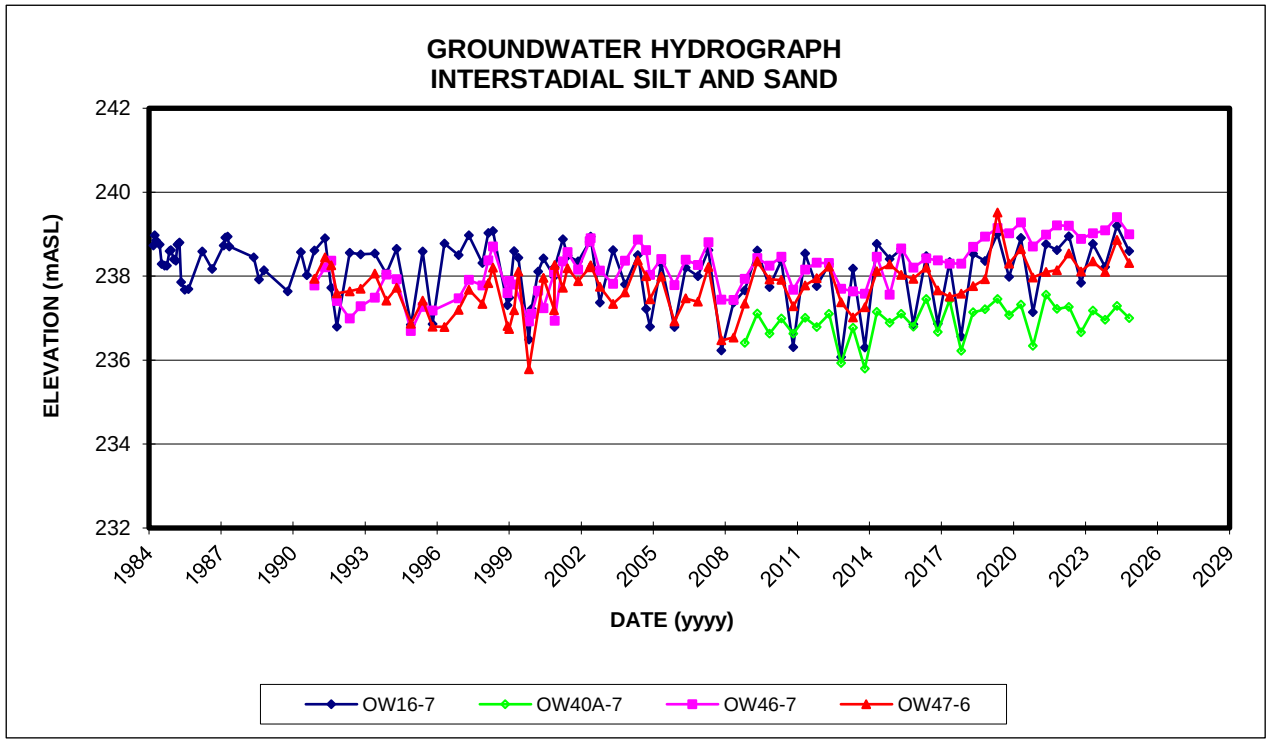


FIGURE F-19

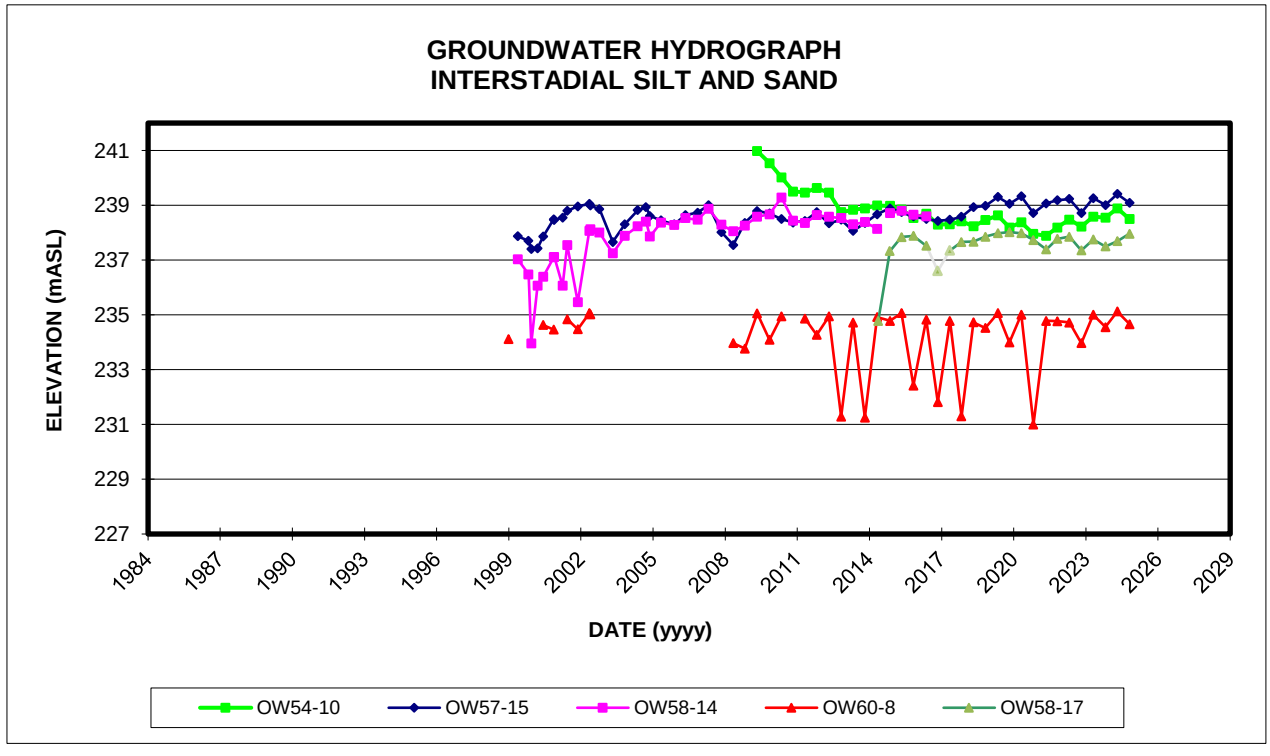


FIGURE F-20

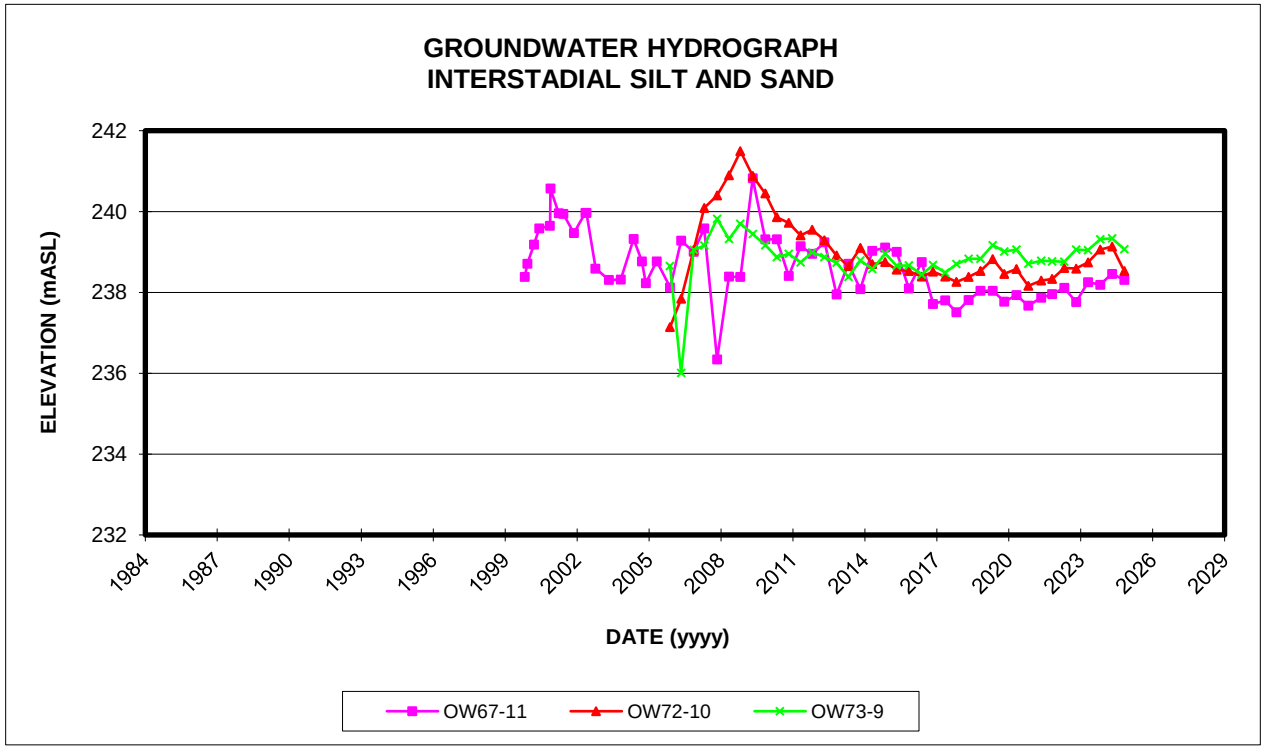


FIGURE F-21

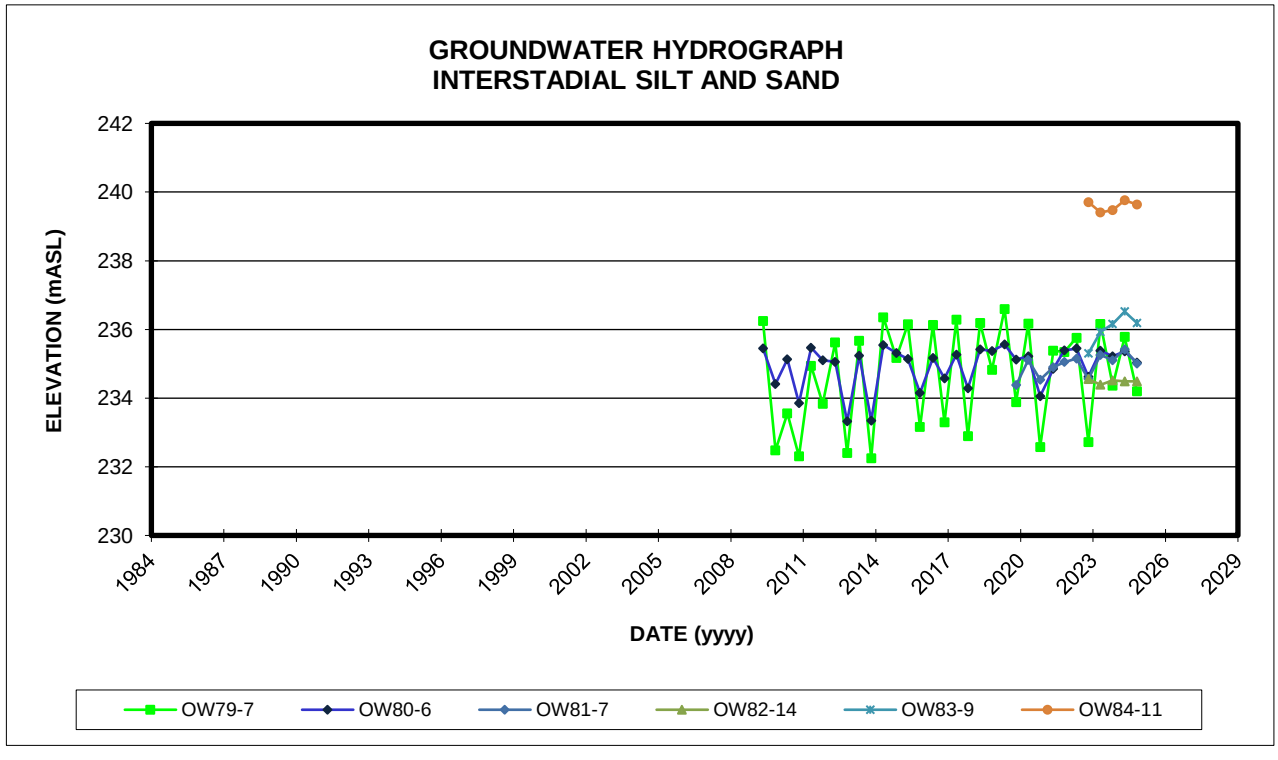


FIGURE F-22

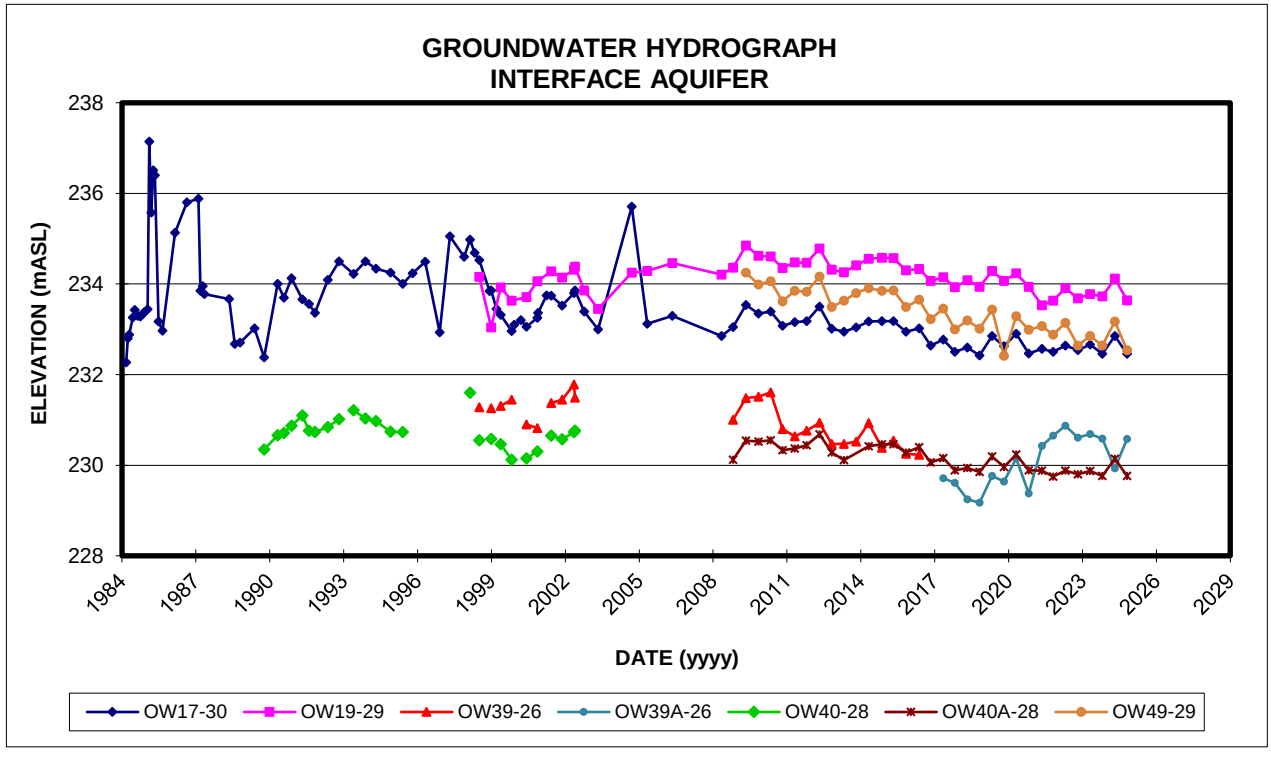


FIGURE F-23

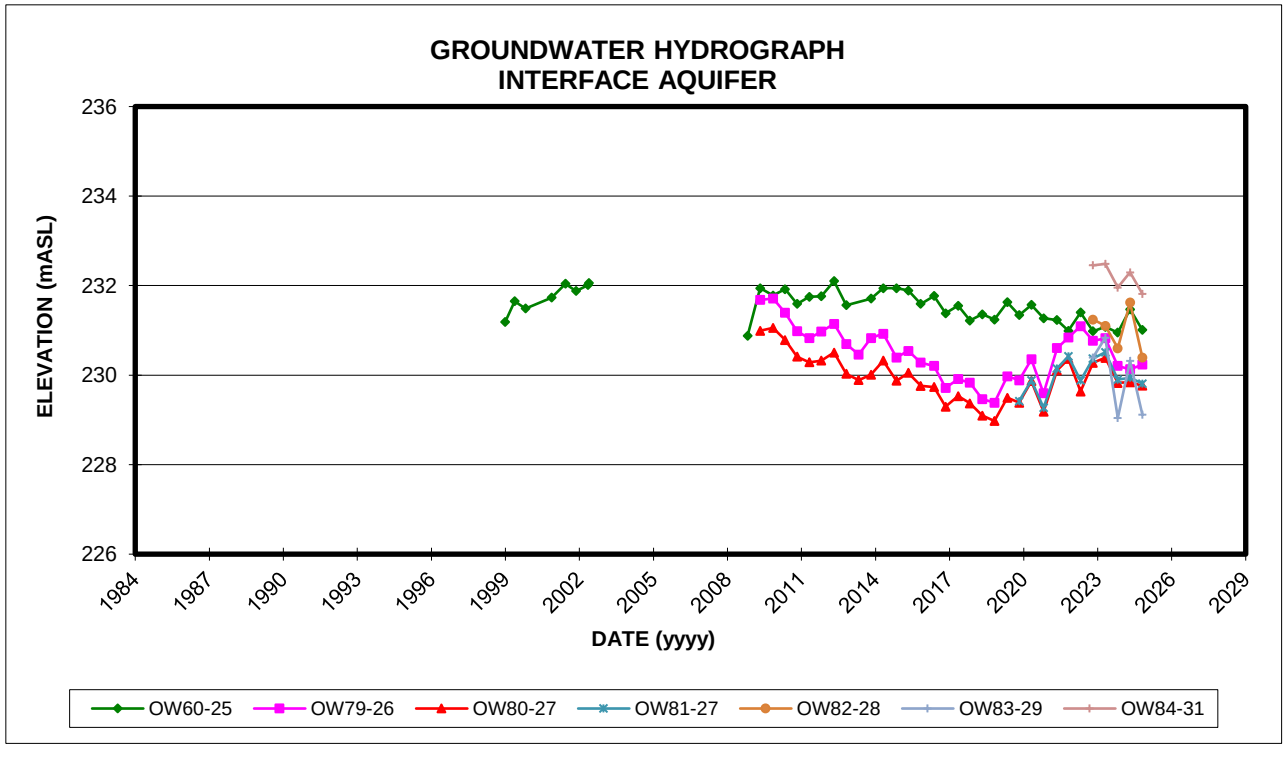


FIGURE F-24

APPENDIX F:

Table F5 - Groundwater Vertical Hydraulic Gradients

Table F-5
Vertical Hydraulic Gradients
Twin Creeks Environmetnal Centre - 2024 Annual Monitoring Report

May 2024 Groundwater Hydraulic Gradient Details											Historical Vertical Hydraulic Gradients											
	Upper Monitor					Lower Monitor																
Date	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)	Vertical Gradient 2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Active Aquitard to Interstadial Silt and Sand																						
01-May-24	OW16-6	S	ACTIVE AQUITARD	234.76	239.85	OW16-7	P	INTERSTADIAL SILT AND SAND	234.00	239.20	0.855	1.013	0.966	0.165	0.749	1.045	1.044	-0.474	0.671	0.816	0.144	0.153
01-May-24	OW17-4	S	ACTIVE AQUITARD	235.00	239.71	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	239.41	0.200	0.373	0.347	0.247	0.233	0.360	0.560	0.660	0.753	0.353	0.148	0.254
01-May-24	OW40E-4	S	ACTIVE AQUITARD	233.83	236.16	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	237.29	-0.452	0.356	0.297	-0.681	0.193	0.142	-0.027	0.024	0.056	-0.236	0.217	0.061
01-May-24	OW54A-4	S	ACTIVE AQUITARD	237.07	242.00	OW54-10	P	INTERSTADIAL SILT AND SAND	232.34	238.89	0.658	0.656	0.723	0.647	0.723	0.668	0.683	0.647	0.514	0.444	0.190	0.205
01-May-24	OW56-4	S	ACTIVE AQUITARD	236.00	239.60	OW47-6	P	INTERSTADIAL SILT AND SAND	233.50	238.86	0.296	0.442	0.355	0.395	0.357	0.037	0.613	0.568	0.308	0.532	0.156	0.278
01-May-24	OW57-4	S	ACTIVE AQUITARD	239.90	240.37	OW57-15	P	INTERSTADIAL SILT AND SAND	228.70	239.41	0.086	0.078	0.033	0.087	0.081	0.084	0.086	0.041	0.031	0.054	0.051	0.009
01-May-24	OW58-6	S	ACTIVE AQUITARD	235.24	240.71	OW58-17	P	INTERSTADIAL SILT AND SAND	226.90	237.69	0.362	0.335	0.364	0.314	0.293	0.302	0.264	0.038	0.008	-0.082	-0.052	-0.126
01-May-24	OW59-6	S	ACTIVE AQUITARD	235.23	240.59	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	238.96	0.597	0.619	0.592	0.498	0.466	0.421	0.402	0.260	0.311	0.381	*	*
01-May-24	OW60-4	S	ACTIVE AQUITARD	231.60	235.08	OW60-8	P	INTERSTADIAL SILT AND SAND	227.30	235.12	-0.009	0.009	0.115	-0.009	0.033	-0.007	0.096	0.040	0.042	0.028	0.026	0.057
01-May-24	OW67-4	S	ACTIVE AQUITARD	238.90	242.64	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	238.46	0.597	0.643	0.623	0.570	0.627	0.652	0.668	0.627	0.473	0.467	0.344	0.353
01-May-24	OW72-6	S	ACTIVE AQUITARD	236.19	241.09	OW72-10	P	INTERSTADIAL SILT AND SAND	232.57	239.13	0.541	0.574	0.636	0.610	0.562	0.476	0.464	-0.022	-0.003	0.019	-0.039	-0.055
01-May-24	OW73-6	S	ACTIVE AQUITARD	235.87	241.41	OW73-9	P	INTERSTADIAL SILT AND SAND	232.69	239.34	0.651	0.681	0.605	0.607	0.524	0.322	0.180	-0.101	-0.113	-0.104	-0.094	-0.084
01-May-24	OW79-5	S	ACTIVE AQUITARD	232.99	237.12	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	235.78	0.525	0.288	0.000	0.267	0.328	0.302	0.257	0.255	0.259	0.318	0.153	0.152
01-May-24	OW80-3	S	ACTIVE AQUITARD	231.98	235.26	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	235.36	-0.044	-0.442	-0.107	-0.158	-0.164	-0.138	-0.151	-0.181	-0.106	-0.207	-0.079	-0.098
01-May-24	OW81-5	S	ACTIVE AQUITARD	230.30	235.35	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	235.42	-0.037	-0.003	0.040	0.005	0.006	-	-	-	-	-	-	-
01-May-24	OW82-5	S	ACTIVE AQUITARD	230.72	235.30	OW82-14	P	INTERSTADIAL SILT AND SAND	222.47	234.49	0.098	0.122	-	-	-	-	-	-	-	-	-	-
01-May-24	OW83-5	S	ACTIVE AQUITARD	234.60	238.37	OW83-9	P	INTERSTADIAL SILT AND SAND	230.87	236.52	0.496	0.669	-	-	-	-	-	-	-	-	-	-
01-May-24	OW84-6	S	ACTIVE AQUITARD	236.70	242.22	OW84-11	P	INTERSTADIAL SILT AND SAND	232.37	239.76	0.568	0.657	-	-	-	-	-	-	-	-	-	-
Interstadial Silt and Sand to Interface Aquifer																						
01-May-24	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	237.29	OW40A-28	P	INTERFACE AQUIFER	210.12	230.14	0.337	0.345	0.348	0.362	0.334	0.343	0.339	0.343	0.333	0.313	0.318	0.314
01-May-24	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	238.46	OW49-29	P	INTERFACE AQUIFER	213.51	233.17	0.288	0.294	0.270	0.261	0.252	0.251	0.251	0.236	0.277	0.279	0.276	0.274
01-May-24	OW60-8	P	INTERSTADIAL SILT AND SAND	227.30	235.12	OW60-25	P	INTERFACE AQUIFER	210.20	231.47	0.213	0.229	0.194	0.208	0.201	0.201	0.197	0.189	0.179	0.185	0.181	0.313
01-May-24	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	239.41	OW17-30	P	INTERFACE AQUIFER	209.60	232.85	0.274	0.266	0.274	0.269	0.267	0.264	0.255	0.231	0.226	0.203	0.215	0.204
01-May-24	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	238.96	OW19-29	P	INTERFACE AQUIFER	212.20	234.12	0.238	0.242	0.314	0.247	0.241	0.252	0.245	0.227	0.216	0.214	0.225	0.263
01-May-24	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	235.78	OW79-26	P	INTERFACE AQUIFER	212.13	230.13	0.309	0.292	0.254	0.261	0.318	0.361	0.368	0.348	0.324	0.306	0.297	0.285
01-May-24	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	235.36	OW80-27	P	INTERFACE AQUIFER	208.78	229.84	0.264	0.239	0.278	0.227	0.256	0.290	0.302	0.274	0.259	0.243	0.249	0.256
01-May-24	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	235.42	OW81-27	P	INTERFACE AQUIFER	209.38	229.94	0.288	0.250	0.277	0.250	0.275	-	-	-	-	-	-	-
01-May-24	OW82-14	P	INTERSTADIAL SILT AND SAND	222.47	234.49	OW82-28	P	INTERFACE AQUIFER	208.21	231.62	0.201	0.231	-	-	-	-	-	-	-	-	-	-
01-May-24	OW83-9	P	INTERSTADIAL SILT AND SAND	230.87	236.52	OW83-29	P	INTERFACE AQUIFER	210.59	230.31	0.306	0.251	-	-	-	-	-	-	-	-	-	-
01-May-24	OW84-11	P	INTERSTADIAL SILT AND SAND	232.37	239.76	OW84-31	P	INTERFACE AQUIFER	212.35	232.30	0.373	0.346	-	-	-	-	-	-	-	-	-	-

NOTES: 1) mASL - Metres Above Sea Level

2) P - denotes piezometer. The measuring point is the mid-point of the filter pack.
S - denotes standpipe. The measuring point is the groundwater table.

3) Negative (-) vertical hydraulic gradients are upward.

4) < denotes liquid elevation at either top of pump or dry well conditions.

5) -- denotes hydraulic gradient can not be calculated.

6) OW40D-4 noted to have been damaged in January 2024. OW40D-4 decomissioned in January 2024. Replacement OW40E-4 installed in March 2024.

7) OW58-14 was decomissioned in April 2014 and was replaced with OW58-17.

8) *' denotes monitoring location not assessed for vertical hydraulic gradient prior to 2015.

9) OW81-5, OW81-7 and OW81-27 installed in June 2019 and monitored beginning in November 2019.

10) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, OW84-31 installed in June 2022.

Table F-5
Vertical Hydraulic Gradients
Twin Creeks Environmetnal Centre - 2024 Annual Monitoring Report

November 2024 Groundwater Hydraulic Gradient Details											Historical Vertical Hydraulic Gradients											
Date	Upper Monitor					Lower Monitor					Vertical Gradient 2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)	Monitor Designation	Type	Hydrostatigraphic Unit	Measuring Point (mASL)	Static Water Level (mASL)												
Active Aquitard to Interstadial Silt and Sand																						
01-Nov-24	OW16-6	S	ACTIVE AQUITARD	234.76	238.64	OW16-7	P	INTERSTADIAL SILT AND SAND	234.00	238.60	0.050	0.568	1.626	1.000	-0.225	0.130	0.505	0.421	-0.250	0.000	0.081	0.048
01-Nov-24	OW17-4	S	ACTIVE AQUITARD	235.00	239.38	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	239.00	0.253	0.180	0.233	0.193	0.253	0.207	0.607	0.913	0.680	0.887	0.288	0.342
01-Nov-24	OW40E-4	S	ACTIVE AQUITARD	233.83	236.74	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	237.00	-0.104	-0.220	-0.188	0.320	-0.176	0.253	0.019	-0.596	-0.360	-0.292	-0.744	-0.007
01-Nov-24	OW54A-4	S	ACTIVE AQUITARD	237.07	241.48	OW54-10	P	INTERSTADIAL SILT AND SAND	232.34	238.50	0.630	0.571	0.411	0.666	0.351	0.550	0.552	0.309	0.469	0.313	0.218	0.175
01-Nov-24	OW56-4	S	ACTIVE AQUITARD	236.00	239.07	OW47-6	P	INTERSTADIAL SILT AND SAND	233.50	238.31	0.306	0.184	0.106	0.280	0.283	0.281	0.370	0.024	0.084	0.020	0.085	0.078
01-Nov-24	OW57-4	S	ACTIVE AQUITARD	239.90	239.59	OW57-15	P	INTERSTADIAL SILT AND SAND	228.70	239.09	0.045	0.040	0.007	0.021	0.016	0.001	0.026	-0.073	0.006	0.001	-0.007	-0.002
01-Nov-24	OW58-6	S	ACTIVE AQUITARD	235.24	240.01	OW58-17	P	INTERSTADIAL SILT AND SAND	226.90	237.96	0.246	0.383	0.219	0.378	0.293	0.139	0.191	-0.026	0.167	-0.074	-0.068	-0.093
01-Nov-24	OW59-6	S	ACTIVE AQUITARD	235.23	239.94	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	238.87	0.394	0.345	0.708	0.330	0.146	0.210	0.168	-0.264	-0.033	0.128	*	*
01-Nov-24	OW67-4	S	ACTIVE AQUITARD	238.90	241.92	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	238.31	0.515	0.622	0.661	0.649	0.685	0.680	0.646	0.670	0.607	0.584	0.322	0.441
01-Nov-24	OW72-6	S	ACTIVE AQUITARD	236.19	240.78	OW72-10	P	INTERSTADIAL SILT AND SAND	232.57	238.53	0.622	0.427	0.635	0.588	0.455	0.423	0.431	-0.254	0.124	0.177	0.059	0.055
01-Nov-24	OW73-6	S	ACTIVE AQUITARD	235.87	240.39	OW73-9	P	INTERSTADIAL SILT AND SAND	232.69	239.07	0.414	0.281	0.322	0.440	0.171	0.222	0.265	-0.487	0.013	0.031	-0.029	0.152
01-Nov-24	OW79-5	S	ACTIVE AQUITARD	232.99	234.19	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	234.20	-0.005	-0.054	0.722	0.075	0.454	-0.057	0.309	--	0.188	--	-0.031	0.531
01-Nov-24	OW80-3	S	ACTIVE AQUITARD	231.98	234.88	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	235.03	-0.070	0.001	0.114	-0.026	0.505	0.087	-0.085	-0.009	0.070	0.233	-0.059	0.317
01-Nov-24	OW81-5	S	ACTIVE AQUITARD	230.30	235.23	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	235.01	0.118	0.026	0.105	0.058	0.108	0.137	-	-	-	-	-	-
01-Nov-24	OW82-5	S	ACTIVE AQUITARD	230.72	235.29	OW82-14	P	INTERSTADIAL SILT AND SAND	222.47	234.49	0.098	0.085	0.062	-	-	-	-	-	-	-	-	-
01-Nov-24	OW83-5	S	ACTIVE AQUITARD	234.60	238.53	OW83-9	P	INTERSTADIAL SILT AND SAND	230.87	236.19	0.628	0.513	0.593	-	-	-	-	-	-	-	-	-
01-Nov-24	OW84-6	S	ACTIVE AQUITARD	236.70	241.20	OW84-11	P	INTERSTADIAL SILT AND SAND	232.37	239.64	0.361	0.434	-0.028	-	-	-	-	-	-	-	-	-
Interstadial Silt and Sand to Interface Aquifer																						
01-Nov-24	OW40A-7	P	INTERSTADIAL SILT AND SAND	231.33	237.00	OW40A-28	P	INTERFACE AQUIFER	210.12	229.76	0.341	0.339	0.323	0.352	0.304	0.335	0.347	0.298	0.312	0.307	0.304	0.221
01-Nov-24	OW67-11	P	INTERSTADIAL SILT AND SAND	231.90	238.31	OW49-29	P	INTERFACE AQUIFER	213.51	232.54	0.314	0.302	0.278	0.276	0.254	0.291	0.273	0.245	0.244	0.251	0.283	0.231
01-Nov-24	OW60-8	P	INTERSTADIAL SILT AND SAND	227.30	234.66	OW60-25	P	INTERFACE AQUIFER	210.20	231.01	0.213	0.211	0.175	0.221	-0.016	0.155	0.192	0.004	0.025	0.049	0.172	-0.028
01-Nov-24	OW46-7	P	INTERSTADIAL SILT AND SAND	233.50	239.00	OW17-30	P	INTERFACE AQUIFER	209.60	232.46	0.274	0.277	0.266	0.281	0.261	0.267	0.273	0.243	0.240	0.220	0.190	0.197
01-Nov-24	OW59-10	P	INTERSTADIAL SILT AND SAND	232.50	238.87	OW19-29	P	INTERFACE AQUIFER	212.20	233.64	0.258	0.248	0.295	0.240	0.226	0.245	0.261	0.245	0.231	0.222	0.233	0.264
01-Nov-24	OW79-7	P	INTERSTADIAL SILT AND SAND	230.44	234.20	OW79-26	P	INTERFACE AQUIFER	212.13	230.23	0.217	0.227	0.107	0.246	0.163	0.218	0.297	0.167	0.196	0.157	0.261	0.078
01-Nov-24	OW80-6	P	INTERSTADIAL SILT AND SAND	229.71	235.03	OW80-27	P	INTERFACE AQUIFER	208.78	229.77	0.252	0.257	0.208	0.240	0.233	0.274	0.306	0.235	0.252	0.210	0.259	0.159
01-Nov-24	OW81-7	P	INTERSTADIAL SILT AND SAND	228.40	235.01	OW81-27	P	INTERFACE AQUIFER	209.38	229.81	0.273	0.273	0.220	0.243	0.277	0.261	-	-	-	-	-	-
01-Nov-24	OW82-14	P	INTERSTADIAL SILT AND SAND	222.47	234.49	OW82-28	P	INTERFACE AQUIFER	208.21	230.39	0.287	0.275	0.233	-	-	-	-	-	-	-	-	-
01-Nov-24	OW83-9	P	INTERSTADIAL SILT AND SAND	230.87	236.19	OW83-29	P	INTERFACE AQUIFER	210.59	229.11	0.349	0.351	0.242	-	-	-	-	-	-	-	-	-
01-Nov-24	OW84-11	P	INTERSTADIAL SILT AND SAND	232.37	239.64	OW84-31	P	INTERFACE AQUIFER	212.35	231.82	0.391	0.376	0.362	-	-	-	-	-	-	-	-	-

NOTES: 1) mASL - Metres Above Sea Level

2) P - denotes piezometer. The measuring point is the mid-point of the filter pack.
S - denotes standpipe. The measuring point is the groundwater table.

3) Negative (-) vertical hydraulic gradients are upward.

4) < denotes liquid elevation at either top of pump or dry well conditions.

5) -- denotes hydraulic gradient can not be calculated.

6) OW40D-4 noted to have been damaged in January 2024. OW40D-4 decomissioned in January 2024. Replacement OW40E-4 installed in March 2024.

7) OW58-14 was decomissioned in April 2014 and was replaced with OW58-17.

8) *' denotes monitoring location not assessed for vertical hydraulic gradient prior to 2015.

9) OW81-5, OW81-7 and OW81-27 installed in June 2019 and monitored beginning in November 2019.

10) OW82-5, OW82-14, OW82-28, OW83-5, OW83-9, OW83-29, OW84-6, OW84-11, OW84-31 installed in June 2022.

APPENDIX F:

Table F6 - Liquid Level Elevations - PDL - Expansion Landfill

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Jan-24	Monday	227.34	**228.82**	227.85	**229.18**
2-Jan-24	Tuesday	227.25	228.20	227.85	**229.18**
3-Jan-24	Wednesday	227.15	227.61	227.86	**229.19**
4-Jan-24	Thursday	227.22	228.42	227.85	**229.20**
5-Jan-24	Friday	227.16	227.95	227.83	**229.20**
6-Jan-24	Saturday	227.25	**228.83**	227.84	**229.21**
7-Jan-24	Sunday	227.30	**228.84**	227.84	**229.21**
8-Jan-24	Monday	227.26	**228.50**	227.84	**229.21**
9-Jan-24	Tuesday	227.24	228.40	227.84	**229.23**
10-Jan-24	Wednesday	227.17	227.91	227.83	**229.25**
11-Jan-24	Thursday	227.25	**228.49**	227.84	**229.27**
12-Jan-24	Friday	227.21	228.16	227.85	**229.27**
13-Jan-24	Saturday	227.31	**228.87**	227.85	**229.30**
14-Jan-24	Sunday	227.34	**228.88**	227.86	**229.32**
15-Jan-24	Monday	227.29	**228.56**	227.87	**229.34**
16-Jan-24	Tuesday	227.20	228.11	227.87	**229.34**
17-Jan-24	Wednesday	227.22	228.43	227.86	**229.35**
18-Jan-24	Thursday	227.16	228.04	227.86	**229.35**
19-Jan-24	Friday	227.11	227.62	227.87	**229.35**
20-Jan-24	Saturday	227.15	**228.71**	227.87	**229.35**
21-Jan-24	Sunday	227.20	**228.91**	227.88	**229.36**
22-Jan-24	Monday	227.18	228.41	227.88	**229.36**
23-Jan-24	Tuesday	227.11	227.87	227.88	**229.35**
24-Jan-24	Wednesday	227.12	228.29	227.88	**229.35**
25-Jan-24	Thursday	227.12	228.32	227.88	**229.37**
26-Jan-24	Friday	227.14	**228.51**	227.89	**229.42**
27-Jan-24	Saturday	227.20	**228.98**	227.91	**229.49**
28-Jan-24	Sunday	227.24	**229.01**	227.92	**229.54**
29-Jan-24	Monday	227.17	228.48	227.92	**229.56**
30-Jan-24	Tuesday	227.17	228.41	227.93	**229.58**
31-Jan-24	Wednesday	227.16	228.38	227.94	**229.59**

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Feb-24	Thursday	227.18	**228.54**	227.94	**229.60**
2-Feb-24	Friday	227.15	228.47	227.95	**229.59**
3-Feb-24	Saturday	227.23	**229.08**	227.96	**229.60**
4-Feb-24	Sunday	227.27	**229.11**	227.96	**229.62**
5-Feb-24	Monday	227.17	228.26	227.97	**229.62**
6-Feb-24	Tuesday	227.19	**228.53**	227.97	**229.61**
7-Feb-24	Wednesday	227.19	228.48	227.98	**229.61**
8-Feb-24	Thursday	227.17	228.23	227.98	**229.60**
9-Feb-24	Friday	227.14	228.02	227.99	**229.61**
10-Feb-24	Saturday	227.19	**229.12**	227.99	**229.62**
11-Feb-24	Sunday	227.23	**229.15**	227.99	**229.63**
12-Feb-24	Monday	227.17	228.25	228.00	**229.63**
13-Feb-24	Tuesday	227.17	**228.50**	228.00	**229.63**
14-Feb-24	Wednesday	227.15	228.33	227.99	**229.63**
15-Feb-24	Thursday	227.16	228.43	227.99	**229.63**
16-Feb-24	Friday	227.11	227.94	227.99	**229.62**
17-Feb-24	Saturday	227.20	**229.17**	228.00	**229.63**
18-Feb-24	Sunday	227.23	**229.18**	228.00	**229.64**
19-Feb-24	Monday	227.14	228.26	228.00	**229.63**
20-Feb-24	Tuesday	227.15	228.35	228.00	**229.63**
21-Feb-24	Wednesday	227.14	228.30	228.00	**229.62**
22-Feb-24	Thursday	227.15	**228.50**	228.00	**229.62**
23-Feb-24	Friday	227.10	227.76	228.00	**229.62**
24-Feb-24	Saturday	227.16	**229.19**	228.00	**229.62**
25-Feb-24	Sunday	227.22	**229.22**	228.00	**229.63**
26-Feb-24	Monday	227.14	228.20	228.00	**229.63**
27-Feb-24	Tuesday	227.17	**228.61**	228.01	**229.63**
28-Feb-24	Wednesday	227.13	227.89	228.00	**229.62**
29-Feb-24	Thursday	227.11	228.25	228.00	**229.62**

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Mar-24	Friday	227.16	**229.11**	228.00	**229.62**
2-Mar-24	Saturday	227.20	**229.22**	228.01	**229.62**
3-Mar-24	Sunday	227.23	**229.24**	228.01	**229.62**
4-Mar-24	Monday	227.18	**228.56**	228.01	**229.63**
5-Mar-24	Tuesday	227.19	**228.71**	228.00	**229.62**
6-Mar-24	Wednesday	227.16	228.45	228.00	**229.61**
7-Mar-24	Thursday	227.12	228.11	228.00	**229.61**
8-Mar-24	Friday	227.12	228.13	228.00	**229.61**
9-Mar-24	Saturday	227.21	**229.24**	228.00	**229.62**
10-Mar-24	Sunday	227.19	**229.26**	228.00	**229.62**
11-Mar-24	Monday	227.17	**228.79**	228.00	**229.63**
12-Mar-24	Tuesday	227.20	**228.78**	228.00	**229.63**
13-Mar-24	Wednesday	227.16	**228.56**	228.00	**229.62**
14-Mar-24	Thursday	227.15	228.36	228.00	**229.62**
15-Mar-24	Friday	227.11	228.02	228.00	**229.62**
16-Mar-24	Saturday	227.22	**229.24**	228.00	**229.63**
17-Mar-24	Sunday	227.22	**229.25**	228.00	**229.63**
18-Mar-24	Monday	227.17	**228.58**	228.00	**229.64**
19-Mar-24	Tuesday	227.24	**229.07**	228.00	**229.64**
20-Mar-24	Wednesday	227.12	227.98	228.00	**229.62**
21-Mar-24	Thursday	227.10	227.81	228.00	**229.62**
22-Mar-24	Friday	227.11	227.97	228.00	**229.63**
23-Mar-24	Saturday	227.20	**229.24**	228.00	**229.64**
24-Mar-24	Sunday	227.22	**229.25**	228.00	**229.64**
25-Mar-24	Monday	227.20	**228.66**	228.01	**229.64**
26-Mar-24	Tuesday	227.21	**228.80**	228.00	**229.63**
27-Mar-24	Wednesday	227.13	228.24	228.00	**229.63**
28-Mar-24	Thursday	227.14	228.33	228.00	**229.62**
29-Mar-24	Friday	227.16	**228.63**	228.00	**229.63**
30-Mar-24	Saturday	227.24	**229.27**	228.00	**229.63**
31-Mar-24	Sunday	227.24	**229.28**	228.01	**229.64**

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Apr-24	Monday	227.20	**228.60**	228.00	**229.64**
2-Apr-24	Tuesday	227.23	**228.78**	228.00	**229.65**
3-Apr-24	Wednesday	227.20	**228.62**	228.00	**229.65**
4-Apr-24	Thursday	227.17	228.49	228.00	**229.63**
5-Apr-24	Friday	227.15	228.45	228.00	**229.63**
6-Apr-24	Saturday	227.15	228.45	228.01	**229.63**
7-Apr-24	Sunday	227.24	**229.28**	228.02	**229.64**
8-Apr-24	Monday	227.21	**228.76**	228.01	**229.65**
9-Apr-24	Tuesday	227.17	228.31	228.01	**229.64**
10-Apr-24	Wednesday	227.16	228.39	228.00	**229.64**
11-Apr-24	Thursday	227.17	228.49	228.00	**229.65**
12-Apr-24	Friday	227.15	**228.63**	228.00	ND
13-Apr-24	Saturday	227.16	**229.27**	228.00	ND
14-Apr-24	Sunday	227.24	**229.29**	228.01	ND
15-Apr-24	Monday	227.17	**228.59**	228.01	ND
16-Apr-24	Tuesday	227.19	**228.75**	228.00	ND
17-Apr-24	Wednesday	227.15	228.03	228.00	ND
18-Apr-24	Thursday	227.13	228.19	228.00	ND
19-Apr-24	Friday	227.07	227.47	228.00	ND
20-Apr-24	Saturday	227.17	**229.26**	228.00	ND
21-Apr-24	Sunday	227.22	**229.28**	228.01	ND
22-Apr-24	Monday	227.17	**228.55**	228.01	ND
23-Apr-24	Tuesday	227.18	**228.66**	228.01	ND
24-Apr-24	Wednesday	227.13	228.17	228.00	ND
25-Apr-24	Thursday	227.11	227.94	228.00	ND
26-Apr-24	Friday	227.09	227.75	228.00	ND
27-Apr-24	Saturday	227.16	**229.08**	228.00	ND
28-Apr-24	Sunday	227.19	**229.26**	228.01	ND
29-Apr-24	Monday	227.15	228.47	228.01	ND
30-Apr-24	Tuesday	227.16	**228.61**	228.00	ND

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-May-24	Wednesday	227.16	**228.54**	228.00	ND
2-May-24	Thursday	227.12	228.14	227.99	ND
3-May-24	Friday	227.09	227.74	227.99	ND
4-May-24	Saturday	227.16	**229.04**	227.99	ND
5-May-24	Sunday	227.20	**229.25**	227.99	ND
6-May-24	Monday	227.12	228.08	227.99	ND
7-May-24	Tuesday	227.15	**228.58**	227.99	ND
8-May-24	Wednesday	227.13	228.46	227.98	ND
9-May-24	Thursday	227.09	227.82	227.98	ND
10-May-24	Friday	227.09	228.06	227.98	ND
11-May-24	Saturday	227.16	**229.23**	227.99	ND
12-May-24	Sunday	227.15	**229.22**	227.99	ND
13-May-24	Monday	227.15	**228.49**	227.99	ND
14-May-24	Tuesday	227.17	228.37	227.99	ND
15-May-24	Wednesday	227.13	228.09	227.99	ND
16-May-24	Thursday	227.12	228.17	227.99	ND
17-May-24	Friday	227.12	228.28	227.99	ND
18-May-24	Saturday	227.13	**228.64**	228.00	ND
19-May-24	Sunday	227.19	**229.22**	228.00	ND
20-May-24	Monday	227.13	228.16	228.00	ND
21-May-24	Tuesday	227.12	228.18	228.00	ND
22-May-24	Wednesday	227.14	**228.58**	227.99	ND
23-May-24	Thursday	227.11	228.22	227.99	ND
24-May-24	Friday	227.08	227.73	227.98	ND
25-May-24	Saturday	227.15	**229.08**	227.99	ND
26-May-24	Sunday	227.19	**229.20**	227.99	ND
27-May-24	Monday	227.12	228.13	227.99	ND
28-May-24	Tuesday	227.12	228.33	227.99	ND
29-May-24	Wednesday	227.11	228.22	227.98	ND
30-May-24	Thursday	227.13	228.39	227.97	ND
31-May-24	Friday	227.08	227.71	227.97	ND

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Jun-24	Saturday	227.13	**228.94**	227.97	ND
2-Jun-24	Sunday	227.15	**229.16**	227.97	ND
3-Jun-24	Monday	227.09	227.93	227.98	ND
4-Jun-24	Tuesday	227.09	227.63	227.98	ND
5-Jun-24	Wednesday	227.07	227.36	227.99	ND
6-Jun-24	Thursday	227.07	227.55	227.99	ND
7-Jun-24	Friday	227.09	227.58	227.99	ND
8-Jun-24	Saturday	227.14	**228.91**	227.99	ND
9-Jun-24	Sunday	227.18	**229.06**	228.00	ND
10-Jun-24	Monday	227.12	228.21	227.99	ND
11-Jun-24	Tuesday	227.10	227.92	227.99	ND
12-Jun-24	Wednesday	227.09	227.70	227.99	ND
13-Jun-24	Thursday	227.09	227.87	227.98	ND
14-Jun-24	Friday	227.08	227.66	227.98	ND
15-Jun-24	Saturday	227.12	**228.63**	227.98	ND
16-Jun-24	Sunday	227.18	**228.99**	227.99	ND
17-Jun-24	Monday	227.09	**228.79**	227.99	ND
18-Jun-24	Tuesday	227.04	**229.01**	227.99	ND
19-Jun-24	Wednesday	227.06	**229.03**	228.00	ND
20-Jun-24	Thursday	227.06	**229.04**	228.00	ND
21-Jun-24	Friday	227.06	**229.06**	228.00	ND
22-Jun-24	Saturday	227.06	**229.08**	228.01	ND
23-Jun-24	Sunday	227.09	**229.09**	228.01	ND
24-Jun-24	Monday	227.06	**229.10**	228.01	ND
25-Jun-24	Tuesday	227.06	**229.12**	228.02	ND
26-Jun-24	Wednesday	227.07	**229.13**	228.02	ND
27-Jun-24	Thursday	227.07	**229.14**	228.02	ND
28-Jun-24	Friday	227.05	**229.15**	228.02	ND
29-Jun-24	Saturday	227.08	**229.17**	227.99	ND
30-Jun-24	Sunday	227.08	**229.17**	227.99	ND

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Jul-24	Monday	227.06	**229.19**	227.99	ND
2-Jul-24	Tuesday	227.06	**229.20**	227.99	ND
3-Jul-24	Wednesday	227.09	**229.20**	227.99	ND
4-Jul-24	Thursday	227.06	**229.21**	227.99	ND
5-Jul-24	Friday	227.07	**229.22**	227.99	ND
6-Jul-24	Saturday	227.08	**229.23**	227.99	ND
7-Jul-24	Sunday	227.06	**229.24**	227.99	ND
8-Jul-24	Monday	227.07	**229.26**	227.99	ND
9-Jul-24	Tuesday	227.07	**229.27**	227.99	ND
10-Jul-24	Wednesday	227.07	**229.28**	227.99	ND
11-Jul-24	Thursday	227.07	**229.28**	227.99	ND
12-Jul-24	Friday	227.04	**229.31**	227.99	ND
13-Jul-24	Saturday	227.05	**229.32**	227.99	ND
14-Jul-24	Sunday	227.07	**229.36**	227.99	ND
15-Jul-24	Monday	227.07	**229.37**	227.99	ND
16-Jul-24	Tuesday	227.05	**229.43**	227.99	ND
17-Jul-24	Wednesday	227.04	**229.44**	227.99	ND
18-Jul-24	Thursday	227.05	**229.42**	227.99	ND
19-Jul-24	Friday	227.05	**229.43**	227.99	ND
20-Jul-24	Saturday	227.05	**229.45**	227.99	ND
21-Jul-24	Sunday	227.06	**229.46**	227.99	ND
22-Jul-24	Monday	227.07	**229.47**	227.99	ND
23-Jul-24	Tuesday	227.07	**229.49**	227.99	ND
24-Jul-24	Wednesday	227.05	**229.48**	227.99	ND
25-Jul-24	Thursday	227.06	**229.49**	227.99	ND
26-Jul-24	Friday	227.06	**229.49**	227.99	ND
27-Jul-24	Saturday	227.06	**229.53**	227.99	ND
28-Jul-24	Sunday	227.10	**229.57**	227.99	ND
29-Jul-24	Monday	227.08	**229.57**	227.99	ND
30-Jul-24	Tuesday	227.05	**229.57**	227.96	ND
31-Jul-24	Wednesday	227.05	**229.57**	227.88	ND

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Aug-24	Thursday	227.05	**228.59**	227.89	ND
2-Aug-24	Friday	227.06	226.98	227.89	ND
3-Aug-24	Saturday	227.08	228.04	227.90	ND
4-Aug-24	Sunday	227.16	**229.49**	227.91	ND
5-Aug-24	Monday	227.15	**228.99**	227.91	ND
6-Aug-24	Tuesday	227.09	227.84	227.92	ND
7-Aug-24	Wednesday	227.09	227.93	227.92	ND
8-Aug-24	Thursday	227.08	227.81	227.91	ND
9-Aug-24	Friday	227.05	227.19	227.92	ND
10-Aug-24	Saturday	227.13	**228.82**	227.92	ND
11-Aug-24	Sunday	227.19	**229.41**	227.92	ND
12-Aug-24	Monday	227.11	228.09	227.92	ND
13-Aug-24	Tuesday	227.09	227.77	227.91	ND
14-Aug-24	Wednesday	227.05	227.28	227.92	ND
15-Aug-24	Thursday	227.10	228.16	227.92	ND
16-Aug-24	Friday	227.08	**229.35**	227.93	ND
17-Aug-24	Saturday	227.12	**229.37**	227.93	ND
18-Aug-24	Sunday	227.19	**229.38**	227.94	ND
19-Aug-24	Monday	227.10	**229.37**	227.92	ND
20-Aug-24	Tuesday	227.03	227.91	227.90	ND
21-Aug-24	Wednesday	227.04	226.98	227.90	ND
22-Aug-24	Thursday	227.04	226.98	227.91	ND
23-Aug-24	Friday	227.04	226.97	227.91	ND
24-Aug-24	Saturday	227.08	227.89	227.92	ND
25-Aug-24	Sunday	227.16	**229.22**	227.92	ND
26-Aug-24	Monday	227.08	227.73	227.92	ND
27-Aug-24	Tuesday	227.07	227.59	227.91	ND
28-Aug-24	Wednesday	227.04	227.09	227.91	**229.64**
29-Aug-24	Thursday	227.08	227.70	227.91	**229.48**
30-Aug-24	Friday	227.06	228.27	227.91	**229.25**
31-Aug-24	Saturday	227.04	**229.09**	227.91	**229.26**

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Sep-24	Sunday	227.04	**229.11**	227.92	**229.26**
2-Sep-24	Monday	227.04	**229.13**	227.91	**229.25**
3-Sep-24	Tuesday	227.05	**229.15**	227.90	**229.23**
4-Sep-24	Wednesday	227.04	**229.16**	227.90	**229.19**
5-Sep-24	Thursday	227.05	**229.18**	227.90	**229.14**
6-Sep-24	Friday	227.04	**229.21**	227.90	**229.11**
7-Sep-24	Saturday	227.04	227.81	227.90	**229.10**
8-Sep-24	Sunday	227.14	**229.11**	227.90	**229.12**
9-Sep-24	Monday	227.08	**228.85**	227.91	**229.11**
10-Sep-24	Tuesday	227.09	**229.21**	227.91	**229.09**
11-Sep-24	Wednesday	227.18	**229.23**	227.91	**229.03**
12-Sep-24	Thursday	227.21	**229.24**	227.91	**228.98**
13-Sep-24	Friday	227.23	**229.26**	227.92	**228.93**
14-Sep-24	Saturday	227.25	**229.27**	227.92	**228.92**
15-Sep-24	Sunday	227.26	**229.29**	227.92	**228.93**
16-Sep-24	Monday	227.28	**229.31**	227.93	**228.91**
17-Sep-24	Tuesday	227.29	**229.32**	227.94	**228.87**
18-Sep-24	Wednesday	227.32	**229.33**	227.94	**228.83**
19-Sep-24	Thursday	227.35	**229.35**	227.94	**228.80**
20-Sep-24	Friday	227.37	**229.36**	227.95	**228.75**
21-Sep-24	Saturday	227.39	**229.43**	227.96	**228.73**
22-Sep-24	Sunday	227.41	**229.38**	227.96	**228.74**
23-Sep-24	Monday	227.35	**229.41**	227.96	**228.73**
24-Sep-24	Tuesday	227.43	**229.42**	227.97	**228.67**
25-Sep-24	Wednesday	227.44	**229.42**	227.97	**228.63**
26-Sep-24	Thursday	227.46	**229.43**	227.97	**228.58**
27-Sep-24	Friday	227.48	**229.45**	227.98	**228.54**
28-Sep-24	Saturday	227.49	**229.46**	227.98	**228.53**
29-Sep-24	Sunday	227.51	**229.47**	227.99	**228.52**
30-Sep-24	Monday	227.52	**229.49**	227.99	**228.51**

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Oct-24	Tuesday	227.53	**229.50**	227.99	**228.49**
2-Oct-24	Wednesday	227.55	**229.52**	228.00	**228.47**
3-Oct-24	Thursday	227.38	**228.64**	228.00	**228.46**
4-Oct-24	Friday	227.30	**228.72**	227.98	**228.45**
5-Oct-24	Saturday	227.52	**229.55**	227.97	**228.46**
6-Oct-24	Sunday	227.53	**229.56**	227.97	**228.46**
7-Oct-24	Monday	227.38	**229.09**	227.98	**228.45**
8-Oct-24	Tuesday	227.37	**228.77**	227.98	**228.43**
9-Oct-24	Wednesday	227.35	**228.77**	227.98	**228.41**
10-Oct-24	Thursday	227.36	**228.85**	227.99	**228.38**
11-Oct-24	Friday	227.36	**228.97**	227.99	**228.37**
12-Oct-24	Saturday	227.47	**229.56**	228.00	**228.37**
13-Oct-24	Sunday	227.48	**229.59**	228.00	**228.38**
14-Oct-24	Monday	227.42	**229.23**	228.00	**228.38**
15-Oct-24	Tuesday	227.39	**229.01**	228.00	**228.39**
16-Oct-24	Wednesday	227.39	**229.00**	228.00	**228.58**
17-Oct-24	Thursday	227.49	**229.58**	228.01	**228.83**
18-Oct-24	Friday	227.67	**229.60**	228.06	**228.77**
19-Oct-24	Saturday	228.04	**229.62**	228.07	**228.70**
20-Oct-24	Sunday	228.32	**229.64**	228.08	**228.62**
21-Oct-24	Monday	228.53	**229.66**	228.08	**228.54**
22-Oct-24	Tuesday	228.34	**228.92**	228.08	**228.48**
23-Oct-24	Wednesday	228.00	228.05	228.09	**228.49**
24-Oct-24	Thursday	228.22	**229.00**	228.09	**228.51**
25-Oct-24	Friday	228.27	**229.16**	228.10	**228.51**
26-Oct-24	Saturday	228.38	**229.66**	228.10	**228.51**
27-Oct-24	Sunday	228.39	**229.65**	228.10	**228.52**
28-Oct-24	Monday	228.26	**229.36**	228.11	**228.52**
29-Oct-24	Tuesday	228.30	**229.39**	228.10	**228.54**
30-Oct-24	Wednesday	228.24	**229.45**	228.10	**228.56**
31-Oct-24	Thursday	228.18	**229.15**	228.09	**228.57**

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Nov-24	Friday	228.16	**229.66**	228.08	**228.58**
2-Nov-24	Saturday	228.31	**229.71**	228.08	**228.58**
3-Nov-24	Sunday	228.32	**229.73**	228.08	**228.59**
4-Nov-24	Monday	228.19	**229.75**	228.08	**228.60**
5-Nov-24	Tuesday	228.17	**229.77**	228.07	**228.60**
6-Nov-24	Wednesday	228.14	**229.76**	228.05	**228.60**
7-Nov-24	Thursday	228.06	**229.78**	228.05	**228.61**
8-Nov-24	Friday	228.07	**229.80**	228.04	**228.61**
9-Nov-24	Saturday	228.07	**229.82**	228.04	ND
10-Nov-24	Sunday	228.21	**229.85**	228.05	ND
11-Nov-24	Monday	228.05	**229.24**	228.05	ND
12-Nov-24	Tuesday	228.00	**229.16**	228.05	ND
13-Nov-24	Wednesday	228.03	**229.85**	228.04	ND
14-Nov-24	Thursday	227.94	**229.15**	228.04	ND
15-Nov-24	Friday	227.94	**229.28**	228.04	ND
16-Nov-24	Saturday	228.06	**229.86**	228.05	ND
17-Nov-24	Sunday	228.08	**229.90**	228.05	ND
18-Nov-24	Monday	227.90	**229.25**	228.06	ND
19-Nov-24	Tuesday	227.86	**229.23**	228.06	ND
20-Nov-24	Wednesday	227.84	**229.28**	228.06	ND
21-Nov-24	Thursday	227.88	**229.55**	228.07	ND
22-Nov-24	Friday	227.77	**229.21**	228.06	ND
23-Nov-24	Saturday	227.92	**229.90**	228.07	ND
24-Nov-24	Sunday	227.93	**229.94**	228.07	ND
25-Nov-24	Monday	227.77	**229.28**	228.08	ND
26-Nov-24	Tuesday	227.81	**229.57**	228.08	**228.58**
27-Nov-24	Wednesday	227.77	**229.46**	228.08	**228.83**
28-Nov-24	Thursday	227.75	**229.50**	228.08	**229.00**
29-Nov-24	Friday	227.71	**229.42**	228.08	**228.99**
30-Nov-24	Saturday	227.80	**229.95**	228.09	**228.99**

Table F-6
Leachate Level Elevations - Primary Drainage Layer
Twin Creeks Environmental Centre

Date	Weekday	Leachate Elevation (mASL)			
		PS1	PS3	PS5	PS7
Condition 14.1: Head Max Elevation (mASL)		**232.70**	**232.60**	**232.80**	**233.40**
Condition 7.18: 0.3 m Head Max Elevation (mASL)		**228.65**	**228.55**	**228.72**	**228.30**
80% Warning of 0.3 m Head Max Elevation (mASL)		**228.59**	**228.49**	**228.66**	**228.24**
Sensor Elevation		**226.16**	**225.96**	**225.91**	**226.51**
T.O.P.		**235.97**	**240.63**	**241.62**	**240.28**
1-Dec-24	Sunday	227.81	**229.98**	228.09	**229.00**
2-Dec-24	Monday	227.72	**229.57**	228.10	**229.00**
3-Dec-24	Tuesday	227.69	**229.56**	228.10	**229.00**
4-Dec-24	Wednesday	227.66	**229.57**	228.11	**228.99**
5-Dec-24	Thursday	227.66	**229.67**	228.09	**229.00**
6-Dec-24	Friday	227.60	**229.48**	228.09	**229.00**
7-Dec-24	Saturday	227.68	**230.06**	228.10	**229.01**
8-Dec-24	Sunday	227.70	**230.11**	228.10	**229.01**
9-Dec-24	Monday	227.61	**229.66**	228.11	**229.05**
10-Dec-24	Tuesday	227.58	**229.60**	228.11	**229.10**
11-Dec-24	Wednesday	227.56	**229.66**	228.12	**229.11**
12-Dec-24	Thursday	227.53	**229.64**	228.12	**229.12**
13-Dec-24	Friday	227.50	**229.62**	228.12	**229.12**
14-Dec-24	Saturday	227.57	**230.07**	228.12	**229.13**
15-Dec-24	Sunday	227.58	**230.13**	228.13	**229.14**
16-Dec-24	Monday	227.51	**229.76**	228.14	**229.16**
17-Dec-24	Tuesday	227.46	**229.68**	228.14	**229.20**
18-Dec-24	Wednesday	227.42	**229.59**	228.14	**229.21**
19-Dec-24	Thursday	227.40	**229.71**	228.15	**229.21**
20-Dec-24	Friday	227.38	**229.78**	228.16	**229.22**
21-Dec-24	Saturday	227.44	**230.16**	228.16	**229.22**
22-Dec-24	Sunday	227.46	**230.19**	228.16	**229.23**
23-Dec-24	Monday	227.37	**229.64**	228.16	**229.24**
24-Dec-24	Tuesday	227.35	**229.75**	228.16	**229.25**
25-Dec-24	Wednesday	227.40	**230.22**	228.16	**229.26**
26-Dec-24	Thursday	227.42	**230.27**	228.17	**229.27**
27-Dec-24	Friday	227.39	**230.08**	228.17	**229.29**
28-Dec-24	Saturday	227.44	**230.38**	228.19	**229.33**
29-Dec-24	Sunday	227.47	**230.51**	228.20	**229.36**
30-Dec-24	Monday	227.50	**230.50**	228.21	**229.42**
31-Dec-24	Tuesday	227.40	**230.37**	228.25	**229.43**

Note: 1) 'm asl' denotes metres above sea level.

2) ' - ' denotes data not available as pumping station not installed.

3) 'ND' denotes no data for that day.

4) 'T.O.P.' denotes 'top of pipe'.

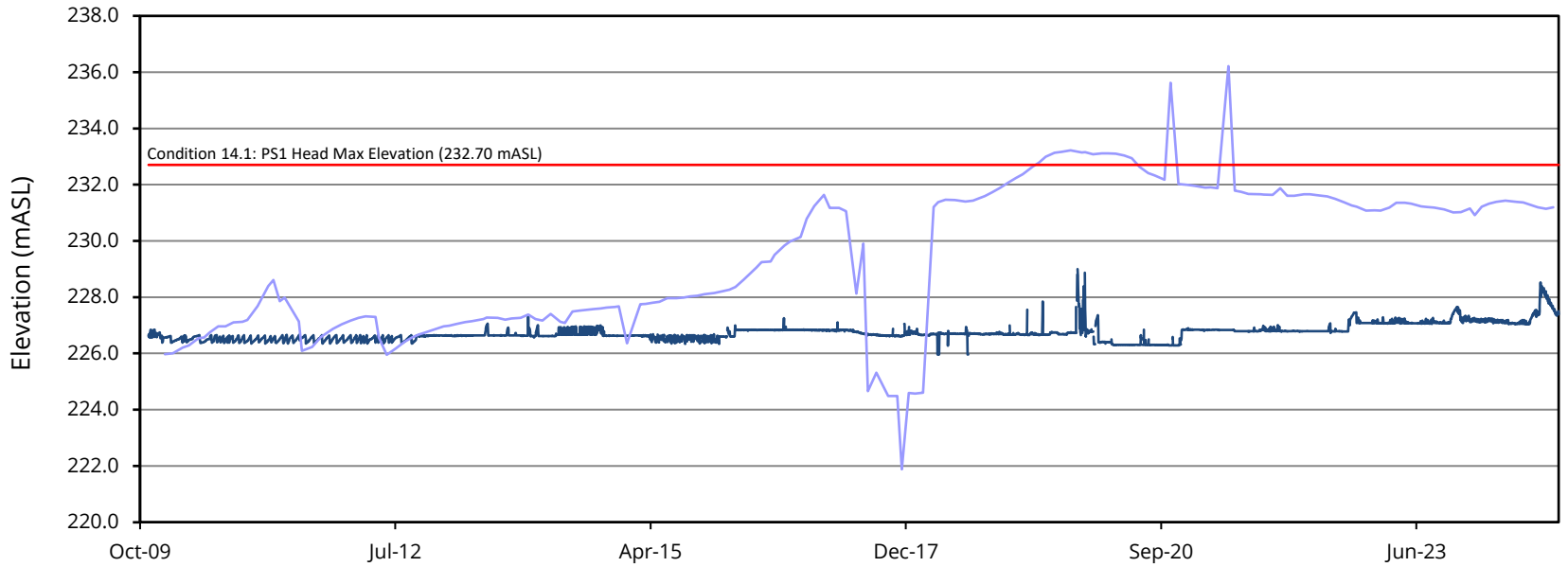
5) '*Italics*' denotes a false elevation due to level sensor error.

6) '**bold**' denotes the 80% warning of the 0.3m Head Max Elevation was reached.

7) '**bold**' and grey shading denotes the Condition 7.18: 0.3 Head Max Elevation was triggered.

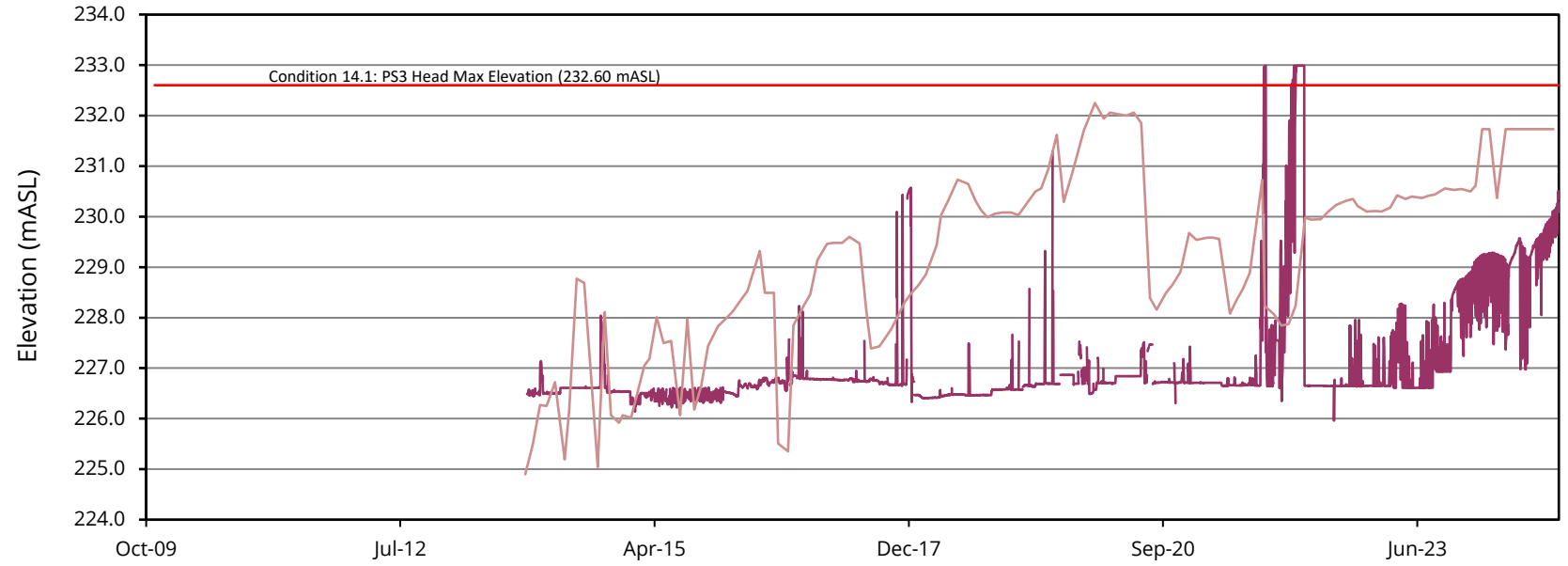
8) '**bold**' and red shading denotes the Condition 14.1: Head Max Elevation was triggered.

Figure F-26
PDL (PS1) & SDL (PS2) Hydrograph



Note: Between June and December 2017, and in November 2020, the level sensor for the SDL at PS2 was noted to be faulty.

Figure F-27
PDL (PS3) & SDL (PS4) Hydrograph



Note: From October 15, 2021 to April 5, 2022 the level sensor for the PDL at PS3 was noted to be faulty.

Figure F-28
PDL (PS5) & SDL (PS6) Hydrograph

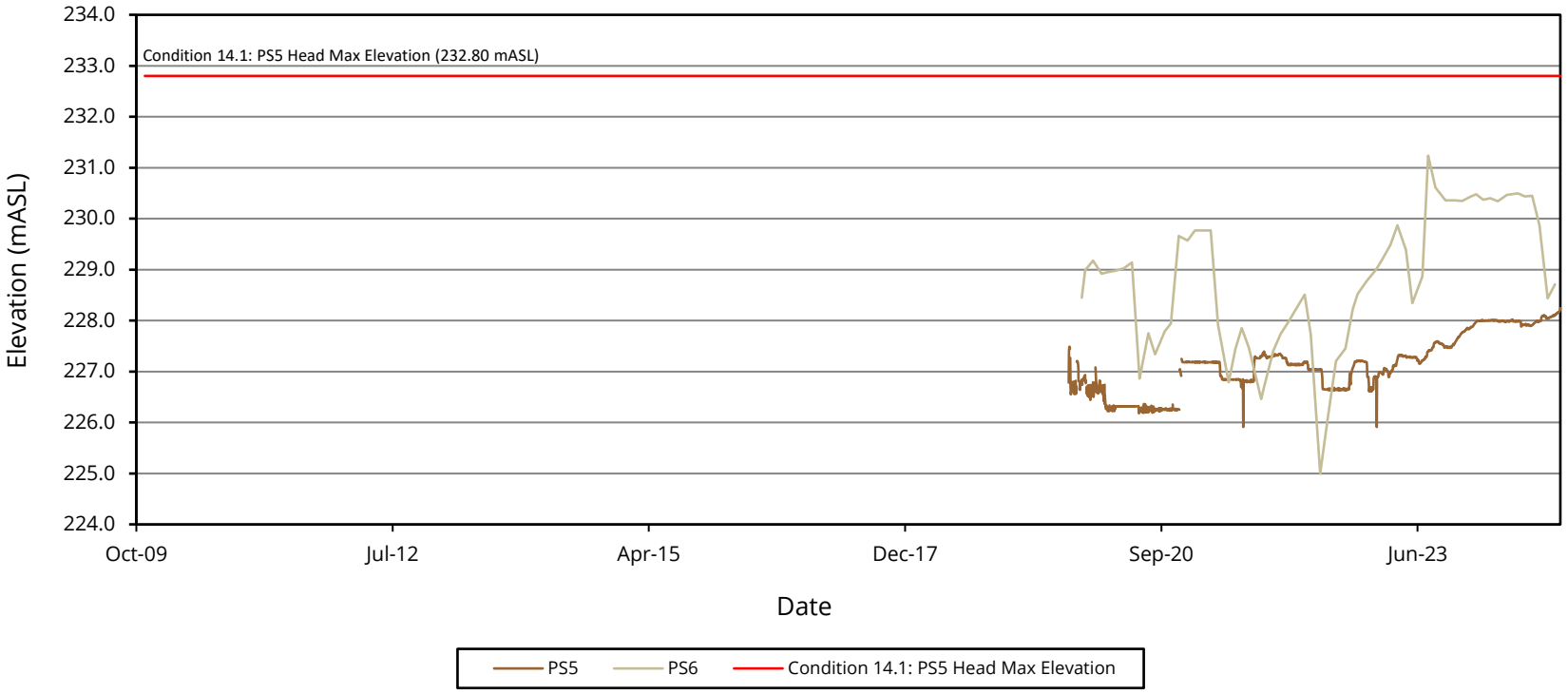
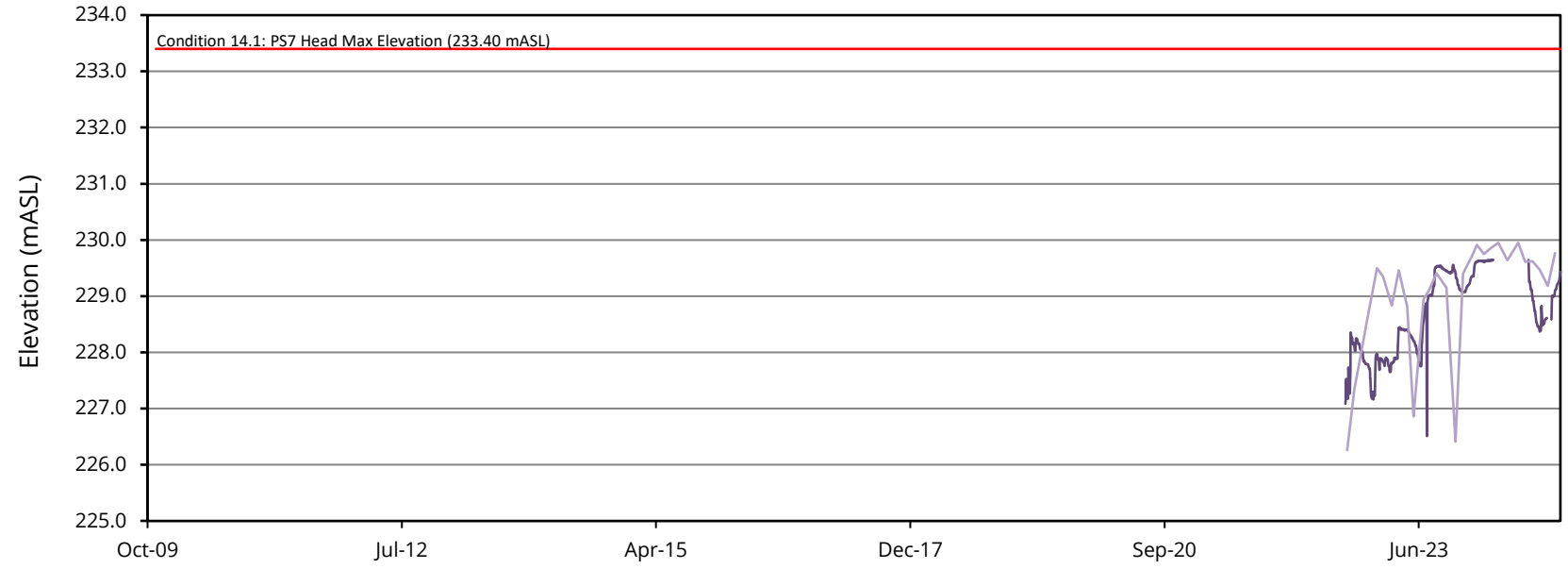


Figure F-29
PDL (PS7) & SDL (PS8) Hydrograph



Note: From April 12 to August 27 and from November 9 to 25, 2024 the PS7 level sensor communications were noted to be faulty.

APPENDIX F:

Table F7 - Liquid Level Elevations - SDL - Expansion Landfill

Table F-7
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	235.72	240.29	241.56	239.93
20-Jan-10	225.97	-	-	-
19-Feb-10	226.01	-	-	-
31-Mar-10	226.21	-	-	-
23-Apr-10	226.28	-	-	-
31-May-10	226.54	-	-	-
22-Jun-10	226.57	-	-	-
14-Jul-10	226.75	-	-	-
17-Aug-10	226.96	-	-	-
14-Sep-10	226.96	-	-	-
15-Oct-10	227.10	-	-	-
19-Nov-10	227.12	-	-	-
8-Dec-10	227.19	-	-	-
18-Jan-11	227.69	-	-	-
28-Feb-11	228.40	-	-	-
21-Mar-11	228.61	-	-	-
15-Apr-11	227.86	-	-	-
3-May-11	227.99	-	-	-
28-Jun-11	227.14	-	-	-
10-Jul-11	226.09	-	-	-
19-Aug-11	226.23	-	-	-
22-Sep-11	226.58	-	-	-
12-Oct-11	226.70	-	-	-
9-Nov-11	226.88	-	-	-
14-Dec-11	227.04	-	-	-
17-Jan-12	227.17	-	-	-
17-Feb-12	227.27	-	-	-
15-Mar-12	227.32	-	-	-
24-Apr-12	227.30	-	-	-
7-May-12	226.56	-	-	-
7-Jun-12	225.95	-	-	-
12-Jul-12	226.18	-	-	-
15-Aug-12	226.41	-	-	-
13-Sep-12	226.56	-	-	-
10-Oct-12	226.67	-	-	-
5-Nov-12	226.75	-	-	-
18-Dec-12	226.88	-	-	-
16-Jan-13	226.96	-	-	-
6-Feb-13	226.99	-	-	-
8-Mar-13	227.05	-	-	-
10-Apr-13	227.11	-	-	-
6-May-13	227.15	-	-	-
20-Jun-13	227.22	-	-	-
3-Jul-13	227.28	-	-	-
15-Aug-13	227.27	-	-	-
13-Sep-13	227.20	-	-	-
9-Oct-13	227.24	-	-	-
13-Nov-13	227.26	224.90	-	-
13-Dec-13	227.38	225.49	-	-
10-Jan-14	227.22	226.27	-	-
6-Feb-14	227.17	226.25	-	-
11-Mar-14	227.40	226.72	-	-
17-Apr-14	227.12	225.19	-	-

Table F-7
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	**235.72**	**240.29**	**241.56**	**239.93**
5-May-14	227.08	226.17	-	-
4-Jun-14	227.49	228.77	-	-
3-Jul-14	227.52	228.69	-	-
26-Aug-14	227.58	225.04	-	-
22-Sep-14	227.60	228.11	-	-
16-Oct-14	227.63	226.07	-	-
17-Nov-14	227.65	225.92	-	-
2-Dec-14	227.67	226.07	-	-
4-Jan-15	*226.36*	226.02	-	-
25-Feb-15	227.75	227.05	-	-
17-Mar-15	227.76	227.19	-	-
14-Apr-15	227.80	228.01	-	-
11-May-15	227.84	227.50	-	-
10-Jun-15	227.96	227.54	-	-
16-Jul-15	227.96	226.07	-	-
13-Aug-15	227.99	227.97	-	-
9-Sep-15	228.03	226.18	-	-
6-Oct-15	228.05	226.64	-	-
2-Nov-15	228.10	227.44	-	-
11-Dec-15	228.15	227.83	-	-
14-Jan-16	228.21	227.99	-	-
9-Feb-16	228.27	228.13	-	-
3-Mar-16	228.36	228.30	-	-
5-Apr-16	228.62	228.53	-	-
24-May-16	229.05	229.32	-	-
13-Jun-16	229.25	228.49	-	-
19-Jul-16	229.27	228.49	-	-
4-Aug-16	229.51	225.51	-	-
12-Sep-16	229.84	225.35	-	-
3-Oct-16	229.98	227.85	-	-
14-Nov-16	230.14	228.25	-	-
8-Dec-16	230.79	228.46	-	-
6-Jan-17	231.24	229.14	-	-
13-Feb-17	231.64	229.46	-	-
8-Mar-17	231.17	229.48	-	-
13-Apr-17	231.17	229.48	-	-
11-May-17	231.06	229.60	-	-
20-Jun-17	228.13	229.47	-	-
17-Jul-17	229.90	228.16	-	-
4-Aug-17	*224.66*	227.39	-	-
7-Sep-17	*225.32*	227.43	-	-
23-Oct-17	*224.49*	227.77	-	-
27-Nov-17	*224.49*	228.12	-	-
15-Dec-17	*221.88*	228.31	-	-
12-Jan-18	*224.59*	228.50	-	-
5-Feb-18	224.57	228.63	-	-
8-Mar-18	224.60	228.85	-	-
19-Apr-18	231.21	229.43	-	-
7-May-18	231.38	230.03	-	-
4-Jun-18	231.46	230.32	-	-
11-Jul-18	231.45	230.73	-	-

Table F-7
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

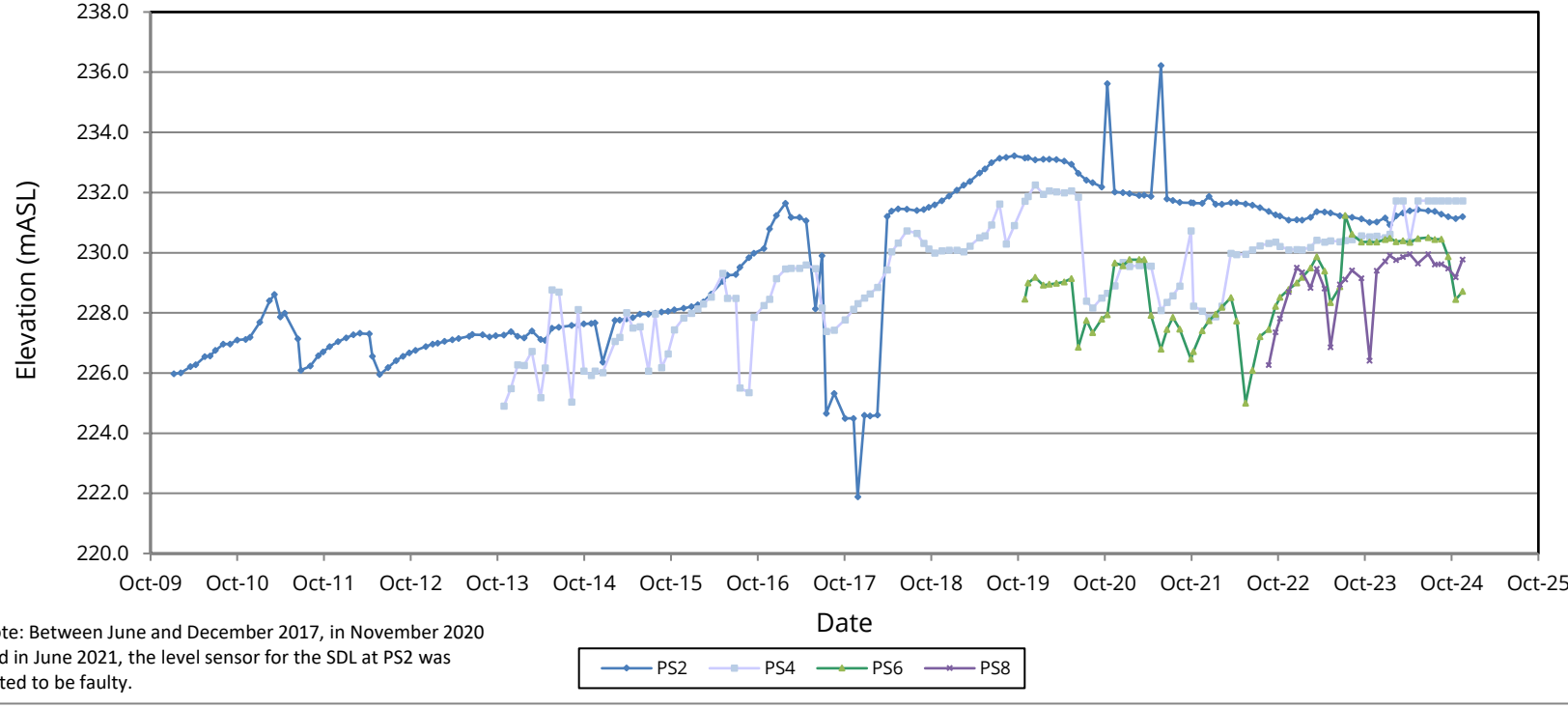
T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	**235.72**	**240.29**	**241.56**	**239.93**
21-Aug-18	231.40	230.65	-	-
20-Sep-18	231.43	230.31	-	-
11-Oct-18	231.51	230.13	-	-
5-Nov-18	231.59	229.99	-	-
5-Dec-18	231.73	230.06	-	-
4-Jan-19	231.88	230.08	-	-
6-Feb-19	232.08	230.08	-	-
7-Mar-19	232.24	230.03	-	-
3-Apr-19	232.37	230.22	-	-
13-May-19	232.65	230.50	-	-
5-Jun-19	232.78	230.56	-	-
2-Jul-19	232.99	230.93	-	-
5-Aug-19	233.14	231.62	-	-
2-Sep-19	233.17	230.29	-	-
7-Oct-19	233.22	230.90	-	-
20-Nov-19	233.15	231.71	228.45	-
3-Dec-19	233.16	231.87	228.99	-
3-Jan-20	233.08	232.25	229.18	-
6-Feb-20	233.11	231.94	228.92	-
2-Mar-20	233.11	232.06	228.95	-
1-Apr-20	233.10	232.03	228.98	-
4-May-20	233.04	232.00	229.03	-
3-Jun-20	232.94	232.06	229.14	-
3-Jul-20	232.64	231.85	226.86	-
6-Aug-20	232.41	228.39	227.75	-
1-Sep-20	232.33	228.16	227.34	-
9-Oct-20	232.18	228.50	227.79	-
2-Nov-20	*235.62*	228.65	227.94	-
3-Dec-20	232.02	228.90	229.66	-
7-Jan-21	231.99	229.68	229.57	-
4-Feb-21	231.96	229.54	229.77	-
17-Mar-21	231.90	229.58	229.77	-
7-Apr-21	231.91	229.59	229.77	-
5-May-21	231.87	229.56	227.92	-
16-Jun-21	*236.22*	228.08	226.79	-
12-Jul-21	231.79	228.35	227.44	-
6-Aug-21	231.74	228.57	227.85	-
3-Sep-21	231.67	228.89	227.46	-
21-Oct-21	231.66	*230.72*	226.46	-
1-Nov-21	231.65	228.23	226.71	-
7-Dec-21	231.64	228.06	227.41	-
5-Jan-22	231.87	227.84	227.74	-
2-Feb-22	231.61	227.87	227.96	-
1-Mar-22	231.61	228.23	228.19	-
8-Apr-22	231.66	229.98	228.51	-
2-May-22	231.66	229.94	227.73	-
8-Jun-22	231.62	229.95	225.00	-
8-Jul-22	231.58	230.10	226.09	-
8-Aug-22	231.50	230.23	227.21	-

Table F-7
Groundwater Level Elevations - Secondary Drainage Layer
Twin Creeks Environmental Centre

T.O.P.	PS2	PS4	PS6	PS8
	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)	GW Elevation (mASL)
T.O.P.	**235.72**	**240.29**	**241.56**	**239.93**
14-Sep-22	231.37	230.31	227.45	226.26
13-Oct-22	231.26	230.35	228.22	227.35
1-Nov-22	231.22	230.21	228.52	227.81
7-Dec-22	231.08	230.10	228.78	228.69
10-Jan-23	231.09	230.11	228.99	229.50
2-Feb-23	231.08	230.10	229.18	229.35
9-Mar-23	231.18	230.18	229.49	228.83
5-Apr-23	231.36	230.42	229.87	229.46
8-May-23	231.36	230.35	229.39	228.81
2-Jun-23	231.32	230.40	228.34	226.86
12-Jul-23	231.23	230.37	228.87	228.94
3-Aug-23	231.21	230.41	231.24	229.11
1-Sep-23	231.18	230.44	230.61	229.41
10-Oct-23	231.12	230.56	230.36	229.15
14-Nov-23	231.01	230.53	230.36	226.41
14-Dec-23	231.02	230.55	230.35	229.40
18-Jan-24	231.16	230.50	230.44	229.71
7-Feb-24	230.92	230.61	230.48	229.91
5-Mar-24	231.22	231.73	230.37	229.75
2-Apr-24	231.32	231.73	230.40	229.86
1-May-24	231.39	230.37	230.34	229.95
5-Jun-24	231.43	231.73	230.47	229.64
18-Jul-24	231.39	231.73	230.50	229.95
15-Aug-24	231.37	231.73	230.44	229.61
12-Sep-24	231.28	231.73	230.45	229.62
10-Oct-24	231.19	231.73	229.87	229.47
11-Nov-24	231.14	231.73	228.44	229.18
10-Dec-24	231.20	231.73	228.71	229.77

NOTES: 1) PS2 operational in November 2009.
2) PS4 operational in November 2013.
3) PS6 operational in November 2019.
4) PS8 operational in September 2022.
5) T.O.P. denotes 'top of pipe'.
6) mASL denotes metres above sea level.
7) *Italics* denotes a level sensor error.

Figure F-25
SDL (PS2, PS4, PS6, and PS8) Hydrograph



Note: Between June and December 2017, in November 2020 and in June 2021, the level sensor for the SDL at PS2 was noted to be faulty.

APPENDIX F:

Table F8 - EVGW Elevations - Expansion Landfill

Table F-8
Leachate Level Elevations - Early Vertical Gas Wells
Twin Creeks Environmental Centre Expansion Site

Date	Cell 1		Cell 2	
	EV299 (1A S1)	EV268 (1A S2)	EV022 (2B)	EV226 (2D)
Well Base	**230.08**	**231.70**	**229.65**	**230.15**
T.O.P. 2018	**257.02**	**254.77**	**258.19**	**256.88**
7-May-18	Dry @ 230.08	Dry @ 231.70	Dry @ 229.65	Dry @ 230.15
5-Nov-18	Dry @ 230.08	Dry @ 231.70	Dry @ 229.65	Dry @ 230.15
T.O.P. May 2019	**257.93**	**260.52**	**258.82**	**257.92**
31-May-19	OBS @ 237.17	OBS @242.82	OBS @ 252.15	OBS @ 254.92
T.O.P. Nov 2019	**257.71**	**261.97**	**258.45**	**260.34**
4-Nov-19	OBS @249.96	Dry @ 232.19	OBS @ 251.84	OBS @ 255.42
T.O.P. May 2020	**257.19**	**261.72**	**258.06**	**259.74**
5-May-20	OBS @ 249.37	Dry @ 232.08	OBS @ 251.49	OBS @ 256.49
T.O.P. Nov 2020	**256.87**	**261.61**	**258.74**	**259.17**
2-Nov-20	OBS @ 249.18	Dry @ 232.14	OBS @ 252.19	OBS @ 255.53
T.O.P. May 2021	**256.57**	**260.70**	**257.44**	**258.62**
17-May-21	OBS @ 248.92	Dry @ 232.16	OBS @ 250.98	OBS @ 255.33
T.O.P. Nov 2021	**256.31**	**260.53**	**257.21**	**258.14**
1-Nov-21	OBS @ 248.68	Dry @ 232.10	OBS @ 250.73	OBS @ 254.87
T.O.P. May 2022	**256.11**	**260.38**	**257.03**	**257.70**
20-May-22	OBS @ 248.49	OBS @ 245.55	OBS @ 250.57	OBS @ 254.43
T.O.P. Nov 2022	**255.93**	**260.20**	**261.05**	**261.32**
1-Nov-22	OBS @ 248.12	OBS @ 245.64	OBS @ 255.98	OBS @ 255.97
T.O.P. May 2023	**255.71**	**260.17**	**260.75**	**265.49**
1-May-23	OBS @ 248.07	OBS @ 246.12	OBS @ 255.55	OBS @ 262.44
T.O.P. Nov 2023	**256.11**	**259.35**	**-**	**267.49**
30-Nov-23	OBS @ 248.49	OBS @ 244.36	Inaccessible	OBS @ 262.44
T.O.P. May 2024	**255.49**	**259.96**	**266.61**	**267.04**
1-May-24	OBS @ 247.88	OBS @ 244.99	OBS @ 262.25	OBS @ 263.10
T.O.P. 11-Nov 2024	**255.33**	**259.83**	**271.84**	**266.26**
12-Nov-24	OBS @ 248.26	OBS @ 245.93	OBS @ 266.30	OBS @ 256.28

NOTES: 1) Blank denotes data not available.

2) Elevations in metres above sea level.

3) T.O.P. denotes 'top of pipe'.

4) Measured levels are accurate to 0.1 m due to gas and condensate interferences during the measuring of levels from leachate monitoring wells/locations.

5) OBS denotes 'Not Determined' as the liquid level probe was unable to reach bottom of Early Vertical Gas Well.

6) EV022 was inaccessible during the November 2023 monitoring event.

APPENDIX G:

Leachate Chemical Results

APPENDIX G:

Table G1 - Leachate Field Analytical Results

Table G-1
Leachate - Field Analytical Results
Twin Creeks Environmental Centre

Location	pH	Conductivity	Temperature	Turbidity	DO
	(as units)	(µS/cm)	(°C)	(NTU)	(mg/L)
Expansion Site - Equalization Tank					
January 10, 2024					
Equalization Tank	8.0	12,980	16.5	135	0.80
May 5, 2024					
Equalization Tank	7.7	>20,000	19.3	277	0.81
July 23, 2024					
Equalization Tank	7.7	17,150	23.7	132	0.50
October 9, 2024					
Equalization Tank	8.0	16,740	18.7	>999	1.78
Expansion Site - Pump Stations					
May 2, 2024					
PS1	7.7	>20,000	15.8	>999	1.01
PS3	8.2	>20,000	16.6	>999	6.15
PS5	7.4	16,310	26.4	>999	0.70
PS7	6.9	9,170	27.5	180	0.54
Existing Site					
May 6, 2024					
CFA-Comp	7.2	4,680	17.4	127	6.90
MH18	7.8	6,250	15.4	92.2	1.10
SUMP	6.9	1,110	16.2	166	3.70

Notes: 1) µS/cm denotes micro-siemens per centimetre.
2) ^{0}C denotes degrees Celsius.
3) NTU denotes nephelometric turbidity units.
4) mg/L denotes milligrams per litre.
5) DO denotes dissolved oxygen.
6) NA denotes not available due to equipment malfunction.

APPENDIX G:

Table G2 - Leachate General Analytical Results

Table G-2
Leachate - General 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)
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**
Laboratory		**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**
Alkalinity (Total as CaCO3)	mg/L	5770	6480	7060	4570	4300	940	5600	4700	4600
Conductivity	umho/cm	13100	15000	16400	10800	12000	2600	14000	13000	15000
Dissolved Chloride (Cl)	mg/L	1300	1500	1800	1100	1400	200	1500	1800	2600
Dissolved Organic Carbon	mg/L	435		462	265	273	49	330	330	300
Dissolved Sulphate (SO4)	mg/L	*10*	81	*5*	59	54	78	72	*0.5*	*10*
Mercury (Hg)	mg/L	<0.0002	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
Nitrate (N)	mg/L	<0.1	<1	<1	<1	<2.0	<0.10	<0.50	<1.0	<1.0
Nitrite (N)	mg/L	0.03	<0.1	<0.1	<0.1	<0.20	<0.010	<0.050	<0.10	<0.10
pH	units	7.6	8.0	7.7	7.6	7.7	7.5	7.8	7.8	7.5
Phenols-4AAP	mg/L	0.10	0.07	0.08	0.06	0.05	0.01	0.08	0.05	0.07
Total Ammonia-N	mg/L	576	724	857	558	529	100	795	592	560
Total Arsenic (As)	mg/L	0.007	0.010	0.007	0.006	<0.01	0.003	0.010	0.010	<0.01
Total Barium (Ba)	mg/L	0.19	0.19	0.20	0.20	0.19	0.11	0.23	0.23	0.29
Total BOD	mg/L	200	140	200	74	81	14	94	60	88
Total Boron (B)	mg/L	70	58	56	28	20	2.0	17	43	49
Total Cadmium (Cd)	mg/L	<0.0001	<0.0001	<0.0005	<0.0005	<0.001	<0.0001	<0.0001	<0.0005	<0.001
Total Calcium (Ca)	mg/L	100	100	85	110	140	96	130	110	130
Total Chemical Oxygen Demand (COD)	mg/L	1200	1200	1400	850	860	180	1000	950	980
Total Chromium (Cr)	mg/L	1.5	1.2	1.1	0.4	0.4	0.0	0.3	1.6	1.5
Total Copper (Cu)	mg/L	<0.002	0.002	<0.01	<0.01	<0.02	0.005	<0.01	<0.02	<0.02
Total Dissolved Solids	mg/L	8000	9410	9960	6320	5110	1200	6210	6360	7400
Total Iron (Fe)	mg/L	7.9	5.2	5.2	3.5	2.9	5.9	5.1	7.4	24.0
Total Kjeldahl Nitrogen (TKN)	mg/L	720	810	930	570	600	100	860	630	580
Total Lead (Pb)	mg/L	0.0082	0.0094	0.0080	0.0040	<0.005	0.0022	0.0034	0.0150	0.0640
Total Magnesium (Mg)	mg/L	240	390	340	300	290	60	330	270	310
Total Manganese (Mn)	mg/L	0.37	0.37	0.23	0.26	0.33	0.25	0.24	0.34	0.23
Total Nickel (Ni)	mg/L	1.10	0.96	0.93	0.44	0.42	0.05	0.35	0.96	0.92
Total Phosphorus	mg/L	3.5	5.2	5.8	2.3	1.8	<0.6	2.4	3.1	2.4
Total Potassium (K)	mg/L	340	520	520	500	440	89	620	390	380
Total Sodium (Na)	mg/L	1600	1800	1700	1200	1200	180	1300	1700	2100
Total Suspended Solids	mg/L	20	14	15	64	20	120	29	12	97
Total Zinc (Zn)	mg/L	0.10	0.08	0.05	<0.05	<0.1	0.02	0.04	<0.05	<0.1
Un-ionized Ammonia	mg/L	3.3	5.4	8.2	2.4	9.7	0.2	29.0	12.0	2.3
Ion Percentage	mg/L	11.5	7.1	15.8	5.2	7.5	6.0	11.5	6.2	5.2

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.

Table G-2
Leachate - General 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)	
Date		26-May-17	11-May-18	16-May-19	12-May-20	18-May-21	06-May-22	03-May-23	06-May-24	
Laboratory		Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	
Alkalinity (Total as CaCO3)	mg/L	3900	2800	290	2900	2900	900	300	280	
Conductivity	umho/cm	11000	7700	880	11000	8900	2600	960	890	
Dissolved Chloride (Cl)	mg/L	1500	860	68	1900	1500	240	83	82	
Dissolved Organic Carbon	mg/L	230	150	25	180	140	52	22	33	
Dissolved Sulphate (SO4)	mg/L	39	40	58	23	0.5	15	74	49	
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.0002	<0.0002	<0.003	
Nitrate (N)	mg/L	<0.50	<1.0	<0.10	1.85	<0.50	0.37	0.52	0.64	
Nitrite (N)	mg/L	0.055	<0.10	0.137	0.085	<0.050	0.265	0.082	0.073	
pH	units	7.6	7.6	7.8	7.6	7.3	8.0	8.1	7.7	
Phenols-4AAP	mg/L	<0.20	<0.080	<0.0040	0.085	<0.020	0.0018	<0.0010	0.0012	
Total Ammonia-N	mg/L	512	354	11.1	416	349	94.9	1.41	5.63	
Total Arsenic (As)	mg/L	0.006	<0.005	0.002	<0.01	<0.005	0.003	0.002	0.003	
Total Barium (Ba)	mg/L	0.17	0.11	0.05	0.2	0.24	0.063	0.049	0.057	
Total BOD	mg/L	63	43	5	49	37	7	5	10	
Total Boron (B)	mg/L	25.0	7.4	1.3	23	18	3.1	1.8	2.3	
Total Cadmium (Cd)	mg/L	<0.0001	<0.0005	<0.0001	<0.001	<0.0005	<0.0001	0.0001	0.0001	
Total Calcium (Ca)	mg/L	95	95	76	120	150	80	72	49	
Total Chemical Oxygen Demand (COD)	mg/L	660	480	63	570	450	160	66	100	
Total Chromium (Cr)	mg/L	0.56	0.11	0.01	0.19	0.12	0.015	<0.005	0.007	
Total Copper (Cu)	mg/L	0.003	<0.01	0.006	<0.02	<0.01	0.006	0.007	0.009	
Total Dissolved Solids	mg/L	4640	3050	525	4870	3560	1030	515	545	
Total Iron (Fe)	mg/L	3.4	4.5	2.2	13	54	5.1	3.3	5.2	
Total Kjeldahl Nitrogen (TKN)	mg/L	530	330	11	420	340	96	3.1	9	
Total Lead (Pb)	mg/L	0.0047	<0.003	0.0011	0.019	0.006	0.0026	0.0018	0.0027	
Total Magnesium (Mg)	mg/L	210	140	22	200	170	54	23	20	
Total Manganese (Mn)	mg/L	0.098	0.110	0.053	0.18	0.29	0.11	0.054	0.072	
Total Nickel (Ni)	mg/L	0.360	0.130	0.011	0.280	0.180	0.038	0.014	0.016	
Total Phosphorus	mg/L	1.60	0.97	0.24	1.00	1.20	0.36	0.12	0.16	
Total Potassium (K)	mg/L	340	260	12	220	210	74	12	18	
Total Sodium (Na)	mg/L	1100	640	57	1100	930	220	100	95	
Total Suspended Solids	mg/L	20	41	52	88	270	230	54	66	
Total Zinc (Zn)	mg/L	0.02	<0.05	0.01	<0.10	<0.05	0.02	0.02	0.03	
Un-ionized Ammonia	mg/L	3.10	1.10	0.03	0.92	0.69	4.7	0.045	0.016	
Ion Percentage	mg/L	14.8	16.0	3.8	14.1	13.9	3.9	7.6	5.1	

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.

Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

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)	MH18 (South Fill Area)	MH18 (South Fill Area)
Date		**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**
Laboratory		**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**	**Maxxam**
Alkalinity (Total as CaCO3)	mg/L	18300	189	160	186	270	850	17000	240	16000
Conductivity	umho/cm	31100	640	501	653	950	2400	30000	660	27000
Dissolved Chloride (Cl)	mg/L	850	22	11	21	34	110	700	18	600
Dissolved Organic Carbon	mg/L	1480.0	70.3	8.9	12.0	12.2	94.0	64.0	8.3	1100.0
Dissolved Sulphate (SO4)	mg/L	*10*	97	78	110	170	230	*10*	72	*10*
Mercury (Hg)	mg/L	<0.03	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.0015	<0.00010	<0.002
Nitrate (N)	mg/L	<1.0	0.6	0.1	0.5	0.74	<0.10	<1.0	1.44	<1.0
Nitrite (N)	mg/L	0.10	0.37	0.03	0.04	0.51	<0.010	<0.10	0.03	<0.10
pH	units	7.80	7.60	8.00	7.99	8.01	8.05	7.81	8.24	7.78
Phenols-4AAP	mg/L	0.60	0.03	<0.001	<0.001	0.0012	0.024	0.35	0.001	0.37
Total Ammonia-N	mg/L	2860.0	13.7	8.0	11.5	29.0	164.0	3540.0	13.5	2550.0
Total Arsenic (As)	mg/L	0.110	0.002	0.001	0.001	0.002	0.006	0.160	<0.001	<0.1
Total Barium (Ba)	mg/L	0.350	0.027	0.037	0.023	0.038	0.066	0.710	0.010	<0.5
Total BOD	mg/L	1800	59	<2	<2	22	120	1500	<2.0	1300
Total Boron (B)	mg/L	260.0	0.9	0.7	1.0	2.1	12.0	560.0	1.1	290.0
Total Cadmium (Cd)	mg/L	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.01
Total Calcium (Ca)	mg/L	19	61	56	65	79	80	58	62	31
Total Chemical Oxygen Demand (COD)	mg/L	4400	34	33	41	33	310	3700	20	3600
Total Chromium (Cr)	mg/L	0.290	<0.005	0.006	<0.005	<0.005	0.014	0.510	<0.005	<0.5
Total Copper (Cu)	mg/L	0.030	0.003	0.004	0.004	<0.002	0.004	<0.1	0.003	<0.2
Total Dissolved Solids	mg/L	20000	412	334	416	494	1150	11600	360	10900
Total Iron (Fe)	mg/L	1.0	1.7	3.3	2.3	1.3	1.9	<1.0	0.1	<10.0
Total Kjeldahl Nitrogen (TKN)	mg/L	3500	14	11	12	33	160	3500	16	2500
Total Lead (Pb)	mg/L	0.0280	0.0013	0.0015	0.0011	0.0007	0.0013	0.0200	<0.0005	<0.05
Total Magnesium (Mg)	mg/L	220	21	19	22	28	40	450	21	220
Total Manganese (Mn)	mg/L	0.030	0.089	0.036	0.030	0.073	0.080	0.050	0.005	<0.2
Total Nickel (Ni)	mg/L	0.300	0.004	0.005	0.005	0.004	0.017	0.460	0.002	0.200
Total Phosphorus	mg/L	4.30	0.12	<0.3	0.17	0.18	<0.6	7.80	0.94	5.40
Total Potassium (K)	mg/L	540.0	7.9	7.0	6.7	14.0	31.0	1100.0	7.0	540.0
Total Sodium (Na)	mg/L	3200	26	19	28	48	200	6300	25	3100
Total Suspended Solids	mg/L	66	22	25	16	18	30	21	3	6
Total Zinc (Zn)	mg/L	0.10	<0.01	0.02	<0.01	<0.01	<0.01	<0.1	<0.01	<1
Un-ionized Ammonia	mg/L	110.00	0.41	0.23	0.09	0.22	3.40	220.00	0.62	77.00
Ion Percentage	mg/L	30.0	3.6	8.6	4.5	1.0	12.6	7.5	1.9	24.1

Notes: 1) Blank denotes parameter not analysed.
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mg/L denotes milligrams per litre.
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Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

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)	MH18 (South Fill Area)	
Date		26-May-17	11-May-18	16-May-19	12-May-20	18-May-21	06-May-22	03-May-23	06-May-24	
Laboratory		Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	
Alkalinity (Total as CaCO3)	mg/L	13000	6800	960	3700	5000	670	1800	2400	
Conductivity	umho/cm	23000	13000	2600	7700	9000	1700	3900	5000	
Dissolved Chloride (Cl)	mg/L	540	450	140	240	250	46	100	130	
Dissolved Organic Carbon	mg/L	810	290	70	170	240	22	93	94	
Dissolved Sulphate (SO4)	mg/L	20	84	230	200	100	180	110	99	
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	<0.00010	<0.0015	<0.0002	<0.0002	<0.0002	
Nitrate (N)	mg/L	<1.0	<2.0	<0.10	<0.50	<0.50	1.00	<0.10	<0.50	
Nitrite (N)	mg/L	<0.10	<0.20	0.031	<0.050	<0.050	0.223	<0.010	<0.050	
pH	units	7.8	7.8	8.0	8.0	8.1	8.2	8.1	8.0	
Phenols-4AAP	mg/L	<0.20	<0.20	<0.020	0.056	0.078	0.0016	0.014	0.015	
Total Ammonia-N	mg/L	1720	935	112	638	826	61.8	295	429	
Total Arsenic (As)	mg/L	0.04	0.02	<0.01	0.02	0.02	0.002	0.006	<0.01	
Total Barium (Ba)	mg/L	0.31	0.21	0.12	0.09	0.06	0.042	0.06	0.10	
Total BOD	mg/L	720	190	6	130	180	6	57	<40	
Total Boron (B)	mg/L	210	97	34	61	75	8.1	31	59	
Total Cadmium (Cd)	mg/L	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0005	<0.001	
Total Calcium (Ca)	mg/L	40	100	110	75	44	110	59	69	
Total Chemical Oxygen Demand (COD)	mg/L	1900	930	130	650	750	57	230	310	
Total Chromium (Cr)	mg/L	0.18	0.09	<0.05	0.06	0.06	0.005	<0.03	<0.05	
Total Copper (Cu)	mg/L	<0.01	<0.02	<0.02	<0.02	<0.02	<0.002	<0.01	<0.02	
Total Dissolved Solids	mg/L	8740	4540	1280	3230	3070	745	1260	2280	
Total Iron (Fe)	mg/L	<0.5	2.0	3.0	1.0	<1	1.4	0.6	<1	
Total Kjeldahl Nitrogen (TKN)	mg/L	2200	870	99	670	830	60	310	380	
Total Lead (Pb)	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.003	<0.005	
Total Magnesium (Mg)	mg/L	170	130	77	94	82	38	41	64	
Total Manganese (Mn)	mg/L	0.03	0.32	0.33	0.25	0.07	0.27	0.03	0.06	
Total Nickel (Ni)	mg/L	0.17	0.10	0.04	0.07	0.08	0.007	0.022	0.04	
Total Phosphorus	mg/L	4.50	2.80	0.31	1.70	1.7	0.2	0.5	1.6	
Total Potassium (K)	mg/L	400	220	80	140	150	20	55	88	
Total Sodium (Na)	mg/L	2400	1200	450	810	900	100	340	570	
Total Suspended Solids	mg/L	18	24	57	12	13	11	170	14	
Total Zinc (Zn)	mg/L	<0.05	<0.1	<0.1	<0.1	<0.1	<0.01	<0.05	<0.1	
Un-ionized Ammonia	mg/L	45	7	3	20	43	1.3	13	9.1	
Ion Percentage	mg/L	26.6	25.6	15.9	16.8	26.7	8.0	20.5	10.8	

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.

Table G-2
Leachate - General 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
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
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L	4100	4520	2930	4330	4100	3400	3000	2300	2300
Conductivity	umho/cm	10400	10800	8730	10800	10000	8900	7100	6400	6000
Dissolved Chloride (Cl)	mg/L	1000	980	850	960	1000	720	580	440	470
Dissolved Organic Carbon	mg/L	793	935	305	467	268	440	180	150	110
Dissolved Sulphate (SO4)	mg/L	292	*100*	410	190	260	150	120	130	280
Mercury (Hg)	mg/L	<0.0002	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001
Nitrate (N)	mg/L	<0.1	<1	<1	<1	<2.0	<1.0	<0.5	2.9	6.7
Nitrite (N)	mg/L	<0.01	<0.1	<0.1	<0.1	<0.20	<0.10	<0.05	1.73	0.44
pH	units	7.70	7.60	7.80	7.71	7.83	7.62	7.77	7.87	7.59
Phenols-4AAP	mg/L	0.360	0.072	0.210	0.200	0.093	0.240	0.038	0.018	<0.020
Total Ammonia-N	mg/L	411	724	385	521	495	512	380	381	264
Total Arsenic (As)	mg/L	0.014	0.014	0.017	0.011	0.010	0.012	0.008	0.008	<0.005
Total Barium (Ba)	mg/L	0.19	0.19	0.23	0.22	0.25	0.26	0.24	0.19	0.17
Total BOD	mg/L	1200	1700	330	480	120	600	130	63	35
Total Boron (B)	mg/L	6.4	7.7	6.6	8.2	15.0	14.0	6.9	5.5	6.2
Total Cadmium (Cd)	mg/L	0.0018	0.0014	0.0004	<0.0005	<0.001	0.0003	0.0001	<0.0005	<0.0005
Total Calcium (Ca)	mg/L	380	370	360	230	200	220	190	140	160
Total Chemical Oxygen Demand (COD)	mg/L	2400	2500	1100	1600	910	1700	570	460	340
Total Chromium (Cr)	mg/L	0.070	0.100	0.059	0.070	0.050	0.057	0.032	0.040	<0.03
Total Copper (Cu)	mg/L	0.080	0.025	0.033	0.010	<0.02	0.008	<0.01	<0.01	<0.01
Total Dissolved Solids	mg/L	6670	6930	5540	6420	4630	4140	3120	2590	2690
Total Iron (Fe)	mg/L	27.0	26.0	33.0	17.0	8.0	19.0	7.4	3.2	3.5
Total Kjeldahl Nitrogen (TKN)	mg/L	530	810	400	550	490	580	410	410	250
Total Lead (Pb)	mg/L	0.0180	0.0083	0.0200	0.0050	0.0050	0.0060	0.0025	0.0040	<0.003
Total Magnesium (Mg)	mg/L	310	350	340	320	400	240	200	150	170
Total Manganese (Mn)	mg/L	3.30	2.50	2.30	1.10	0.74	0.74	0.35	0.32	0.31
Total Nickel (Ni)	mg/L	0.240	0.210	0.180	0.220	0.250	0.120	0.110	0.087	0.064
Total Phosphorus	mg/L	1.0	5.2	2.5	2.3	1.5	2.2	1.2	1.5	<1.5
Total Potassium (K)	mg/L	320	340	250	350	390	260	220	180	150
Total Sodium (Na)	mg/L	960	1000	830	1100	1400	740	700	490	460
Total Suspended Solids	mg/L	86	78	830	21	8	18	86	46	26
Total Zinc (Zn)	mg/L	17.00	2.40	0.37	0.88	0.20	0.27	0.07	0.10	0.07
Un-ionized Ammonia	mg/L	5.5	5.4	6.1	2.9	6.1	6.0	8.9	7.6	1.9
Ion Percentage	mg/L	2.9	1.4	5.2	3.1	6.6	5.7	3.9	7.0	10.0

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.

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Table G-2
Leachate - General 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	
Date		26-May-17	11-May-18	16-May-19	12-May-20	18-May-21	06-May-22	03-May-23	06-May-24	
Laboratory		Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	
Alkalinity (Total as CaCO3)	mg/L	3400	2800	1300	3200	2900	1700	2400	1700	
Conductivity	umho/cm	8000	6800	3600	9100	6300	4200	5600	4100	
Dissolved Chloride (Cl)	mg/L	680	450	250	850	590	300	310	140	
Dissolved Organic Carbon	mg/L	190	140	64	200	110	70	160	110	
Dissolved Sulphate (SO4)	mg/L	53	230	220	93	190	110	280	140	
Mercury (Hg)	mg/L	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.0002	<0.0002	<0.0002	
Nitrate (N)	mg/L	<1.0	<1.0	1.55	2.54	0.13	1.12	<0.10	0.39	
Nitrite (N)	mg/L	0.100	0.240	0.163	0.422	0.095	0.821	<0.010	0.915	
pH	units	7.7	7.6	7.7	7.8	7.6	7.8	7.7	7.7	
Phenols-4AAP	mg/L	<0.080	<0.080	<0.0080	<0.040	<0.020	0.042	0.51	0.41	
Total Ammonia-N	mg/L	396	412	150	495	302	233	410	374	
Total Arsenic (As)	mg/L	0.006	<0.005	0.003	<0.01	0.018	0.005	0.022	0.02	
Total Barium (Ba)	mg/L	0.20	0.17	0.10	0.22	0.22	0.11	0.15	0.10	
Total BOD	mg/L	76	38	38	62	38	28	210	13	
Total Boron (B)	mg/L	7.9	5.0	3.0	12	8.6	3.4	4.3	1.7	
Total Cadmium (Cd)	mg/L	<0.0001	<0.0005	<0.0001	<0.001	<0.0005	<0.0001	<0.0005	<0.0001	
Total Calcium (Ca)	mg/L	110	140	140	150	180	130	170	120	
Total Chemical Oxygen Demand (COD)	mg/L	550	430	180	610	330	200	440	290	
Total Chromium (Cr)	mg/L	0.039	0.030	0.013	0.21	0.05	0.019	<0.03	0.011	
Total Copper (Cu)	mg/L	0.003	<0.01	0.004	<0.02	0.01	0.003	<0.01	0.004	
Total Dissolved Solids	mg/L	3280	2530	1630	3940	2400	1450	1710	1100	
Total Iron (Fe)	mg/L	2.4	2.5	2.5	8.0	11	3.4	6.5	2.9	
Total Kjeldahl Nitrogen (TKN)	mg/L	460	350	140	470	300	240	400	370	
Total Lead (Pb)	mg/L	0.001	<0.003	0.001	0.009	0.005	0.0013	<0.003	0.0015	
Total Magnesium (Mg)	mg/L	180	120	110	200	170	95	110	70	
Total Manganese (Mn)	mg/L	0.20	0.63	0.30	0.42	0.46	0.26	0.53	0.19	
Total Nickel (Ni)	mg/L	0.110	0.078	0.029	0.16	0.089	0.03	0.031	0.018	
Total Phosphorus	mg/L	1.20	0.87	0.50	1.80	1.2	0.63	0.5	0.35	
Total Potassium (K)	mg/L	210	140	75	220	150	68	65	44	
Total Sodium (Na)	mg/L	660	400	270	820	540	270	280	140	
Total Suspended Solids	mg/L	17	20	23	77	180	46	19	65	
Total Zinc (Zn)	mg/L	0.03	<0.05	0.02	<0.1	<0.05	0.03	<0.05	0.17	
Un-ionized Ammonia	mg/L	2.20	1.30	0.55	4	1.9	0.9	2	2.4	
Ion Percentage	mg/L	15.9	24.6	4.6	8.5	14.4	15.6	25.8	28.6	

Notes: 1) Blank denotes parameter not analysed.

2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).

3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.

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Table G-2
Leachate - General 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
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
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as $CaCO_3$)	mg/L		1820		3090		5460		3360	
Conductivity	umho/cm		4390		7220		13000		8020	
Dissolved Chloride (Cl)	mg/L		330		510		1300		750	
Dissolved Organic Carbon	mg/L	308	958	547	2430	3110	3020	1250	762	634
Dissolved Sulphate (SO_4)	mg/L		<20		<50		*25*		*10*	
Mercury (Hg)	mg/L		<0.0001		<0.0001		<0.0001		<0.0001	
Nitrate (N)	mg/L		<0.1		<0.1		<1		<1	
Nitrite (N)	mg/L		0.03		0.02		<0.1		<0.1	
pH	units	7.0	7.5	7.3	7.4	7.6	7.4	7.4	7.3	7.5
Phenols-4AAP	mg/L		0.80		1.00		3.90		1.31	
Total Ammonia-N	mg/L		57		128		489		368	
Total Arsenic (As)	mg/L		0.006		0.012		0.032		0.022	
Total Barium (Ba)	mg/L		0.25		0.60		0.51		0.25	
Total BOD	mg/L	370	920	650	3800	1600	3800	2400	1100	460
Total Boron (B)	mg/L		1.3		1.3		4.8		3.3	
Total Cadmium (Cd)	mg/L		0.0001		0.0002		0.0005		0.0002	
Total Calcium (Ca)	mg/L		530		1000		1000		460	
Total Chemical Oxygen Demand (COD)	mg/L		2600		14000		12000		2400	
Total Chromium (Cr)	mg/L		0.048		0.036		0.190		0.100	
Total Copper (Cu)	mg/L		0.005		0.008		<0.01		0.010	
Total Dissolved Solids	mg/L		2720		4010		7410		4540	
Total Iron (Fe)	mg/L		9.5		12.0		5.7		4.2	
Total Kjeldahl Nitrogen (TKN)	mg/L	26	66	70	140	400	580	330	330	520
Total Lead (Pb)	mg/L		0.0013		0.0020		<0.003		0.0022	
Total Magnesium (Mg)	mg/L		200		250		460		230	
Total Manganese (Mn)	mg/L		3.3		8.1		4.8		1.5	
Total Nickel (Ni)	mg/L		0.029		0.074		0.190		0.110	
Total Phosphorus	mg/L	0.79	2.70	1.10	7.00	6.00	5.50	2.50	2.40	4.60
Total Potassium (K)	mg/L		81		150		500		270	
Total Sodium (Na)	mg/L		270		410		1200		670	
Total Suspended Solids	mg/L		56		76		67		39	
Total Zinc (Zn)	mg/L		0.14		0.16		0.24		0.15	
Un-ionized Ammonia	mg/L		0.07		0.17		5.80		1.50	
Ion Percentage	mg/L		19.0		17.8		10.1		1.8	

Notes: 1) Blank denotes parameter not analysed.
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NTU denotes nephelometric turbidity unit.
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Table G-2
Leachate - General 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
Date		15-May-12	01-Aug-12	05-Nov-12	22-Feb-13	13-May-13	21-Aug-13	13-Nov-13	11-Mar-14	05-May-14
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L	5500		6500		6500		6500		4900
Conductivity	umho/cm	15000		2000		15000		18000		13000
Dissolved Chloride (Cl)	mg/L	1800		1600		1900		2400		1300
Dissolved Organic Carbon	mg/L	468	234	1070	460	450	550	530	2200	3000
Dissolved Sulphate (SO4)	mg/L	<20		88		*10*		*10*		*25*
Mercury (Hg)	mg/L	<0.00010		<0.00010		<0.00010		<0.00010		<0.00010
Nitrate (N)	mg/L	<1.0		<2.0		<1.0		<1.0		<2.0
Nitrite (N)	mg/L	<0.10		<0.20		<0.10		<0.10		<0.20
pH	units	7.7	7.5	7.7	7.5	7.8	7.8	7.9	7.3	7.7
Phenols-4AAP	mg/L	0.55		0.81		0.13		0.19		1.00
Total Ammonia-N	mg/L	663		715		859		924		676
Total Arsenic (As)	mg/L	0.044		0.040		0.040		0.046		0.050
Total Barium (Ba)	mg/L	0.27		0.37		0.22		0.31		0.75
Total BOD	mg/L	350	460	1600	480	240	200	120	5200	5500
Total Boron (B)	mg/L	7.7		6.5		6.5		8.3		9.7
Total Cadmium (Cd)	mg/L	0.0008		0.0002		<0.001		<0.0005		*<0.001*
Total Calcium (Ca)	mg/L	180		300		110		79		1400
Total Chemical Oxygen Demand (COD)	mg/L	1900		4900		1600		1800		12000
Total Chromium (Cr)	mg/L	0.14		0.18		0.15		0.20		0.45
Total Copper (Cu)	mg/L	0.020		0.013		<0.02		<0.01		0.030
Total Dissolved Solids	mg/L	7170		7860		7280		8460		8430
Total Iron (Fe)	mg/L	2.8		5.2		2.2		2.0		120.0
Total Kjeldahl Nitrogen (TKN)	mg/L	700	300	760	730	910	1000	1100	660	770
Total Lead (Pb)	mg/L	0.0030		0.0023		<0.005		<0.003		0.0090
Total Magnesium (Mg)	mg/L	490		420		390		370		530
Total Manganese (Mn)	mg/L	0.19		0.71		0.10		0.10		14.00
Total Nickel (Ni)	mg/L	0.28		0.33		0.32		0.34		0.79
Total Phosphorus	mg/L	4.0	1.8	5.2	3.3	3.3	5.7	4.8	10.0	23.0
Total Potassium (K)	mg/L	590		520		620		670		760
Total Sodium (Na)	mg/L	1600		1700		1600		1800		2000
Total Suspended Solids	mg/L	56		27		22		13		360
Total Zinc (Zn)	mg/L	0.36		0.20		0.20		0.15		3.60
Un-ionized Ammonia	mg/L	6.7		5.1		6.6		25.0		19.0
Ion Percentage	mg/L	1.9		5.1		12.5		14.1		31.1

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Table G-2
Leachate - General 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
Date		28-Jul-14	19-Nov-14	05-Mar-15	27-May-15	30-Jul-15	18-Nov-15	15-Mar-16	30-May-16	25-Jul-16
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Alkalinity (Total as CaCO3)	mg/L		5300		7700		7000		8100	
Conductivity	umho/cm		16000		20000		19000		18000	
Dissolved Chloride (Cl)	mg/L		1900		2300		2200		1900	
Dissolved Organic Carbon	mg/L	3700	1900	1800	4500	4400	1000	2000	2000	830
Dissolved Sulphate (SO4)	mg/L		*20*		*50*		*50*		*10*	
Mercury (Hg)	mg/L		<0.00010		<0.0020		*<0.00010*		<0.0002	
Nitrate (N)	mg/L		<1.0		<5.0		<5.0		<2.0	
Nitrite (N)	mg/L		0.13		<0.50		<0.50		<0.20	
pH	units	7.5	7.7	7.4	7.9	7.6	7.4	7.7	7.7	7.6
Phenols-4AAP	mg/L		1.10		2.40		1.50		1.92	
Total Ammonia-N	mg/L		772		1130		1130		939	
Total Arsenic (As)	mg/L		0.05		0.05		0.06		0.05	
Total Barium (Ba)	mg/L		0.28		0.37		0.31		0.33	
Total BOD	mg/L	7500	3300	3700	7600	8200	6300	3600	3900	960
Total Boron (B)	mg/L		9.6		11.0		11.0		10.0	
Total Cadmium (Cd)	mg/L		*<0.001*		<0.001		<0.0005		<0.001	
Total Calcium (Ca)	mg/L		480		960		800		480	
Total Chemical Oxygen Demand (COD)	mg/L		5800		14000		9400		7000	
Total Chromium (Cr)	mg/L		0.29		0.37		0.35		0.28	
Total Copper (Cu)	mg/L		*<0.02*		0.12		<0.02		0.05	
Total Dissolved Solids	mg/L		8620		13600		12000		10700	
Total Iron (Fe)	mg/L		14		25		28		12	
Total Kjeldahl Nitrogen (TKN)	mg/L	1000	1000	920	1200	1400	1200	840	1000	1000
Total Lead (Pb)	mg/L		*<0.005*		0.006		<0.003		<0.005	
Total Magnesium (Mg)	mg/L		250		380		380		380	
Total Manganese (Mn)	mg/L		3.4		7.8		5.6		3.0	
Total Nickel (Ni)	mg/L		0.34		0.45		0.45		0.38	
Total Phosphorus	mg/L	9.5	7.6	7.5	10.0	11.0	7.4	5.0	5.8	6.5
Total Potassium (K)	mg/L		590		680		700		630	
Total Sodium (Na)	mg/L		1600		1900		1800		1800	
Total Suspended Solids	mg/L		190		110		420		240	
Total Zinc (Zn)	mg/L		0.60		0.80		0.41		0.30	
Un-ionized Ammonia	mg/L		9.5		26.0		13.0		10.0	
Ion Percentage	mg/L		3.7		2.8		2.3		10.0	

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Table G-2
Leachate - General 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
Date		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
Alkalinity (Total as CaCO3)	mg/L	6100		8200		5100		7900		6200
Conductivity	umho/cm	14000		20000		12000		19000		14000
Dissolved Chloride (Cl)	mg/L	1400		2300		1400		2600		1500
Dissolved Organic Carbon	mg/L	1000	480	710	880	530	290	820	1000	650
Dissolved Sulphate (SO4)	mg/L	*25*		50		38		<20		60
Mercury (Hg)	mg/L	<0.0002		<0.0002		<0.0002		<0.0004		<0.0002
Nitrate (N)	mg/L	*<1.0*		<5.0		<0.10		<2.0		<1.0
Nitrite (N)	mg/L	<0.10		<0.50		0.039		<0.20		<0.10
pH	units	7.8	7.7	8.0	7.8	7.8	7.9	7.8	8.0	7.9
Phenols-4AAP	mg/L	0.660		0.233		0.790		0.110		0.430
Total Ammonia-N	mg/L	821		1150		700		1300		970
Total Arsenic (As)	mg/L	0.048		0.080		0.540		0.100		0.062
Total Barium (Ba)	mg/L	0.27		0.44		0.29		0.46		0.23
Total BOD	mg/L	1600	440	350	410	540	170	240	610	620
Total Boron (B)	mg/L	6.7		11.0		14.0		18.0		14.0
Total Cadmium (Cd)	mg/L	<0.005		<0.001		<0.0005		<0.001		<0.0005
Total Calcium (Ca)	mg/L	270		110		140		96		96
Total Chemical Oxygen Demand (COD)	mg/L	3400		2500		1700		2300		1900
Total Chromium (Cr)	mg/L	0.19		0.33		0.20		0.45		0.24
Total Copper (Cu)	mg/L	0.04		0.35		0.06		0.05		0.08
Total Dissolved Solids	mg/L	7030		8580		5330		6850		6300
Total Iron (Fe)	mg/L	7.1		4.0		5.6		4.0		3.0
Total Kjeldahl Nitrogen (TKN)	mg/L	1200	1000	1200	1400	630	970	1300	1400	980
Total Lead (Pb)	mg/L	<0.003		0.009		0.003		<0.005		0.007
Total Magnesium (Mg)	mg/L	300		340		180		290		200
Total Manganese (Mn)	mg/L	1.10		0.18		0.26		0.18		0.24
Total Nickel (Ni)	mg/L	0.27		0.39		0.19		0.37		0.23
Total Phosphorus	mg/L	4.0	5.9	8.1	10.0	4.7	5.1	8.4	7.2	3.7
Total Potassium (K)	mg/L	460		630		340		680		460
Total Sodium (Na)	mg/L	1300		2000		1100		2200		1400
Total Suspended Solids	mg/L	56		70		83		100		47
Total Zinc (Zn)	mg/L	0.21		0.40		0.13		0.20		0.55
Un-ionized Ammonia	mg/L	11.0		21.0		7.7		28.0		19.0
Ion Percentage	mg/L	12.9		18.3		21.9		17.3		20.5

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Table G-2
Leachate - General 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
Date		08-Jan-19	11-Apr-19	23-Jul-19	07-Nov-19	22-Jan-20	12-May-20	11-Aug-20	11-Nov-20	12-Jan-21
Laboratory		Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L		9900		3900		9300		4600	
Conductivity	umho/cm		21000		10000		26000		12000	
Dissolved Chloride (Cl)	mg/L		2600		1200		3400		1300	
Dissolved Organic Carbon	mg/L	670	890	1000	550	1200	1500	1500	540	750
Dissolved Sulphate (SO4)	mg/L		72		220		*25*		*10*	
Mercury (Hg)	mg/L		<0.0002		<0.0002		<0.0002		<0.0002	
Nitrate (N)	mg/L		<5.0		0.061		<1.0		<1.0	
Nitrite (N)	mg/L		<0.50		<0.10		0.12		<0.10	
pH	units	7.9	7.9	8.0	7.5	7.6	7.9	8.0	8.1	7.5
Phenols-4AAP	mg/L		0.240		0.077		1.000		0.11	
Total Ammonia-N	mg/L		1200		620		2000		830	
Total Arsenic (As)	mg/L		0.11		0.07		0.16		0.08	
Total Barium (Ba)	mg/L		0.32		0.28		0.41		0.21	
Total BOD	mg/L	220	330	210	520	1500	1200	1300	230	510
Total Boron (B)	mg/L		12.0		6.8		18.0		7.8	
Total Cadmium (Cd)	mg/L		<0.0005		<0.001		<0.001		<0.001	
Total Calcium (Ca)	mg/L		91		280		150		85	
Total Chemical Oxygen Demand (COD)	mg/L		2800		1200		4600		1400	
Total Chromium (Cr)	mg/L		0.45		0.26		0.76		0.36	
Total Copper (Cu)	mg/L		0.12		0.07		0.08		<0.02	
Total Dissolved Solids	mg/L		8410		5010		11700		4910	
Total Iron (Fe)	mg/L		4.2		5.0		4.0		2	
Total Kjeldahl Nitrogen (TKN)	mg/L	1300	1400	1800	600	1000	2700	2700	940	1400
Total Lead (Pb)	mg/L		0.007		0.006		0.011		<0.005	
Total Magnesium (Mg)	mg/L		230		140		280		130	
Total Manganese (Mn)	mg/L		0.22		1.70		0.55		0.22	
Total Nickel (Ni)	mg/L		0.31		0.23		0.46		0.21	
Total Phosphorus	mg/L	0.1	8.9	11.0	4.0	7.0	12.0	9.5	5.1	6.8
Total Potassium (K)	mg/L		670		380		900		390	
Total Sodium (Na)	mg/L		2000		1100		2700		1200	
Total Suspended Solids	mg/L		120		70		270		29	
Total Zinc (Zn)	mg/L		0.31		0.30		0.20		0.1	
Un-ionized Ammonia	mg/L		24.0		4.2		63.0		40	
Ion Percentage	mg/L		29.4		9.8		18.0		18.0	

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Twin Creeks Environmental Centre

Parameter	Units	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank
Date		19-May-21	11-Aug-21	04-Nov-21	19-Jan-22	24-May-22	25-Jul-22	07-Nov-22	18-Jan-23	05-May-23
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas
Alkalinity (Total as CaCO3)	mg/L	10000		6400		9000		5400		6800
Conductivity	umho/cm	21000		13000		19000		14000		17000
Dissolved Chloride (Cl)	mg/L	2200		970		2000		1400		1700
Dissolved Organic Carbon	mg/L	800	850	760	580	760	170	730	820	1000
Dissolved Sulphate (SO4)	mg/L	*10*		*25*		*25*		25		38
Mercury (Hg)	mg/L	<0.003		<0.0002		<0.0002		<0.0002		<0.003
Nitrate (N)	mg/L	<1.0		<0.50		<1.0		<5.0		<2.0
Nitrite (N)	mg/L	<0.10		<0.050		0.11		<0.50		<0.20
pH	units	7.8	7.8	7.7	7.6	7.9	7.7	7.7	7.6	7.9
Phenols-4AAP	mg/L	0.26		0.87		0.08		0.34		0.366
Total Ammonia-N	mg/L	1800		705		666		983		1280
Total Arsenic (As)	mg/L	0.12		0.077		0.14		0.14		0.21
Total Barium (Ba)	mg/L	0.38		0.36		0.42		0.27		<0.3
Total BOD	mg/L	410	240	790	170	170	46	400	900	360
Total Boron (B)	mg/L	24		8.2		28		9.9		16
Total Cadmium (Cd)	mg/L	<0.0005		<0.0005		<0.001		<0.001		<0.005
Total Calcium (Ca)	mg/L	89		210		82		200		120
Total Chemical Oxygen Demand (COD)	mg/L	2600		2300		250		2700		3100
Total Chromium (Cr)	mg/L	0.53		0.22		0.46		0.39		0.5
Total Copper (Cu)	mg/L	<0.01		0.01		<0.02		0.03		<0.1
Total Dissolved Solids	mg/L	8280		6500		7710		5530		7450
Total Iron (Fe)	mg/L	3.2		1.6		2		10		<5
Total Kjeldahl Nitrogen (TKN)	mg/L	1500	1700	930	1400	2000	460	910	1000	1800
Total Lead (Pb)	mg/L	0.005		0.004		0.005		0.007		<0.03
Total Magnesium (Mg)	mg/L	280		210		250		160		180
Total Manganese (Mn)	mg/L	0.17		0.48		0.16		1.2		0.3
Total Nickel (Ni)	mg/L	0.35		0.2		0.3		0.29		0.27
Total Phosphorus	mg/L	9.5	10	4.6	6.4	9.7	2.1	7.5	6.6	11
Total Potassium (K)	mg/L	660		400		600		450		560
Total Sodium (Na)	mg/L	2000		1100		1800		1400		1700
Total Suspended Solids	mg/L	45		44		37		110		190
Total Zinc (Zn)	mg/L	0.23		0.34		0.20		0.2		<0.5
Un-ionized Ammonia	mg/L	32		5.6		31		18		77
Ion Percentage	mg/L	25.9		20.7		26.1		14.1		18.4

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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.

Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank	Equalization Tank			
Date		12-Jul-23	11-Oct-23	24-Jan-24	02-May-24	23-Jul-24	09-Oct-24			
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas			
Alkalinity (Total as CaCO3)	mg/L		8800		9000		7300			
Conductivity	umho/cm		21000		21000	17150	20000			
Dissolved Chloride (Cl)	mg/L		1800		2300		2000			
Dissolved Organic Carbon	mg/L	1100	970	1000	1100	950	960			
Dissolved Sulphate (SO4)	mg/L		32		22		54			
Mercury (Hg)	mg/L		<0.0002		<0.003		<0.003			
Nitrate (N)	mg/L		<0.20		<2.0		<2.0			
Nitrite (N)	mg/L		<2.0		<0.20		<0.20			
pH	pH	7.7	7.8	7.7	7.73	7.7	7.9			
Phenols-4AAP	mg/L		0.364		0.292		0.133			
Total Ammonia-N	mg/L		1750		1910		1440			
Total Arsenic (As)	mg/L		0.19		0.22		0.15			
Total Barium (Ba)	mg/L		0.32		0.32		0.29			
Total BOD	mg/L	430	280	250	390	270	<400			
Total Boron (B)	mg/L		41		41		15			
Total Cadmium (Cd)	mg/L		<0.001		<0.001		<0.001			
Total Calcium (Ca)	mg/L		90		66		83			
Total Chemical Oxygen Demand (COD)	mg/L		2700		3700		2900			
Total Chromium (Cr)	mg/L		0.43		0.63		0.45			
Total Copper (Cu)	mg/L		<0.02		<0.02		<0.02			
Total Dissolved Solids	mg/L		8140		9420		8250			
Total Iron (Fe)	mg/L		<1		3		2			
Total Kjeldahl Nitrogen (TKN)	mg/L	1700	2100	1800	2200	2000	2700			
Total Lead (Pb)	mg/L		<0.005		0.006		<0.005			
Total Magnesium (Mg)	mg/L		210		200		230			
Total Manganese (Mn)	mg/L		0.19		0.15		0.19			
Total Nickel (Ni)	mg/L		0.26		0.32		0.24			
Total Phosphorus	mg/L	15	9.9	11	12	11	8.5			
Total Potassium (K)	mg/L		600		710		730			
Total Sodium (Na)	mg/L		1900		2200		2000			
Total Suspended Solids	mg/L		49		29		38			
Total Un-ionized Ammonia	mg/L		88		46		61			
Total Zinc (Zn)	mg/L		<0.1		0.2		0.2			
Ion Percentage	mg/L		23.4		22.3		15.2			

Notes: 1) Blank denotes parameter not analysed.
2) < denotes parameter concentration is below the laboratory reportable detection limit (RDL).
3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.
4) Accutest denotes Accutest Laboratories.
5) Maxxam denotes Maxxam Analytics Inc.
6) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.

Table G-2
Leachate - General 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
Alkalinity (Total as CaCO3)	mg/L	1600	4300	11000	6600	8600	8400	8300	7800	8100
Conductivity	umho/cm	4800	11000	23000	19000	25000	25000	24000	23000	22000
Dissolved Chloride (Cl)	mg/L	440	1100	2800	2700	3000	3300	3500	3300	3000
Dissolved Organic Carbon	mg/L	590	110	730	630	930	1000	950	890	850
Dissolved Sulphate (SO4)	mg/L	*10*	160	10	100	310	150	50	50	150
Mercury (Hg)	mg/L	<0.00010	<0.00010	<0.002	<0.0001	<0.0001	<0.002	<0.00010	<0.0015	<0.003
Nitrate (N)	mg/L	<0.50	<1.0	<2.0	<5.0	<5.0	<2.0	<1.0	<2.0	11.7
Nitrite (N)	mg/L	<0.050	0.16	<0.20	<0.50	<0.50	<0.20	0.18	<0.20	0.35
pH	pH	7.5	8.0	7.7	7.9	7.8	8.1	7.9	7.6	8.0
Phenols-4AAP	mg/L	0.480	0.390	0.570	<0.40	<0.20	<0.040	<0.040	0.046	0.064
Total Ammonia-N	mg/L	559	379	1590	1240	1610	1520	1650	1780	1560
Total Arsenic (As)	mg/L	0.04	1.30	0.94	0.39	0.49	0.32	1.6	0.64	3.1
Total Barium (Ba)	mg/L	0.6	9.7	2.3	0.9	1.2	0.9	3.6	1.5	13
Total BOD	mg/L	1800	840	760	260	560	390	1100	940	3800
Total Boron (B)	mg/L	8	6	16	12	14	18	15	13	14
Total Cadmium (Cd)	mg/L	<0.001	0.028	0.007	0.002	0.002	0.002	0.010	0.003	0.031
Total Calcium (Ca)	mg/L	1100	17000	480	170	230	190	960	380	4900
Total Chemical Oxygen Demand (COD)	mg/L	7700	1700	7300	9800	6100	5000	9400	4100	4200
Total Chromium (Cr)	mg/L	0.37	4.60	1.20	0.60	0.91	0.87	1.80	2.5	27
Total Copper (Cu)	mg/L	0.03	3.80	0.33	0.10	0.18	0.08	0.64	0.23	2.7
Total Dissolved Solids	mg/L	4080		9390	8600	9030	11800	11900	8920	8150
Total Iron (Fe)	mg/L	100	4200	1200	310	330	130	1000	250	3400
Total Kjeldahl Nitrogen (TKN)	mg/L	650	440	1700	1400	1600	1400	2100	2200	2500
Total Lead (Pb)	mg/L	0.007	2.000	0.180	0.044	0.072	0.035	0.280	0.091	0.91
Total Magnesium (Mg)	mg/L	430	4200	330	230	220	270	520	300	1700
Total Manganese (Mn)	mg/L	12.00	92.00	3.00	0.90	1.20	0.85	5.60	2.8	32
Total Nickel (Ni)	mg/L	0.63	7.40	2.10	0.78	0.85	0.57	1.50	1.2	8.9
Total Phosphorus	mg/L	11	53	26	29	51	130	150	65	40
Total Potassium (K)	mg/L	640	600	850	600	710	980	920	760	800
Total Sodium (Na)	mg/L	1700	890	2400	1800	2200	2900	2700	2400	2100
Total Suspended Solids	mg/L	42	190000	1300	8800	6200	6000	1500	18000	46000
Total Zinc (Zn)	mg/L	2.9	9.6	7.2	1.6	2.6	1.1	7.6	2	20
Un-ionized Ammonia	mg/L	17	66	39	46	26	130	54	25	48
Ion Percentage	mg/L	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.

Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS1	PS1							
Date		02-May-23	02-May-24							
Laboratory		Bureau Veritas	Bureau Veritas							
Alkalinity (Total as CaCO3)	mg/L	6400	8700							
Conductivity	umho/cm	18000	25000							
Dissolved Chloride (Cl)	mg/L	2400	2800							
Dissolved Organic Carbon	mg/L	610	1100							
Dissolved Sulphate (SO4)	mg/L	240	210							
Mercury (Hg)	mg/L	<0.003	0.005							
Nitrate (N)	mg/L	<2.0	<5.0							
Nitrite (N)	mg/L	<0.20	1.80							
pH	pH	8.1	8.0							
Phenols-4AAP	mg/L	0.11	0.15							
Total Ammonia-N	mg/L	1550	2640							
Total Arsenic (As)	mg/L	1.2	1.9							
Total Barium (Ba)	mg/L	6	8.3							
Total BOD	mg/L	360	3100							
Total Boron (B)	mg/L	15	17							
Total Cadmium (Cd)	mg/L	0.01	0.020							
Total Calcium (Ca)	mg/L	2000	3700							
Total Chemical Oxygen Demand (COD)	mg/L	610	5600							
Total Chromium (Cr)	mg/L	17	12							
Total Copper (Cu)	mg/L	1	1.7							
Total Dissolved Solids	mg/L	7420	11100							
Total Iron (Fe)	mg/L	1400	2600							
Total Kjeldahl Nitrogen (TKN)	mg/L	1600	3200							
Total Lead (Pb)	mg/L	0.52	0.71							
Total Magnesium (Mg)	mg/L	720	1000							
Total Manganese (Mn)	mg/L	14	25							
Total Nickel (Ni)	mg/L	5.8	8.3							
Total Phosphorus	mg/L	19	31							
Total Potassium (K)	mg/L	710	790							
Total Sodium (Na)	mg/L	2200	2100							
Total Suspended Solids	mg/L	46000	22000							
Total Zinc (Zn)	mg/L	9.2	17							
Un-ionized Ammonia	mg/L	70	46							
Ion Percentage	mg/L	21.8	26.0							

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.

Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

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
Alkalinity (Total as CaCO3)	mg/L	4400	8000	12000	11000	9800	16000	14000	14000	13000
Conductivity	umho/cm	12000	24000	23000	22000	21000	31000	31000	20000	29000
Dissolved Chloride (Cl)	mg/L	840	3000	2000	2100	2000	2900	3200	3600	3400
Dissolved Organic Carbon	mg/L	840	760	4400	490	420	810	1100	1200	1300
Dissolved Sulphate (SO4)	mg/L	380	1000	10	100	140	0.1	50	170	320
Mercury (Hg)	mg/L	0.0048	<0.0020	<0.002	<0.0001	<0.0001	<0.002	<0.00010	<0.0015	<0.003
Nitrate (N)	mg/L	<0.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0
Nitrite (N)	mg/L	<0.05	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1.12	51.4
pH	pH	6.1	7.5	7.2	7.8	7.9	7.7	7.9	8.1	8.2
Phenols-4AAP	mg/L	1.90	0.09	3.30	1.39	<0.20	<0.20	0.09	0.07	0.097
Total Ammonia-N	mg/L	449	1460	1320	1400	1410	2210	2690	2790	2480
Total Arsenic (As)	mg/L	1.90	0.24	0.70	0.07	0.05	0.15	0.18	0.19	0.17
Total Barium (Ba)	mg/L	17.00	1.30	5.40	0.14	0.14	0.32	0.2	0.14	0.1
Total BOD	mg/L	7700	240	13000	260	160	540	340	230	200
Total Boron (B)	mg/L	8	14	8	11	9.2	16	16	23	20
Total Cadmium (Cd)	mg/L	0.030	0.003	0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Calcium (Ca)	mg/L	24000	1000	6600	210	210	350	130	120	94
Total Chemical Oxygen Demand (COD)	mg/L	22000	2700	23000	2100	1500	3300	3400	4400	4300
Total Chromium (Cr)	mg/L	6.80	0.86	2.70	0.32	0.26	0.72	0.70	1.0	0.87
Total Copper (Cu)	mg/L	5.50	0.34	1.80	0.06	0.05	0.10	0.04	0.03	0.04
Total Dissolved Solids	mg/L	8680	11200	16900	9600	7590	12500	12600	13600	11900
Total Iron (Fe)	mg/L	6800	420	2400	190	92	170	94	64	66
Total Kjeldahl Nitrogen (TKN)	mg/L	1100	1700	1400	1400	1300	2100	3400	2900	3100
Total Lead (Pb)	mg/L	3.000	0.170	0.850	0.026	0.022	0.045	0.023	0.013	0.014
Total Magnesium (Mg)	mg/L	5600	520	1700	690	520	470	390	330	290
Total Manganese (Mn)	mg/L	140.0	6.1	42.0	1.5	1.3	1.9	0.6	0.58	0.39
Total Nickel (Ni)	mg/L	10.00	1.30	5.60	1.00	0.90	0.92	0.81	0.88	0.85
Total Phosphorus	mg/L	130.0	12.0	110.0	5.8	4.8	15.0	12.0	9.7	6.8
Total Potassium (K)	mg/L	780	900	680	850	690	1100	1200	1200	1100
Total Sodium (Na)	mg/L	1000	2500	1400	2300	1900	2900	2900	3500	3000
Total Suspended Solids	mg/L	210000	1000	43000	1500	2400	5200	1200	2400	870
Total Zinc (Zn)	mg/L	18.0	7.5	2.9	4.6	2.8	5.4	4.7	2.4	3.1
Un-ionized Ammonia	mg/L	78	14	80	13	18	64	87	210	370
Ion Percentage	mg/L	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.

Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS3	PS3							
Date		02-May-23	02-May-24							
Laboratory		Bureau Veritas	Bureau Veritas							
Alkalinity (Total as CaCO3)	mg/L	9200	9200							
Conductivity	umho/cm	22000	24000							
Dissolved Chloride (Cl)	mg/L	3000	2700							
Dissolved Organic Carbon	mg/L	1100	910							
Dissolved Sulphate (SO4)	mg/L	320	160							
Mercury (Hg)	mg/L	<0.003	<0.003							
Nitrate (N)	mg/L	<5.0	<2.0							
Nitrite (N)	mg/L	<0.50	0.58							
pH	pH	8.2	8.3							
Phenols-4AAP	mg/L	<0.10	0.032							
Total Ammonia-N	mg/L	2330	2730							
Total Arsenic (As)	mg/L	0.21	0.24							
Total Barium (Ba)	mg/L	<0.3	0.14							
Total BOD	mg/L	32	66							
Total Boron (B)	mg/L	18	20							
Total Cadmium (Cd)	mg/L	<0.005	<0.001							
Total Calcium (Ca)	mg/L	110	120							
Total Chemical Oxygen Demand (COD)	mg/L	1100	4000							
Total Chromium (Cr)	mg/L	0.8	0.88							
Total Copper (Cu)	mg/L	<0.1	0.04							
Total Dissolved Solids	mg/L	10100	11500							
Total Iron (Fe)	mg/L	92	48							
Total Kjeldahl Nitrogen (TKN)	mg/L	2500	3000							
Total Lead (Pb)	mg/L	<0.03	0.009							
Total Magnesium (Mg)	mg/L	250	260							
Total Manganese (Mn)	mg/L	0.5	0.53							
Total Nickel (Ni)	mg/L	0.57	0.65							
Total Phosphorus	mg/L	9.6	12							
Total Potassium (K)	mg/L	870	990							
Total Sodium (Na)	mg/L	2600	2700							
Total Suspended Solids	mg/L	960	390							
Total Zinc (Zn)	mg/L	3.7	2.8							
Un-ionized Ammonia	mg/L	320	150							
Ion Percentage	mg/L	19.5	14.4							

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.

Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS5	PS5	PS5	PS5	PS5				
Date		12-May-20	19-May-21	10-May-22	02-May-23	02-May-24				
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas				
Alkalinity (Total as CaCO3)	mg/L	6400	7700	6900	6900	6000				
Conductivity	umho/cm	15000	16220	15000	15000	15000				
Dissolved Chloride (Cl)	mg/L	860	1400	1300	1600	1500				
Dissolved Organic Carbon	mg/L	4100	280	400	360	470				
Dissolved Sulphate (SO4)	mg/L	89	10	55	78	130				
Mercury (Hg)	mg/L	<0.00010	<0.00010	<0.003	<0.003	<0.003				
Nitrate (N)	mg/L	<0.50	<1.0	<1.0	<1.0	<2.0				
Nitrite (N)	mg/L	<0.050	<0.10	<0.10	<0.10	<0.20				
pH	pH	7.4	7.6	8.0	8.0	8.2				
Phenols-4AAP	mg/L	4.33	0.04	0.03	0.023	0.13				
Total Ammonia-N	mg/L	1060	1080	1040	1070	1840				
Total Arsenic (As)	mg/L	0.04	0.06	0.07	0.07	0.26				
Total Barium (Ba)	mg/L	0.49	0.31	0.33	0.13	0.37				
Total BOD	mg/L	>8500	230	63	47	230				
Total Boron (B)	mg/L	5.8	7.5	9.0	12	19				
Total Cadmium (Cd)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001				
Total Calcium (Ca)	mg/L	730	130	98	77	130				
Total Chemical Oxygen Demand (COD)	mg/L	12000	1600	1400	360	3700				
Total Chromium (Cr)	mg/L	0.09	0.11	0.12	0.15	0.64				
Total Copper (Cu)	mg/L	<0.02	<0.02	<0.02	0.02	0.06				
Total Dissolved Solids	mg/L	9980	5510	5210	6460	9210				
Total Iron (Fe)	mg/L	30	24	25	4	41				
Total Kjeldahl Nitrogen (TKN)	mg/L	1300	1000	1600	1200	2500				
Total Lead (Pb)	mg/L	0.007	0.007	0.01	<0.005	0.024				
Total Magnesium (Mg)	mg/L	390	380	400	380	290				
Total Manganese (Mn)	mg/L	3.4	0.33	0.27	0.06	0.69				
Total Nickel (Ni)	mg/L	0.22	0.32	0.38	0.3	0.42				
Total Phosphorus	mg/L	6.3	5.9	5.4	2.7	10				
Total Potassium (K)	mg/L	420	510	590	480	750				
Total Sodium (Na)	mg/L	960	1400	1500	1500	2300				
Total Suspended Solids	mg/L	740	280	190	90	880				
Total Zinc (Zn)	mg/L	0.2	0.7	0.6	0.4	0.7				
Un-ionized Ammonia	mg/L	4.3	13	13	54	35				
Ion Percentage	mg/L	3.1	18.8	11.5	16.7	2.7				

Notes: 1) Blank denotes parameter not analysed.

2) < denotes parameter concentration is below the laboratory method reporting limit (MRL).

3) µmho/cm denotes micro-ohms per centimetre.
NTU denotes nephelometric turbidity unit.
mg/L denotes milligrams per litre.

4) Maxxam denotes Maxxam Analytics Inc.

5) *Italics* denotes parameter concentration is presented as half the laboratory RDL for Ion Percentage calculation.

Table G-2
Leachate - General Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS7	PS7							
Date		02-May-23	02-May-24							
Laboratory		Bureau Veritas	Bureau Veritas							
Alkalinity (Total as CaCO3)	mg/L	3800	3300							
Conductivity	umho/cm	9300	7700							
Dissolved Chloride (Cl)	mg/L	780	640							
Dissolved Organic Carbon	mg/L	1400	150							
Dissolved Sulphate (SO4)	mg/L	23	120							
Mercury (Hg)	mg/L	<0.0002	<0.003							
Nitrate (N)	mg/L	<1.0	<0.50							
Nitrite (N)	mg/L	<0.10	0.063							
pH	pH	7.5	7.9							
Phenols-4AAP	mg/L	3	0.063							
Total Ammonia-N	mg/L	698	849							
Total Arsenic (As)	mg/L	0.07	0.041							
Total Barium (Ba)	mg/L	0.4	0.25							
Total BOD	mg/L	>60	150							
Total Boron (B)	mg/L	4.4	3.5							
Total Cadmium (Cd)	mg/L	<0.001	<0.0001							
Total Calcium (Ca)	mg/L	340	230							
Total Chemical Oxygen Demand (COD)	mg/L	1400	1400							
Total Chromium (Cr)	mg/L	0.06	0.049							
Total Copper (Cu)	mg/L	<0.02	0.002							
Total Dissolved Solids	mg/L	5170	5670							
Total Iron (Fe)	mg/L	5	1.9							
Total Kjeldahl Nitrogen (TKN)	mg/L	650	920							
Total Lead (Pb)	mg/L	<0.005	0.0007							
Total Magnesium (Mg)	mg/L	240	200							
Total Manganese (Mn)	mg/L	0.45	0.41							
Total Nickel (Ni)	mg/L	0.08	0.065							
Total Phosphorus	mg/L	3.2	5.6							
Total Potassium (K)	mg/L	280	230							
Total Sodium (Na)	mg/L	750	600							
Total Suspended Solids	mg/L	140	250							
Total Zinc (Zn)	mg/L	0.7	0.08							
Un-ionized Ammonia	mg/L	4.1	5.5							
Ion Percentage	mg/L	4.3	10.2							

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.

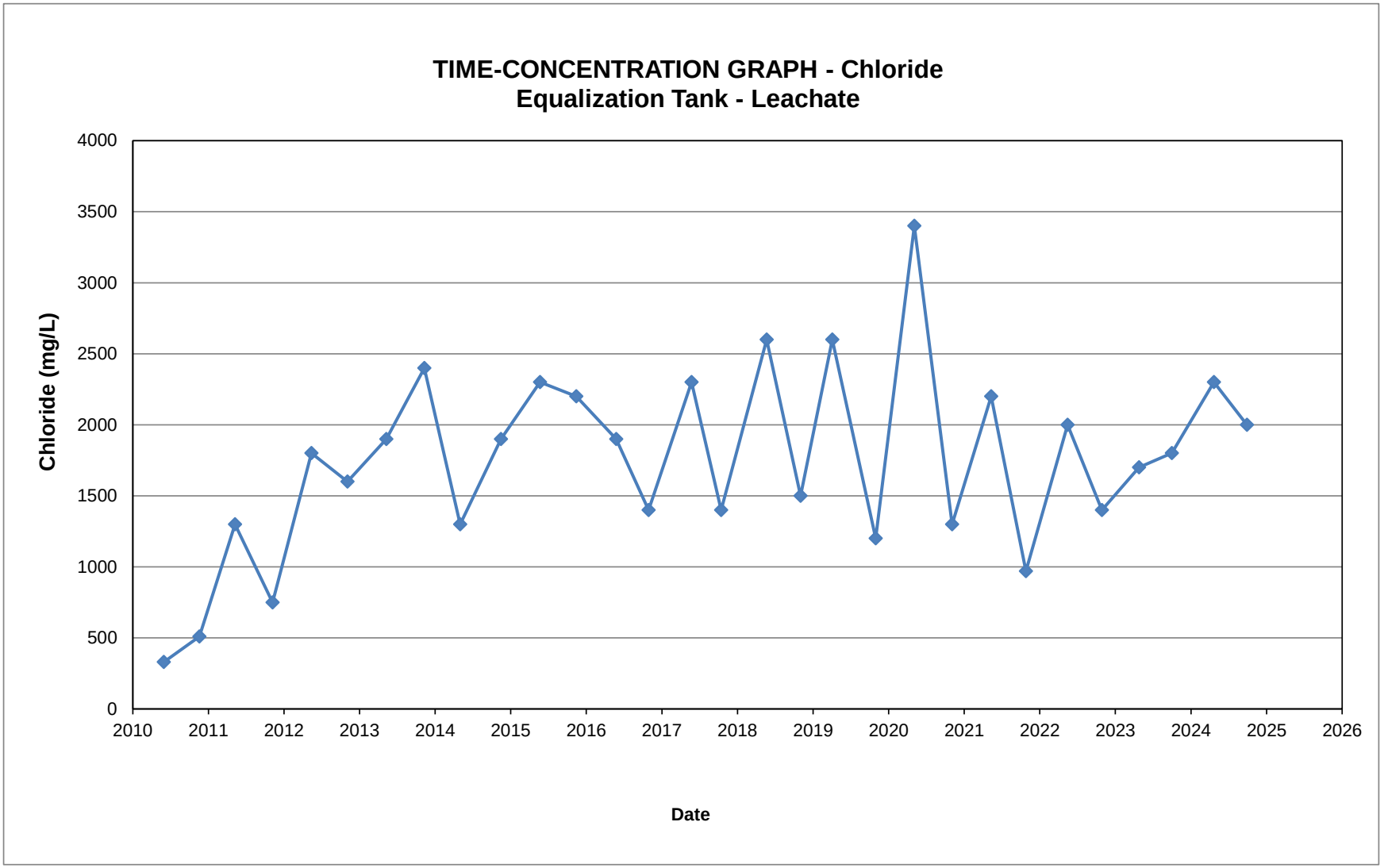
TIME-CONCENTRATION GRAPH - Chloride
Equalization Tank - Leachate
Chloride (mg/L)
4000
3500
3000
2500
2000
1500
1000
500
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Date

FIGURE G-1

APPENDIX G:

Table G3 - Organic Analytical Results

Table G-3
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)	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	03-May-23	06-May-24			
Laboratory		MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas			
Benzo(a)pyrene	µg/L	<0.80	<1.6	<0.80	<0.20	<20	<0.80	<0.80	<0.20	<1.0			
1,2-Dichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0	<0.50	<2.5			
1,3-Dichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0	<0.50	<2.5			
1,4-Dichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	2.2	<2.0	<0.50	<2.5			
Hexachlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0	<0.50	<2.5			
1,2,4-Trichlorobenzene	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0	<0.50	<2.5			
2,4-Dichlorophenol	µg/L	<1.2	<2.4	<1.2	<0.30	<30	<1.2	<1.2	<0.30	<1.5			
Pentachlorophenol	µg/L	<10	<8.0	<28	<6.0	<100	<4.0	<4.0	<1.0	<5.0			
Phenol	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0	<0.50	<2.5			
2,4,6-Trichlorophenol	µg/L	<2.0	<4.0	<2.0	<0.50	<50	<2.0	<2.0	<0.50	<2.5			
Di-N-butyl phthalate	µg/L	<8.0	<16	<8.0	<2.0	<200	<8.0	<8.0	<2.0	<10			
Diethyl phthalate	µg/L	5.0	<8.0	<4.0	<1.0	<100	<4.0	<4.0	<1.0	<5.0			
Dimethyl phthalate	µg/L	<4.0	<8.0	<4.0	<1.0	<100	<4.0	<4.0	<1.0	<5.0			
Benzene	µg/L	21.0	<2.5	<10	<0.20	110	64	3.2	<2.0	<0.20			
1,4-Dichlorobenzene	µg/L	<20	<5.0	<2.0	<0.50	7.8	<20	<2.0	<4.0	<0.40			
Ethylbenzene	µg/L	<10	<2.5	<10	0.34	190	110	3.8	<2.0	0.26			
Methylene Chloride(Dichloromethane)	µg/L	<50	<13	<100	<2.0	<20	<100	<10	<20	<2.0			
Toluene	µg/L	21.0	<5.0	<10	<0.20	220	<10	<1.0	<2.0	<0.20			
Vinyl Chloride	µg/L	<20	<5.0	<10	<0.20	<2.0	<10	<1.0	<2.0	<0.20			
p+m-Xylene	µg/L	740.00	82.00	18.00	0.81	1500	120	15	<2.0	0.72			
o-Xylene	µg/L	93	<2.5	<10	<0.20	620	23	4.9	<2.0	0.39			
Xylene (Total)	µg/L	830.00	82.00	18.00	0.81	2100	140	20	<2.0	1.1			

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 G-3
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)	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	03-May-23	06-May-24			
Laboratory		MAXXAM	MAXXAM	MAXXAM	MAXXAM	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas			
Benzo(a)pyrene	µg/L	<0.80	<1.6	<2.0	<0.20	<20	<0.80	<0.80	<0.20	<4.0			
1,2-Dichlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0	<0.50	<10			
1,3-Dichlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0	<0.50	<10			
1,4-Dichlorobenzene	µg/L	2.1	<4.0	<5.0	<0.50	<50	<2.0	<2.0	<0.50	<10			
Hexachlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0	<0.50	<10			
1,2,4-Trichlorobenzene	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0	<0.50	<10			
2,4-Dichlorophenol	µg/L	<1.2	<2.4	<3.0	<0.30	<30	<1.2	<1.2	<0.30	<6.0			
Pentachlorophenol	µg/L	<10	<8.0	<70	<6.0	<100	<4.0	<4.0	<1.0	<20			
Phenol	µg/L	17.0	16.0	8.8	<0.50	<50	11	<2.0	1.3	<10			
2,4,6-Trichlorophenol	µg/L	<2.0	<4.0	<5.0	<0.50	<50	<2.0	<2.0	<0.50	<10			
Di-N-butyl phthalate	µg/L	<8.0	<16	<20	<2.0	<200	<8.0	<8.0	<2.0	<40			
Diethyl phthalate	µg/L	11.0	21.0	11.0	<1.0	<100	6.6	<4.0	2.1	<20			
Dimethyl phthalate	µg/L	<4.0	<8.0	<10	<1.0	<100	<4.0	<4.0	<1.0	<20			
Benzene	µg/L	10.0	10.0	<10	0.2	3.4	<10	<1.0	<2.0	<1.0			
1,4-Dichlorobenzene	µg/L	<10	<25	<5.0	<0.50	<4.0	<20	<2.0	<4.0	<2.0			
Ethylbenzene	µg/L	49.0	58.0	25.0	0.6	17	14	<1.0	4.0	6.7			
Methylene Chloride(Dichloromethane)	µg/L	<25	<100	<100	<2.0	<20	<100	<10	<20	<10			
Toluene	µg/L	520.0	500.0	230.0	<0.20	150	140	<1.0	30	1.8			
Vinyl Chloride	µg/L	17.0	19.0	<16	0.4	3.1	<10	<1.0	<2.0	1.9			
p+m-Xylene	µg/L	160.0	170.0	73.0	<0.20	53	40	<1.0	11	25			
o-Xylene	µg/L	60.0	70.0	30.0	0.7	20	15	<1.0	4.2	8.4			
Xylene (Total)	µg/L	220.0	240.0	100.0	0.7	73	55	<1.0	15	33			

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 G-3
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	03-May-23	06-May-24							
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas							
Benzo(a)pyrene	µg/L	<20	<0.80	<0.80	<0.20	<4.0							
1,2-Dichlorobenzene	µg/L	<50	<2.0	<2.0	<0.50	<10							
1,3-Dichlorobenzene	µg/L	<50	<2.0	<2.0	<0.50	<10							
1,4-Dichlorobenzene	µg/L	<50	<2.0	<2.0	1.2	<10							
Hexachlorobenzene	µg/L	<50	<2.0	<2.0	<0.50	<10							
1,2,4-Trichlorobenzene	µg/L	<50	<2.0	<2.0	<0.50	<10							
2,4-Dichlorophenol	µg/L	<30	<1.2	<1.2	<0.30	<6.0							
Pentachlorophenol	µg/L	<100	<4.0	<4.0	<1.0	<20							
Phenol	µg/L	<50	<2.0	5.7	130	87							
2,4,6-Trichlorophenol	µg/L	<50	<2.0	<2.0	<0.50	<10							
Di-N-butyl phthalate	µg/L	<200	<8.0	<8.0	3.0	<40							
Diethyl phthalate	µg/L	<100	<4.0	<4.0	1.3	<20							
Dimethyl phthalate	µg/L	<100	<4.0	<4.0	<1.0	<20							
Benzene	µg/L	<2.0	<10	3.4	3.1	1.9							
1,4-Dichlorobenzene	µg/L	<4.0	<20	<2.0	<4.0	1.3							
Ethylbenzene	µg/L	<2.0	<10	7.6	7.1	2.0							
Methylene Chloride(Dichloromethane)	µg/L	<20	<100	<10	<20	<2.0							
Toluene	µg/L	<2.0	<10	6.9	9.9	3.5							
Vinyl Chloride	µg/L	<2.0	<10	<1.0	<2.0	<0.20							
p+m-Xylene	µg/L	14	<10	21	13	8.2							
o-Xylene	µg/L	8.8	<10	9.6	6.0	3.5							
Xylene (Total)	µg/L	23	<10	30	18	12							

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table G-3
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 G-3
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 G-3
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		19-Jan-22	24-May-22	25-Jul-22	07-Nov-22	18-Jan-23	05-May-23	12-Jul-23	11-Oct-23	24-Jan-24	02-May-24	23-Jul-24	09-Oct-24
Laboratory		Bureau Veritas	Bureau Veritas	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		<2.0		<8.0		<4.0		<10		<20		<10
1,2-Dichlorobenzene	µg/L		<5.0		<20		<10		<25		<50		<25
1,3-Dichlorobenzene	µg/L		<5.0		<20		<10		<25		<50		<25
1,4-Dichlorobenzene	µg/L		<5.0		<20		<10		<25		<50		<25
Hexachlorobenzene	µg/L		<5.0		<20		<10		<25		<50		<25
1,2,4-Trichlorobenzene	µg/L		<5.0		<20		<10		<25		<50		<25
2,4-Dichlorophenol	µg/L		<3.0		<12		<6.0		<15		<30		<15
Pentachlorophenol	µg/L		<10		<40		<20		<100		<100		<50
Phenol	µg/L		<5.0		<20		<10		<25		<50		<25
2,4,6-Trichlorophenol	µg/L		<5.0		<20		<10		<25		<50		<25
Di-N-butyl phthalate	µg/L		<20		<80		<40		<100		<200		<100
Diethyl phthalate	µg/L		<10		<40		<20		<50		<100		<50
Dimethyl phthalate	µg/L		<10		<40		<20		<50		<100		<50
Benzene	µg/L	<10	5.2	2.6	<10	4.7	<10	<10	<10	<10	5.2	5.5	<10
Ethylbenzene	µg/L	16	17	<1.0	11	15	<10	30	21	20	24	25	<10
o-Xylene	µg/L	13	18	1.1	12	16	<10	28	21	18	24	24	<10
p+m-Xylene	µg/L	27	40	2.5	27	38	21	64	47	40	52	48	17
Toluene	µg/L	71	49	4.2	55	92	41	380	140	130	110	78	22
Dichloromethane	µg/L		<2.0		<100		<100		<100		<20		<100
Vinyl Chloride	µg/L		1.7		<10		<10		<10		2.0		<10

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table G-3
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS1	PS1	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	02-May-23	02-May-24	
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	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	<4.0	<4.0	
1,2-Dichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0	<10	<10	
1,3-Dichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0	<10	<10	
1,4-Dichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0	<10	<10	
Hexachlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0	<10	<10	
1,2,4-Trichlorobenzene	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0	<10	<10	
2,4-Dichlorophenol	µg/L	<10	<6.0	<6.0	<3.0	<6.0	<6.0	<50	<1.2	<3.0	<6.0	<6.0	
Pentachlorophenol	µg/L	<100	<50	<50	<10	<14	<120	<30	<4.0	<10	<20	<20	
Phenol	µg/L	170	<10	<10	<5.0	16.0	<10	<100	7.2	<5.0	<10	<10	
2,4,6-Trichlorophenol	µg/L	<20	<10	<10	<5.0	<10	<10	<50	<2.0	<5.0	<10	<10	
Di-N-butyl phthalate	µg/L	<80	<40	<40	<20	<40	<40	<50	<8.0	<20	<40	<40	
Diethyl phthalate	µg/L	<40	<20	<20	<10	<20	<20	<200	<4.0	<10	<20	<20	
Dimethyl phthalate	µg/L	<40	<20	<20	<10	<20	<20	<100	<4.0	<10	<20	<20	
Benzene	µg/L	<2.0	<0.50	2.8	<10	<10	<2.0	<2.0	<10	2.5	<10	2.0	
Ethylbenzene	µg/L	4.9	<0.50	5.5	<10	11.0	2.8	2.4	<10	3.2	<10	4.4	
o-Xylene	µg/L	<2.0	<0.50	6.3	<10	12.0	2.6	2.5	<10	2.8	<10	4.5	
p+m-Xylene	µg/L	2.8	<0.50	15	<10	25.0	9.0	6.3	<10	5.2	12	8.8	
Toluene	µg/L	20.0	5.0	37.0	12.0	44.0	7.7	6.3	16	11	19	24	
Dichloromethane	µg/L	40.0	<2.5	<13	<100	<100	<20	<20	<100	<20	<100	<20	
Vinyl Chloride	µg/L	<4.0	<1.0	<5.0	<10	<10	<2.0	<2.0	<10	<2.0	12	<2.0	

Parameter	Units	PS3	PS3	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	02-May-23	02-May-24	
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Bureau Veritas	Bureau Veritas	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	<4.0	<4.0	
1,2-Dichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0	<10	<10	
1,3-Dichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0	<10	<10	
1,4-Dichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0	<10	<10	
Hexachlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0	<10	<10	
1,2,4-Trichlorobenzene	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0	<10	<10	
2,4-Dichlorophenol	µg/L	<5	<15	<6.0	<3.0	<3.0	<1.2	<30	<3.0	<3.0	<6.0	<6.0	
Pentachlorophenol	µg/L	<20	<50	<50	<10	<70	<25	<100	<10	<10	<20	<20	
Phenol	µg/L	290.0	<25	490.0	<5.0	<5.0	<2.0	<50	<5.0	<5.0	<10	<10	
2,4,6-Trichlorophenol	µg/L	<8	<25	<10	<5.0	<5.0	<2.0	<50	<5.0	<5.0	<10	<10	
Di-N-butyl phthalate	µg/L	<30	<100	<40	<20	<20	<8.0	<200	<20	<20	<40	<40	
Diethyl phthalate	µg/L	43.0	<50	24.0	<10	<10	<4.0	<100	<10	<10	<20	<20	
Dimethyl phthalate	µg/L	<20	<50	<20	<10	<10	<4.0	<2.0	<10	<10	<20	<20	
Benzene	µg/L	<5.0	4.9	<25	<10	<10	4.3	<2.0	<10	<10	<10	<2.0	
Ethylbenzene	µg/L	<5.0	9.3	<25	<10	<10	3.6	<2.0	<10	<10	<10	<2.0	
o-Xylene	µg/L	6.6	12.0	<25	<10	<10	3.7	<2.0	<10	<10	<10	<2.0	
p+m-Xylene	µg/L	13.0	24.0	26.0	<10	<10	7.2	<2.0	<10	<10	<10	<2.0	
Toluene	µg/L	120.0	52.0	180.0	<10	<10	68.0	2.4	<10	<10	<10	<2.0	
Dichloromethane	µg/L	470.0	<5.0	<130	<100	<100	<20	<20	<100	<100	<100	<20	
Vinyl Chloride	µg/L	<10	3.4	<50	<10	<10	<2.0	<2.0	<10	<10	<10	<2.0	

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

Table G-3
Leachate - Organic Analytical Results - Compliance Monitoring
Twin Creeks Environmental Centre

Parameter	Units	PS5	PS5	PS5	PS5	PS5							
Date		12-May-20	19-May-21	10-May-22	02-May-23	02-May-24							
Laboratory		Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas	Bureau Veritas							
Benzo(a)pyrene	µg/L	<20	<0.20	<2.0	<4.0	<4.0							
1,2-Dichlorobenzene	µg/L	<50	<0.50	<5.0	<10	<10							
1,3-Dichlorobenzene	µg/L	<50	<0.50	<5.0	<10	<10							
1,4-Dichlorobenzene	µg/L	<50	<1.0	<5.0	<10	<10							
Hexachlorobenzene	µg/L	<50	<0.50	<5.0	<10	<10							
1,2,4-Trichlorobenzene	µg/L	<50	<0.50	<5.0	<10	<10							
2,4-Dichlorophenol	µg/L	<30	<0.30	<3.0	<6.0	<6.0							
Pentachlorophenol	µg/L	<100	<1.0	<10	<20	<20							
Phenol	µg/L	800	<3.0	<5.0	<10	<10							
2,4,6-Trichlorophenol	µg/L	<50	<0.50	<5.0	<10	<10							
Di-N-butyl phthalate	µg/L	<200	<2.0	<20	<40	<40							
Diethyl phthalate	µg/L	<100	1	<10	<20	<20							
Dimethyl phthalate	µg/L	<100	<1.0	<10	<20	<20							
Benzene	µg/L	2.5	4.3	<2.0	<5.0	5.2							
Ethylbenzene	µg/L	7.3	10	<2.0	<5.0	18							
o-Xylene	µg/L	9.2	9.2	2.3	<5.0	17							
p+m-Xylene	µg/L	19	22	6.3	<5.0	33							
Toluene	µg/L	87	1700	6.1	<5.0	49							
Dichloromethane	µg/L	<20	<20	<20	<50	<20							
Vinyl Chloride	µg/L	<2.0	2.2	<2.0	<5.0	2.6							

Parameter	Units	PS7	PS7										
Date		02-May-23	02-May-24										
Laboratory		Bureau Veritas	Bureau Veritas										
Benzo(a)pyrene	µg/L	<100	<4.0										
1,2-Dichlorobenzene	µg/L	<250	<10										
1,3-Dichlorobenzene	µg/L	<250	<10										
1,4-Dichlorobenzene	µg/L	<250	<10										
Hexachlorobenzene	µg/L	<250	<10										
1,2,4-Trichlorobenzene	µg/L	<250	<10										
2,4-Dichlorophenol	µg/L	<150	<6.0										
Pentachlorophenol	µg/L	<500	<20										
Phenol	µg/L	610	<10										
2,4,6-Trichlorophenol	µg/L	<250	<10										
Di-N-butyl phthalate	µg/L	<1000	<40										
Diethyl phthalate	µg/L	<500	<20										
Dimethyl phthalate	µg/L	<500	<20										
Benzene	µg/L	3.5	2.1										
Ethylbenzene	µg/L	9.6	11										
o-Xylene	µg/L	8.8	7.5										
p+m-Xylene	µg/L	18	20										
Toluene	µg/L	120	260										
Dichloromethane	µg/L	<20	<20										
Vinyl Chloride	µg/L	26	2.1										

Notes: 1) µg/L denotes micrograms per litre.
2) MAXXAM denotes chemical analytical testing was completed by Maxxam Analytics Inc.

APPENDIX G4:

Laboratory Reports

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: TCLP-LCHCM-JAN

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/02/01
Report #: R8011903
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C424942
Received: 2024/01/25, 11:20

Sample Matrix: Leachate
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Biochemical Oxygen Demand (BOD)	1	2024/01/27	2024/02/01	CAM SOP-00427	SM 24 5210B m
Conductance in Water - On-site	1	N/A	2024/01/31		
Dissolved Organic Carbon (DOC) (1)	1	N/A	2024/01/26	CAM SOP-00446	SM 24 5310 B m
Field Measured Dissolved Oxygen in Water	1	N/A	2024/01/31		
pH (2)	1	2024/01/26	2024/01/29	CAM SOP-00413	SM 24th - 4500H+ B
Field Measured pH (3)	1	N/A	2024/01/31		Field pH Meter
Field Temperature (3)	1	N/A	2024/01/31		Field Thermometer
Total Kjeldahl Nitrogen in Water	1	2024/01/26	2024/01/30	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2024/01/26	2024/01/31	CAM SOP-00407	SM 24 4500-P I
Turbidity - On-site	1	N/A	2024/01/31		
Volatile Organic Compounds in Water	1	N/A	2024/01/29	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: TCLP-LCHCM-JAN

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/02/01
Report #: R8011903
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C424942

Received: 2024/01/25, 11:20

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

(2) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

(3) This is a field test, therefore, the results relate to items that were not analysed at Bureau Veritas.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C424942
Report Date: 2024/02/01

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JRA

RESULTS OF ANALYSES OF LEACHATE

Bureau Veritas ID		YFD953		
Sampling Date		2024/01/24		
COC Number		TCLP-LCHCM-JAN		
	UNITS	**EQUALIZATION TANK**	**RDL**	**QC Batch**
Field Measurements				
Field Conductivity	uS/cm	12980	N/A	ONSITE
Field Dissolved Oxygen	mg/L	0.80	N/A	ONSITE
Field Temperature	Celsius	16.5	N/A	ONSITE
Field Measured Field Turbidity	NTU	135	N/A	ONSITE
Field Measured pH	pH	8.0		ONSITE
Inorganics				
Total BOD	mg/L	250	2	9186580
Total Kjeldahl Nitrogen (TKN)	mg/L	1800	50	9183730
Dissolved Organic Carbon	mg/L	1000	4	9185975
pH	pH	7.70		9185022
Total Phosphorus	mg/L	11	0.20	9185817

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Bureau Veritas Job #: C424942
Report Date: 2024/02/01

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JRA

VOLATILE ORGANICS BY GC/MS (LEACHATE)

Bureau Veritas ID		YFD953		
Sampling Date		2024/01/24		
COC Number		TCLP-LCHCM-JAN		
	UNITS	EQUALIZATION TANK	RDL	QC Batch
Volatile Organics				
Benzene	ug/L	<10	10	9185625
Ethylbenzene	ug/L	20	10	9185625
Toluene	ug/L	130	10	9185625
p+m-Xylene	ug/L	40	10	9185625
o-Xylene	ug/L	18	10	9185625
Total Xylenes	ug/L	58	10	9185625
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	99		9185625
D4-1,2-Dichloroethane	%	96		9185625
D8-Toluene	%	99		9185625

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

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

Package 1	6.3°C

Sample YFD953 [EQUALIZATION TANK] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Bureau Veritas Job #: C424942
Report Date: 2024/02/01

QUALITY ASSURANCE REPORT

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JRA

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9185625	4-Bromofluorobenzene	2024/01/29	101	70 - 130	101	70 - 130	102	%				
9185625	D4-1,2-Dichloroethane	2024/01/29	102	70 - 130	98	70 - 130	96	%				
9185625	D8-Toluene	2024/01/29	99	70 - 130	100	70 - 130	100	%				
9183730	Total Kjeldahl Nitrogen (TKN)	2024/01/30	NC	80 - 120	96	80 - 120	<0.7	mg/L	2.2 (1)	20	95	80 - 120
9185022	pH	2024/01/29			102	98 - 103			0.45 (1)	N/A		
9185625	Benzene	2024/01/29	91	70 - 130	92	70 - 130	<0.20	ug/L				
9185625	Ethylbenzene	2024/01/29	89	70 - 130	93	70 - 130	<0.20	ug/L				
9185625	o-Xylene	2024/01/29	84	70 - 130	87	70 - 130	<0.20	ug/L				
9185625	p+m-Xylene	2024/01/29	94	70 - 130	99	70 - 130	<0.20	ug/L				
9185625	Toluene	2024/01/29	90	70 - 130	92	70 - 130	<0.20	ug/L				
9185625	Total Xylenes	2024/01/29					<0.20	ug/L				
9185817	Total Phosphorus	2024/01/31	NC (2)	80 - 120	99	80 - 120	<0.030	mg/L	5.6 (3)	25	106	80 - 120
9185975	Dissolved Organic Carbon	2024/01/26	NC (4)	80 - 120	98	80 - 120	<0.4	mg/L	0.70 (5)	20		

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9186580	Total BOD	2024/02/01					<2	mg/L	NC (1)	30	92	80 - 120

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [YFD953-03]

(3) Duplicate Parent ID [YFD953-03]

(4) Matrix Spike Parent ID [YFD953-04]

(5) Duplicate Parent ID [YFD953-04]

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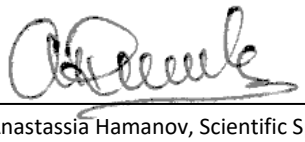
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C424942
Report Date: 2024/02/01

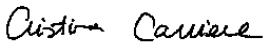
RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JRA

VALIDATION SIGNATURE PAGE

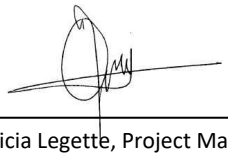
The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist



Cristina Carriere, Senior Scientific Specialist



Patricia Legette, Project Manager

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BUREAU VERITAS

FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name: TCEC

Site No.:

Sample: EQUALIZATION
Sample ID: DWK

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Filter Device: (Y) or N — (0.45 μ) or ____ μ (circle or fill in)

Purging Device: ____ A-Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device: ____

X-Other: ____

Filter Type: A — A-In-line Disposable, B-Pressure, C-Vacuum, X-Other: ____

Sample Tube Type: A — A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other: ____

WELL DATA

Well Elevation (at TOC) ____ (ft/msl)

Depth to Water (DTW) (from TOC) ____ (ft)

Groundwater Elevation (GWE) (Site Datum, from TOC) ____ (ft msl)

Total Well Depth (from TOC) ____ (ft)

Stick Up (from ground elevation) ____ (ft)

Casing ID ____ (in)

Casing Material ____

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (μmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
	1st		1st					
	2nd		2nd					
	3rd		3rd					
	4th		4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (mS/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: ____ Units ____
01 24 24	8.0	17.98	16.5	135	0.80		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

FIELD COMMENTS

Sample Appearance: Opaque Odor: Strong leachate Color: Black Other: ____

Weather Conditions (required daily, or as conditions change): 2°C Direction/Speed: 4 km/h E Outlook: Overcast Precipitation: Y or (N)

Specific Comments (including purge/well volume calculations if required): ____

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
01 / 24 / 24	Jake Aitkenhead	[signature]	RWDI
/ /			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2013

Maxxam Analytics Inc. 6740 Campobello Road Mississauga, ON L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5777 Toll Free: (800) 563-6266

BOD

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		MAXXAM JOB NUMBER:
Company Name:	Waste Management of Canada Corporation	Company Name:	RWDI AIR Inc.	Quotation #		
Contact Name:	Lisa Mertick	Contact Name:	Brent Langille	P.O. #:	12285739	
Address:	5768 Nauvoo Rd, Watford, ON	Address:	4510 Rhodes Drive, Unit 530	Project #:	2402553.01	CHAIN OF CUSTODY # :
	N0M 2S0		Windsor, ON, N8W 5K5	Project Name:	TCLF-LCHCM-JAN	TCLF-LCHCM-JAN
Phone:	519-849-5810 Fax: 519-849-5811	Phone:	519-823-1311 x:2984 Fax: 519-823-1316	Location:	Twin Creeks	
Email:	lmertick@wm.com	Email:	Brent.Langille@RWDI.com, Jeffery.Cleland@rwdi.c	Sampled By:	JRA	

REGULATORY CRITERIA

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

- [ ] MISA
- [ ] PWQO
- [ ] Reg. 558
- Reg. 153: [ ] Table 1 [ ] Table 2 [ ] Table 3
- Sewer Use: [ ] Sanitary [ ] Storm; Region ______
- [x] Other: site specific (specify)

Report Criteria on C of A ? n

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: [x] 5 to 7 Working Days

Rush TAT: Rush Confirmation # ______ (call Lab for #)

[ ] 1 day [ ] 2 days [ ] 3 days

DATE Required: 2-Feb-24

TIME Required: 12:00 PM

Please note that TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

ANALYSIS REQUESTED (Please be specific):

	Sample Identification	Date Sampled	Time Sampled	Matrix (GW, SW, Soil, etc.)	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	ON-WLF-2023 TCLS - EQUALIZATION TANK QUARTERLY							# of Cont.	COMMENTS / TAT COMMENTS
1	EQUALIZATION TANK	24-Jan-24	AM	LCH	N	N	X							6	
2															
3															Filtered DOC field filtered
4															See lab addendum for analysis.
5															
6															
7															
8															
9															
10															
11															
12															

NONT-2024-01-1384

RELINQUISHED BY: (Signature/Print)	RECEIVED BY: (Signature/Print)	Date:	Time:	Laboratory Use Only
JRA 24-Jan-24 - AM	[signature]	24/01/25	1120	Temperature (°C) on Receipt: 7/7/5 T-38; Condition of Sample on Receipt: [ ] OK [ ] SIF

*** MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS**

Custody seal [illegible]

White: Maxxam Yellow: Mail Pink: Client

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 891813

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/05/13
Report #: R8146472
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D3663
Received: 2024/05/03, 12:46

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
ABN Compounds in Water by GC/MS	4	2024/05/08	2024/05/09	CAM SOP-00301	EPA 8270 m
Alkalinity	4	N/A	2024/05/11	CAM SOP-00448	SM 24 2320 B m
Biochemical Oxygen Demand (BOD)	4	2024/05/04	2024/05/09	CAM SOP-00427	SM 24 5210B m
Chloride by Automated Colourimetry	4	N/A	2024/05/10	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	2	N/A	2024/05/08	CAM SOP-00416	SM 24 5220 D m
Chemical Oxygen Demand	2	N/A	2024/05/09	CAM SOP-00416	SM 24 5220 D m
Conductance in Water - On-site	4	N/A	2024/05/08		
Conductivity	4	N/A	2024/05/11	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2024/05/07	CAM SOP-00446	SM 24 5310 B m
Field Measured Dissolved Oxygen in Water	4	N/A	2024/05/08		
Mercury in Water by CVAA	4	2024/05/07	2024/05/07	CAM SOP-00453	EPA 7470A m
Total Metals by ICPMS	4	N/A	2024/05/09	CAM SOP-00447	EPA 6020B m
Ammonia-N	4	N/A	2024/05/07	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2024/05/07	CAM SOP-00440	SM 24 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2024/05/08	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	4	2024/05/04	2024/05/10	CAM SOP-00413	SM 24th - 4500H+ B
Phenols (4AAP)	4	N/A	2024/05/07	CAM SOP-00444	OMOE E3179 m
Field Measured pH (4)	4	N/A	2024/05/04		Field pH Meter
Sulphate by Automated Turbidimetry	4	N/A	2024/05/10	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	4	2024/05/08	2024/05/09	CAM SOP-00428	SM 24 2540C m
Field Temperature (4)	4	N/A	2024/05/04		Field Thermometer
Total Kjeldahl Nitrogen in Water	3	2024/05/06	2024/05/07	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	1	2024/05/06	2024/05/08	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	4	2024/05/06	2024/05/07	CAM SOP-00407	SM 24 4500-P I
Total Suspended Solids	4	2024/05/06	2024/05/08	CAM SOP-00428	SM 24 2540D m
Turbidity - On-site	4	N/A	2024/05/08		
Un-ionized Ammonia (5)	4	2024/05/04	2024/05/08	Auto Calc.	PWQO
Volatile Organic Compounds in Water	4	N/A	2024/05/08	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau

Your P.O. #: 13384121
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BUREAU VERITAS JOB #: C4D3663
Received: 2024/05/03, 12:46

Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

(4) This is a field test, therefore, the results relate to items that were not analysed at Bureau Veritas.
(5) Un-ionized ammonia is calculated using the total ammonia result and field data provided by the client for pH and temperature.

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
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Report Date: 2024/05/13
Report #: R8146472
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D3663
Received: 2024/05/03, 12:46

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas Job #: C4D3663
Report Date: 2024/05/13

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZBS925			ZBS926			ZBS927		
Sampling Date		2024/05/02 09:20			2024/05/02 10:23			2024/05/02 12:50		
COC Number		891813			891813			891813		
	UNITS	PS1	RDL	QC Batch	PS3	RDL	QC Batch	PS5	RDL	QC Batch
Calculated Parameters										
Total Un-ionized Ammonia	mg/L	46	0.52	9374109	150	1.7	9374109	35	0.57	9374109
Field Measurements										
Field Conductivity	uS/cm	>20000	N/A	ONSITE	>20000	N/A	ONSITE	16310	N/A	ONSITE
Field Dissolved Oxygen	mg/L	1.01	N/A	ONSITE	6.15	N/A	ONSITE	0.70	N/A	ONSITE
Field Temperature	Celsius	15.8	N/A	ONSITE	16.6	N/A	ONSITE	26.4	N/A	ONSITE
Field Measured Field Turbidity	NTU	>999	N/A	ONSITE	>999	N/A	ONSITE	>999	N/A	ONSITE
Field Measured pH	pH	7.7		ONSITE	8.2		ONSITE	7.4		ONSITE
Inorganics										
Total Ammonia-N	mg/L	2640	30	9372105	2730	30	9372105	1840	30	9372105
Total BOD	mg/L	3100	2	9374373	66	2	9374373	230	2	9374373
Total Chemical Oxygen Demand (COD)	mg/L	5600	400	9376043	4000	400	9376043	3700	400	9376043
Conductivity	umho/cm	25000	1.0	9374464	24000	1.0	9374464	15000	1.0	9374464
Total Dissolved Solids	mg/L	11100	20	9380458	11500	20	9380458	9210	20	9380458
Total Kjeldahl Nitrogen (TKN)	mg/L	3200	100	9372981	3000	100	9372981	2500	100	9372981
Dissolved Organic Carbon	mg/L	1100	8	9375722	910	8	9375722	470	4	9375722
pH	pH	7.99		9374465	8.25		9374465	8.15		9374465
Phenols-4AAP	mg/L	0.15	0.010	9378103	0.032	0.010	9378103	0.13	0.010	9378103
Total Phosphorus	mg/L	31	0.40	9373461	12	0.20	9373461	10	0.20	9373461
Total Suspended Solids	mg/L	22000	200	9375219	390	25	9375219	880	33	9375219
Dissolved Sulphate (SO4)	mg/L	210	100	9377510	160	100	9377510	130	100	9377510
Alkalinity (Total as CaCO3)	mg/L	8700	10	9374462	9200	10	9374462	6000	5.0	9374462
Dissolved Chloride (Cl-)	mg/L	2800	100	9377496	2700	100	9377496	1500	100	9377496
Nitrite (N)	mg/L	1.80	0.50	9374398	0.58	0.20	9374460	<0.20	0.20	9374398
Nitrate (N)	mg/L	<5.0	5.0	9374398	<2.0	2.0	9374460	<2.0	2.0	9374398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D3663
Report Date: 2024/05/13

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZBS928		
Sampling Date		2024/05/02 13:30		
COC Number		891813		
	UNITS	PS7	RDL	QC Batch
Calculated Parameters				
Total Un-ionized Ammonia	mg/L	5.5	0.098	9374109
Field Measurements				
Field Conductivity	uS/cm	9170	N/A	ONSITE
Field Dissolved Oxygen	mg/L	0.54	N/A	ONSITE
Field Temperature	Celsius	27.5	N/A	ONSITE
Field Measured Field Turbidity	NTU	180	N/A	ONSITE
Field Measured pH	pH	6.9		ONSITE
Inorganics				
Total Ammonia-N	mg/L	849	15	9372105
Total BOD	mg/L	150	2	9374373
Total Chemical Oxygen Demand (COD)	mg/L	1400	80	9376043
Conductivity	umho/cm	7700	1.0	9374464
Total Dissolved Solids	mg/L	5670	20	9380458
Total Kjeldahl Nitrogen (TKN)	mg/L	920	20	9372981
Dissolved Organic Carbon	mg/L	150	4	9375722
pH	pH	7.92		9374465
Phenols-4AAP	mg/L	0.063	0.010	9378103
Total Phosphorus	mg/L	5.6	0.20	9373461
Total Suspended Solids	mg/L	250	20	9375219
Dissolved Sulphate (SO4)	mg/L	120	20	9377510
Alkalinity (Total as CaCO3)	mg/L	3300	5.0	9374462
Dissolved Chloride (Cl-)	mg/L	640	20	9377496
Nitrite (N)	mg/L	0.063	0.050	9374398
Nitrate (N)	mg/L	<0.50	0.50	9374398

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Bureau Veritas Job #: C4D3663
Report Date: 2024/05/13

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZBS925		ZBS926	ZBS927		ZBS928		
Sampling Date		2024/05/02 09:20		2024/05/02 10:23	2024/05/02 12:50		2024/05/02 13:30		
COC Number		891813		891813	891813		891813		
	UNITS	PS1	RDL	PS3	PS5	RDL	PS7	RDL	QC Batch
Metals									
Mercury (Hg)	mg/L	0.005	0.003	<0.003	<0.003	0.003	<0.003	0.003	9377555
Total Arsenic (As)	mg/L	1.9	0.05	0.24	0.26	0.01	0.041	0.001	9377119
Total Barium (Ba)	mg/L	8.3	0.3	0.14	0.37	0.05	0.25	0.005	9377119
Total Beryllium (Be)	mg/L	<0.03	0.03	<0.006	<0.006	0.006	<0.0006	0.0006	9377119
Total Boron (B)	mg/L	17	1	20	19	0.2	3.5	0.02	9377119
Total Cadmium (Cd)	mg/L	0.020	0.005	<0.001	<0.001	0.001	<0.0001	0.0001	9377119
Total Calcium (Ca)	mg/L	3700	10	120	130	2	230	0.2	9377119
Total Chromium (Cr)	mg/L	12	0.3	0.88	0.64	0.05	0.049	0.005	9377119
Total Copper (Cu)	mg/L	1.7	0.1	0.04	0.06	0.02	0.002	0.002	9377119
Total Iron (Fe)	mg/L	2600	5	48	41	1	1.9	0.1	9377119
Total Lead (Pb)	mg/L	0.71	0.03	0.009	0.024	0.005	0.0007	0.0005	9377119
Total Magnesium (Mg)	mg/L	1000	3	260	290	0.5	200	0.05	9377119
Total Manganese (Mn)	mg/L	25	0.1	0.53	0.69	0.02	0.41	0.002	9377119
Total Nickel (Ni)	mg/L	8.3	0.05	0.65	0.42	0.01	0.065	0.001	9377119
Total Potassium (K)	mg/L	790	10	990	750	2	230	1	9377119
Total Sodium (Na)	mg/L	2100	5	2700	2300	1	600	0.1	9377119
Total Zinc (Zn)	mg/L	17	0.5	2.8	0.7	0.1	0.08	0.01	9377119

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		ZBS925	ZBS926	ZBS927	ZBS928		
Sampling Date		2024/05/02 09:20	2024/05/02 10:23	2024/05/02 12:50	2024/05/02 13:30		
COC Number		891813	891813	891813	891813		
	UNITS	PS1	PS3	PS5	PS7	RDL	QC Batch
Semivolatile Organics							
Benzo(a)pyrene	ug/L	<4.0	<4.0	<4.0	<4.0	4.0	9381360
1,2-Dichlorobenzene	ug/L	<10	<10	<10	<10	10	9381360
1,3-Dichlorobenzene	ug/L	<10	<10	<10	<10	10	9381360
1,4-Dichlorobenzene	ug/L	<10	<10	<10	<10	10	9381360
Hexachlorobenzene	ug/L	<10	<10	<10	<10	10	9381360
1,2,4-Trichlorobenzene	ug/L	<10	<10	<10	<10	10	9381360
2,4-Dichlorophenol	ug/L	<6.0	<6.0	<6.0	<6.0	6.0	9381360
Pentachlorophenol	ug/L	<20	<20	<20	<20	20	9381360
Phenol	ug/L	<10	<10	<10	<10	10	9381360
2,4,6-Trichlorophenol	ug/L	<10	<10	<10	<10	10	9381360
Di-N-butyl phthalate	ug/L	<40	<40	<40	<40	40	9381360
Diethyl phthalate	ug/L	<20	<20	<20	<20	20	9381360
Dimethyl phthalate	ug/L	<20	<20	<20	<20	20	9381360
Surrogate Recovery (%)							
2,4,6-Tribromophenol	%	105	97	110	104		9381360
2-Fluorobiphenyl	%	38	33	69	42		9381360
2-Fluorophenol	%	18	16	34	19		9381360
D14-Terphenyl	%	73	77	83	81		9381360
D5-Nitrobenzene	%	43	38	78	46		9381360
D5-Phenol	%	12	10	25	17		9381360

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C4D3663
Report Date: 2024/05/13

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

VOLATILE ORGANICS BY GC/MS (WATER)

Bureau Veritas ID		ZBS925	ZBS926	ZBS927	ZBS928		
Sampling Date		2024/05/02 09:20	2024/05/02 10:23	2024/05/02 12:50	2024/05/02 13:30		
COC Number		891813	891813	891813	891813		
	UNITS	PS1	PS3	PS5	PS7	RDL	QC Batch
Volatile Organics							
Benzene	ug/L	2.0	<2.0	5.2	2.1	2.0	9375734
1,4-Dichlorobenzene	ug/L	<4.0	<4.0	<4.0	<4.0	4.0	9375734
Ethylbenzene	ug/L	4.4	<2.0	18	11	2.0	9375734
Methylene Chloride(Dichloromethane)	ug/L	<20	<20	<20	<20	20	9375734
Toluene	ug/L	24	<2.0	49	260	2.0	9375734
Vinyl Chloride	ug/L	<2.0	<2.0	2.6	2.1	2.0	9375734
p+m-Xylene	ug/L	8.8	<2.0	33	20	2.0	9375734
o-Xylene	ug/L	4.5	<2.0	17	7.5	2.0	9375734
Total Xylenes	ug/L	13	<2.0	50	28	2.0	9375734
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	98	99	99	97		9375734
D4-1,2-Dichloroethane	%	102	99	100	101		9375734
D8-Toluene	%	104	103	104	103		9375734

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Sample ZBS925 [PS1] : Mercury Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.

ABN Analysis: Due to the sample matrix, a smaller amount was used for extraction. Detection limits were adjusted accordingly.

Metal Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample ZBS926 [PS3] : Mercury Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.

VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

ABN Analysis: Due to the sample matrix, a smaller amount was used for extraction. Detection limits were adjusted accordingly.

Metal Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample ZBS927 [PS5] : Mercury Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.

ABN Analysis: Due to the sample matrix, a smaller amount was used for extraction. Detection limits were adjusted accordingly.

Metal Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample ZBS928 [PS7] : Mercury Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.

ABN Analysis: Due to the sample matrix, a smaller amount was used for extraction. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9375734	4-Bromofluorobenzene	2024/05/07	100	70 - 130	100	70 - 130	106	%				
9375734	D4-1,2-Dichloroethane	2024/05/07	103	70 - 130	105	70 - 130	98	%				
9375734	D8-Toluene	2024/05/07	106	70 - 130	100	70 - 130	97	%				
9381360	2,4,6-Tribromophenol	2024/05/09	114	10 - 130	105	10 - 130	91	%				
9381360	2-Fluorobiphenyl	2024/05/09	69	30 - 130	69	30 - 130	74	%				
9381360	2-Fluorophenol	2024/05/09	35	10 - 130	41	10 - 130	36	%				
9381360	D14-Terphenyl	2024/05/09	71	30 - 130	74	30 - 130	73	%				
9381360	D5-Nitrobenzene	2024/05/09	80	30 - 130	86	30 - 130	82	%				
9381360	D5-Phenol	2024/05/09	25	10 - 130	29	10 - 130	26	%				
9372105	Total Ammonia-N	2024/05/07	94	75 - 125	99	80 - 120	<0.15	mg/L	NC (1)	20		
9372981	Total Kjeldahl Nitrogen (TKN)	2024/05/07	NC	80 - 120	102	80 - 120	<0.7	mg/L	2.4 (1)	20	99	80 - 120
9373461	Total Phosphorus	2024/05/07	106	80 - 120	103	80 - 120	<0.030	mg/L	8.8 (1)	25	100	80 - 120
9374373	Total BOD	2024/05/09					<2	mg/L	NC (1)	30	100	80 - 120
9374398	Nitrate (N)	2024/05/08	99	80 - 120	102	80 - 120	<0.10	mg/L	NC (1)	20		
9374398	Nitrite (N)	2024/05/08	102	80 - 120	103	80 - 120	<0.010	mg/L	3.0 (1)	20		
9374460	Nitrate (N)	2024/05/07	99	80 - 120	100	80 - 120	<0.10	mg/L	NC (1)	20		
9374460	Nitrite (N)	2024/05/07	102	80 - 120	103	80 - 120	<0.010	mg/L	NC (1)	20		
9374462	Alkalinity (Total as CaCO3)	2024/05/11			100	85 - 115	<1.0	mg/L	4.2 (1)	20		
9374464	Conductivity	2024/05/11			101	85 - 115	<1.0	umho/cm	1.1 (1)	10		
9374465	pH	2024/05/10			102	98 - 103			0.24 (1)	N/A		
9375219	Total Suspended Solids	2024/05/08			96	80 - 120	<10	mg/L	8.7 (1)	20		
9375722	Dissolved Organic Carbon	2024/05/06	87	80 - 120	94	80 - 120	<0.4	mg/L	0.57 (1)	20		
9375734	1,4-Dichlorobenzene	2024/05/07	115	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30		
9375734	Benzene	2024/05/07	86	70 - 130	94	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	Ethylbenzene	2024/05/07	98	70 - 130	91	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	Methylene Chloride(Dichloromethane)	2024/05/07	90	70 - 130	92	70 - 130	<2.0	ug/L	NC (1)	30		
9375734	o-Xylene	2024/05/07	90	70 - 130	83	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	p+m-Xylene	2024/05/07	103	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	Toluene	2024/05/07	95	70 - 130	87	70 - 130	<0.20	ug/L	NC (1)	30		

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9375734	Total Xylenes	2024/05/07					<0.20	ug/L	NC (1)	30		
9375734	Vinyl Chloride	2024/05/07	87	70 - 130	90	70 - 130	<0.20	ug/L				
9376043	Total Chemical Oxygen Demand (COD)	2024/05/08	101	80 - 120	101	80 - 120	<4.0	mg/L	NC (1)	20		
9377119	Total Arsenic (As)	2024/05/09	104	80 - 120	102	80 - 120	<0.001	mg/L				
9377119	Total Barium (Ba)	2024/05/09	100	80 - 120	99	80 - 120	<0.005	mg/L	1.3 (1)	20		
9377119	Total Beryllium (Be)	2024/05/09	96	80 - 120	98	80 - 120	<0.0006	mg/L				
9377119	Total Boron (B)	2024/05/09	NC	80 - 120	95	80 - 120	<0.02	mg/L	11 (1)	20		
9377119	Total Cadmium (Cd)	2024/05/09	103	80 - 120	103	80 - 120	<0.0001	mg/L	NC (1)	20		
9377119	Total Calcium (Ca)	2024/05/09	NC	80 - 120	96	80 - 120	<0.2	mg/L	1.0 (1)	20		
9377119	Total Chromium (Cr)	2024/05/09	97	80 - 120	96	80 - 120	<0.005	mg/L	NC (1)	20		
9377119	Total Copper (Cu)	2024/05/09	99	80 - 120	98	80 - 120	<0.002	mg/L	2.0 (1)	20		
9377119	Total Iron (Fe)	2024/05/09	97	80 - 120	96	80 - 120	<0.1	mg/L	3.1 (1)	20		
9377119	Total Lead (Pb)	2024/05/09	94	80 - 120	96	80 - 120	<0.0005	mg/L	NC (1)	20		
9377119	Total Magnesium (Mg)	2024/05/09	NC	80 - 120	96	80 - 120	<0.05	mg/L	3.3 (1)	20		
9377119	Total Manganese (Mn)	2024/05/09	98	80 - 120	95	80 - 120	<0.002	mg/L	3.9 (1)	20		
9377119	Total Nickel (Ni)	2024/05/09	97	80 - 120	95	80 - 120	<0.001	mg/L				
9377119	Total Potassium (K)	2024/05/09	100	80 - 120	99	80 - 120	<0.2	mg/L	2.6 (1)	20		
9377119	Total Sodium (Na)	2024/05/09	NC	80 - 120	95	80 - 120	<0.1	mg/L	2.4 (1)	20		
9377119	Total Zinc (Zn)	2024/05/09	103	80 - 120	105	80 - 120	<0.01	mg/L	NC (1)	20		
9377496	Dissolved Chloride (Cl-)	2024/05/10	NC	80 - 120	97	80 - 120	<1.0	mg/L	0.67 (1)	20		
9377510	Dissolved Sulphate (SO4)	2024/05/10	NC	75 - 125	96	80 - 120	<1.0	mg/L	0.36 (1)	20		
9377555	Mercury (Hg)	2024/05/07	93	75 - 125	94	80 - 120	<0.0002	mg/L	NC (1)	20		
9378103	Phenols-4AAP	2024/05/07	104	80 - 120	104	80 - 120	<0.0010	mg/L	NC (1)	20		
9380458	Total Dissolved Solids	2024/05/09			97	80 - 120	<10	mg/L	1.4 (1)	20		
9381360	1,2,4-Trichlorobenzene	2024/05/09	41	30 - 130	37	30 - 130	<0.50	ug/L				
9381360	1,2-Dichlorobenzene	2024/05/09	43	30 - 130	40	30 - 130	<0.50	ug/L				
9381360	1,3-Dichlorobenzene	2024/05/09	36	30 - 130	30	30 - 130	<0.50	ug/L				
9381360	1,4-Dichlorobenzene	2024/05/09	35	30 - 130	32	30 - 130	<0.50	ug/L				
9381360	2,4,6-Trichlorophenol	2024/05/09	88	10 - 130	92	10 - 130	<0.50	ug/L				
9381360	2,4-Dichlorophenol	2024/05/09	79	10 - 130	76	10 - 130	<0.30	ug/L				

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9381360	Benzo(a)pyrene	2024/05/09	97	30 - 130	100	30 - 130	<0.20	ug/L				
9381360	Diethyl phthalate	2024/05/09	96	30 - 130	97	30 - 130	<1.0	ug/L				
9381360	Dimethyl phthalate	2024/05/09	91	30 - 130	92	30 - 130	<1.0	ug/L				
9381360	Di-N-butyl phthalate	2024/05/09	104	30 - 130	109	30 - 130	<2.0	ug/L	NC (1)	40		
9381360	Hexachlorobenzene	2024/05/09	96	30 - 130	101	30 - 130	<0.50	ug/L				
9381360	Pentachlorophenol	2024/05/09	124	10 - 130	106	10 - 130	<1.0	ug/L				
9381360	Phenol	2024/05/09	27	10 - 130	30	10 - 130	<0.50	ug/L				

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Duplicate Parent ID

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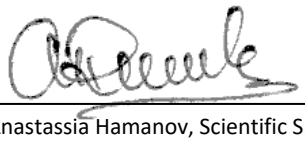
Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D3663
Report Date: 2024/05/13

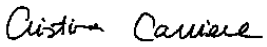
RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist



Cristina Carriere, Senior Scientific Specialist

Michael Damianidis, Project Manager Assistant

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BUREAU VERITAS

FIELD INFORMATION FORM

WM WASTE MANAGEMENT

Site Name: TCEC

Site No.: Sample: PS1 (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Filter Device: Y or N (0.45 µ) or _____ µ (circle or fill in)

Purging Device: A-Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device:

X-Other:

Filter Type: A (A-In-line Disposable, B-Pressure, C-Vacuum, X-Other: _____)

Sample Tube Type: (A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other: _____)

WELL DATA

Well Elevation (at TOC) _____ (ft/msl)

Depth to Water (DTW) (from TOC) _____ (ft)

Groundwater Elevation (GWE) (Site Datum, from TOC) _____ (ft msl)

Total Well Depth (from TOC) _____ (ft)

Stick Up (from ground elevation) _____ (ft)

Casing ID _____ (in)

Casing Material _____

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
050224	7.7	MS >20.00	15.8	7999	1.01		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

FIELD COMMENTS

Sample Appearance: opaque Odor: leachate Color: black Other: _____

Weather Conditions (required daily, or as conditions change): 17°C Direction/Speed: 5 Knots W Outlook: clear Precipitation: Y or N

Specific Comments (including purge/well volume calculations if required): _____

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/02/24	Eric Wilson	Eric Wilson	RWDI
/ /			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v 3.1 06/20

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FIELD INFORMATION FORM

BUREAU VERITAS

WASTE MANAGEMENT

Site Name: TCEC

Site No.: Sample: PS3 (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: [Y] or [N]

Filter Device: [Y] or [N] [0.45 µ] or [ ] µ (circle or fill in)

Purging Device: [ ] A-Submersible Pump B-Peristaltic Pump C-QED Bladder Pump D-Bailer E-Piston Pump F-Dipper/Bottle

Sampling Device: [ ]

Filter Type: [A] A-In-line Disposable B-Pressure C-Vacuum X-Other: ____

X-Other: [ ] Sample Tube Type: [ ] A-Teflon B-Stainless Steel C-PVC D-Polypropylene X-Other: ____

WELL DATA

Well Elevation (at TOC): [ ] (ft/msl) Depth to Water (DTW) (from TOC): [ ] (ft) Groundwater Elevation (GWE) (Site Datum, from TOC): [ ] (ft msl)

Total Well Depth (from TOC): [ ] (ft) Stick Up (from ground elevation): [ ] (ft) Casing ID: [ ] (in) Casing Material: [ ]

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
05 02 24	8.2 ms	720.00	16.6	7999	6.15		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

FIELD COMMENTS

Sample Appearance: opaque Odor: moderate Color: black Other: ____

Weather Conditions (required daily, or as conditions change): 17°c Direction/Speed: 5 Kmh N Outlook: clear Precipitation: Y or (N)

Specific Comments (including purge/well volume calculations if required): ____

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/02/24	Eric Wilson	E. Wilson	RWDI
/ /			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

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FIELD INFORMATION FORM

BUREAU VERITAS

WASTE MANAGEMENT

Site Name: TCEC

Site No.: Sample: PS5 (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Purging Device: A-Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device:

X-Other:

Filter Device: Y or N — 0.45 µ or ____ µ (circle or fill in)

Filter Type: A — A-In-line Disposable, B-Pressure, C-Vacuum, X-Other:

Sample Tube Type: A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other:

WELL DATA

Well Elevation (at TOC) (ft/msl)

Depth to Water (DTW) (from TOC) (ft)

Groundwater Elevation (GWE) (Site Datum, from TOC) (ft msl)

Total Well Depth (from TOC) (ft)

Stick Up (from ground elevation) (ft)

Casing ID (in)

Casing Material

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit		pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st							
		2nd							
		3rd							
		4th							
Input Range for 3 consec. readings or Permit/State requirements:			+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
050224	7.40	16.31 mS	26.4	>999	0.79		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

FIELD COMMENTS

Sample Appearance: opaque — Odor: leachate — Color: black — Other:

Weather Conditions (required daily, or as conditions change): 17°C — Direction/Speed: 5 Kmh N — Outlook: clear — Precipitation: Y or N

Specific Comments (including purge/well volume calculations if required):

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/02/24	Eric Wilson	E. Wilson	KWDI

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

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FIELD INFORMATION FORM

BUREAU VERITAS

WASTE MANAGEMENT

Site Name: TCEC

Site No.: Sample: PS 17 (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: [Y] or [N]

Filter Device: [Y] or [N] 0.45 µ or [ ] µ (circle or fill in)

Purging Device: [ ] A-Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device: [ ]

X-Other:

Filter Type: [A] A-In-line Disposable, B-Pressure, C-Vacuum, X-Other:

Sample Tube Type: [ ] A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other:

WELL DATA

Well Elevation (at TOC)	Depth to Water (DTW) (from TOC)	Groundwater Elevation (GWE) (Site Datum, from TOC)
(ft/msl)	(ft)	(ft msl)

Total Well Depth (from TOC)	Stick Up (from ground elevation)	Casing ID	Casing Material
(ft)	(ft)	(in)	

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
9 5 0 2 2 3	6.9 MS	9.17	27.5	180	0.54		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

FIELD COMMENTS

Sample Appearance: translucent Odor: leachate Color: black Other:

Weather Conditions (required daily, or as conditions change): 17°C Direction/Speed: 5 Km/h N Outlook: clear Precipitation: Y or (N)

Specific Comments (including purge/well volume calculations if required):

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/02/23	Eric Wilson	E. Wilson	RWDI

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2044

Custody Tracking Form

T891813

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: PS1
Last Sample: PS7
Sample Count: 4

Relinquished By (Print)	Relinquished By (Sign)			Received By (Print)	Received By (Sign)		
Eric Wilson	E.W./ [signature]	Date	2024/05/03	Saumya. Ragamoni	[signature]	Date	2024/05/03
		Time (24 HR)	10:00			Time (24 HR)	12:46
		Date		ARSHDEEP KAUR	[signature]	Date	2024/05/03
		Time (24 HR)				Time (24 HR)	18:25
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): Eric Wilson

# of Coolers/Pkgs: 2

Rush ☐ Micro ☐ Immediate Test ☐ Food Residue ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At:

Labeled By:

Verified By:

Lab Comments:

Custody Seal Present (Y/N)	Custody Seal Intact (Y/N)	Cooling Media Present (Y/N)	Temperature °C 1	Temperature °C 2	Temperature °C 3
Y	Y	Y	6	6	4.
Y	Y	Y	3	2	3
Y	Y	Y	5	4	3
Drinking Water Metals Preservation Check Done (Circle)				YES	NO

03-May-24 12:46
Patricia Legette
C4D3663
IDK ENV-1176

752419

REC'D IN LONDON

COR FCD-00383/4

Page 1 of 1

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 891801

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/05/10
Report #: R8144120
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D3738
Received: 2024/05/03, 12:49

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
ABN Compounds in Water by GC/MS	1	2024/05/06	2024/05/07	CAM SOP-00301	EPA 8270 m
Alkalinity	1	N/A	2024/05/07	CAM SOP-00448	SM 24 2320 B m
Biochemical Oxygen Demand (BOD)	1	2024/05/05	2024/05/10	CAM SOP-00427	SM 24 5210B m
Chloride by Automated Colourimetry	1	N/A	2024/05/08	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	1	N/A	2024/05/08	CAM SOP-00416	SM 24 5220 D m
Conductance in Water - On-site	1	N/A	2024/05/06		
Conductivity	1	N/A	2024/05/07	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2024/05/06	CAM SOP-00446	SM 24 5310 B m
Field Measured Dissolved Oxygen in Water	1	N/A	2024/05/06		
Mercury in Water by CVAA	1	2024/05/07	2024/05/07	CAM SOP-00453	EPA 7470A m
Total Metals by ICPMS	1	N/A	2024/05/09	CAM SOP-00447	EPA 6020B m
Ammonia-N	1	N/A	2024/05/10	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2024/05/07	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	1	2024/05/06	2024/05/06	CAM SOP-00413	SM 24th - 4500H+ B
Phenol (4AAP)	1	N/A	2024/05/08	CAM SOP-00444	OMOE E3179 m
Field Measured pH (4)	1	N/A	2024/05/04		Field pH Meter
Sulphate by Automated Turbidimetry	1	N/A	2024/05/08	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	1	2024/05/08	2024/05/09	CAM SOP-00428	SM 24 2540C m
Field Temperature (4)	1	N/A	2024/05/04		Field Thermometer
Total Kjeldahl Nitrogen in Water	1	2024/05/06	2024/05/07	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2024/05/06	2024/05/07	CAM SOP-00407	SM 24 4500-P I
Total Suspended Solids	1	2024/05/06	2024/05/08	CAM SOP-00428	SM 24 2540D m
Turbidity - On-site	1	N/A	2024/05/06		
Un-ionized Ammonia (5)	1	2024/05/04	2024/05/10	Auto Calc.	PWQO
Volatile Organic Compounds in Water	2	N/A	2024/05/08	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 891801

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/05/10
Report #: R8144120
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D3738
Received: 2024/05/03, 12:49

using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

(4) This is a field test, therefore, the results relate to items that were not analysed at Bureau Veritas.
(5) Un-ionized ammonia is calculated using the total ammonia result and field data provided by the client for pH and temperature.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas Job #: C4D3738
Report Date: 2024/05/10

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZBT506			ZBT507		
Sampling Date		2024/05/02 11:30			2024/05/02 11:30		
COC Number		891801			891801		
	UNITS	EQUILIZATION TANK	RDL	QC Batch	EQUILIZATION TANK SEMI-ANNUAL	RDL	QC Batch
Calculated Parameters							
Total Un-ionized Ammonia	mg/L				46	0.72	9374109
Field Measurements							
Field Conductivity	uS/cm				>20000	N/A	ONSITE
Field Dissolved Oxygen	mg/L				0.81	N/A	ONSITE
Field Temperature	Celsius				19.3	N/A	ONSITE
Field Measured Field Turbidity	NTU				277	N/A	ONSITE
Field Measured pH	pH				7.73		ONSITE
Inorganics							
Total Ammonia-N	mg/L				1910	30	9380217
Total BOD	mg/L	390	2	9374694			
Total Chemical Oxygen Demand (COD)	mg/L				3700	200	9376043
Conductivity	umho/cm				21000	1.0	9376069
Total Dissolved Solids	mg/L				9420	20	9380458
Total Kjeldahl Nitrogen (TKN)	mg/L	2200	50	9372981			
Dissolved Organic Carbon	mg/L	1100	4	9375736			
pH	pH	7.73		9375979			
Phenols-4AAP	mg/L				0.292	0.040	9381099
Total Phosphorus	mg/L	12	0.20	9373461			
Total Suspended Solids	mg/L				29	10	9375219
Dissolved Sulphate (SO4)	mg/L				22	20	9375385
Alkalinity (Total as CaCO3)	mg/L				9000	5.0	9376058
Dissolved Chloride (Cl-)	mg/L				2300	20	9375383
Nitrite (N)	mg/L				<0.20	0.20	9375251
Nitrate (N)	mg/L				<2.0	2.0	9375251

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D3738
Report Date: 2024/05/10

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZBT507		
Sampling Date		2024/05/02 11:30		
COC Number		891801		
	UNITS	EQUILIZATION TANK SEMI-ANNUAL	RDL	QC Batch
Metals				
Mercury (Hg)	mg/L	<0.003	0.003	9377555
Total Arsenic (As)	mg/L	0.22	0.01	9377119
Total Barium (Ba)	mg/L	0.32	0.05	9377119
Total Boron (B)	mg/L	41	0.2	9377119
Total Cadmium (Cd)	mg/L	<0.001	0.001	9377119
Total Calcium (Ca)	mg/L	66	2	9377119
Total Chromium (Cr)	mg/L	0.63	0.05	9377119
Total Copper (Cu)	mg/L	<0.02	0.02	9377119
Total Iron (Fe)	mg/L	3	1	9377119
Total Lead (Pb)	mg/L	0.006	0.005	9377119
Total Magnesium (Mg)	mg/L	200	0.5	9377119
Total Manganese (Mn)	mg/L	0.15	0.02	9377119
Total Nickel (Ni)	mg/L	0.32	0.01	9377119
Total Potassium (K)	mg/L	710	2	9377119
Total Sodium (Na)	mg/L	2200	1	9377119
Total Zinc (Zn)	mg/L	0.2	0.1	9377119

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		ZBT507		
Sampling Date		2024/05/02 11:30		
COC Number		891801		
	UNITS	**EQUILIZATION TANK SEMI-ANNUAL**	**RDL**	**QC Batch**
Semivolatile Organics				
Benzo(a)pyrene	ug/L	<20	20	9374897
1,2-Dichlorobenzene	ug/L	<50	50	9374897
1,3-Dichlorobenzene	ug/L	<50	50	9374897
1,4-Dichlorobenzene	ug/L	<50	50	9374897
Hexachlorobenzene	ug/L	<50	50	9374897
1,2,4-Trichlorobenzene	ug/L	<50	50	9374897
2,4-Dichlorophenol	ug/L	<30	30	9374897
Pentachlorophenol	ug/L	<100	100	9374897
Phenol	ug/L	<50	50	9374897
2,4,6-Trichlorophenol	ug/L	<50	50	9374897
Di-N-butyl phthalate	ug/L	<200	200	9374897
Diethyl phthalate	ug/L	<100	100	9374897
Dimethyl phthalate	ug/L	<100	100	9374897
Surrogate Recovery (%)				
2,4,6-Tribromophenol	%	104		9374897
2-Fluorobiphenyl	%	37		9374897
2-Fluorophenol	%	22		9374897
D14-Terphenyl	%	65		9374897
D5-Nitrobenzene	%	45		9374897
D5-Phenol	%	18		9374897

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

VOLATILE ORGANICS BY GC/MS (WATER)

Bureau Veritas ID		ZBT506			ZBT507		
Sampling Date		2024/05/02 11:30			2024/05/02 11:30		
COC Number		891801			891801		
	UNITS	EQUILIZATION TANK	RDL	QC Batch	EQUILIZATION TANK SEMI-ANNUAL	RDL	QC Batch
Volatile Organics							
Benzene	ug/L	5.2	2.0	9375734			
1,4-Dichlorobenzene	ug/L				<4.0	4.0	9375734
Ethylbenzene	ug/L	24	2.0	9375734			
Methylene Chloride(Dichloromethane)	ug/L				<20	20	9375734
Toluene	ug/L	110	2.0	9375734			
Vinyl Chloride	ug/L				2.0	2.0	9375734
p+m-Xylene	ug/L	52	2.0	9375734			
o-Xylene	ug/L	24	2.0	9375734			
Total Xylenes	ug/L	75	2.0	9375734			
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	97		9375734	98		9375734
D4-1,2-Dichloroethane	%	98		9375734	101		9375734
D8-Toluene	%	104		9375734	102		9375734

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

GENERAL COMMENTS

Sample ZBT506 [EQUILIZATION TANK] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample ZBT507 [EQUILIZATION TANK SEMI-ANNUAL] : ABN Analysis: Due to the sample matrix, a smaller than usual portion of the sample was used for extraction and further dilution was required. Detection limits were adjusted accordingly.
Mercury Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.
VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Metal Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D3738
Report Date: 2024/05/10

QUALITY ASSURANCE REPORT

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9374897	2,4,6-Tribromophenol	2024/05/06	104	10 - 130	110	10 - 130	89	%				
9374897	2-Fluorobiphenyl	2024/05/06	65	30 - 130	72	30 - 130	72	%				
9374897	2-Fluorophenol	2024/05/06	29	10 - 130	50	10 - 130	42	%				
9374897	D14-Terphenyl	2024/05/06	78	30 - 130	80	30 - 130	73	%				
9374897	D5-Nitrobenzene	2024/05/06	72	30 - 130	88	30 - 130	80	%				
9374897	D5-Phenol	2024/05/06	17	10 - 130	34	10 - 130	27	%				
9375734	4-Bromofluorobenzene	2024/05/07	100	70 - 130	100	70 - 130	106	%				
9375734	D4-1,2-Dichloroethane	2024/05/07	103	70 - 130	105	70 - 130	98	%				
9375734	D8-Toluene	2024/05/07	106	70 - 130	100	70 - 130	97	%				
9372981	Total Kjeldahl Nitrogen (TKN)	2024/05/07	NC	80 - 120	102	80 - 120	<0.7	mg/L	2.4 (1)	20	99	80 - 120
9373461	Total Phosphorus	2024/05/07	106	80 - 120	103	80 - 120	<0.030	mg/L	8.8 (1)	25	100	80 - 120
9374694	Total BOD	2024/05/10					<2	mg/L	0.73 (2)	30	96	80 - 120
9374897	1,2,4-Trichlorobenzene	2024/05/06	55	30 - 130	58	30 - 130	<0.50	ug/L				
9374897	1,2-Dichlorobenzene	2024/05/06	55	30 - 130	59	30 - 130	<0.50	ug/L				
9374897	1,3-Dichlorobenzene	2024/05/06	50	30 - 130	56	30 - 130	<0.50	ug/L				
9374897	1,4-Dichlorobenzene	2024/05/06	49	30 - 130	54	30 - 130	<0.50	ug/L				
9374897	2,4,6-Trichlorophenol	2024/05/06	84	10 - 130	95	10 - 130	<0.50	ug/L				
9374897	2,4-Dichlorophenol	2024/05/06	67	10 - 130	84	10 - 130	<0.30	ug/L				
9374897	Benzo(a)pyrene	2024/05/06	107	30 - 130	106	30 - 130	<0.20	ug/L				
9374897	Diethyl phthalate	2024/05/06	101	30 - 130	107	30 - 130	<1.0	ug/L				
9374897	Dimethyl phthalate	2024/05/06	83	30 - 130	100	30 - 130	<1.0	ug/L				
9374897	Di-N-butyl phthalate	2024/05/06	116	30 - 130	117	30 - 130	<2.0	ug/L	NC (1)	40		
9374897	Hexachlorobenzene	2024/05/06	103	30 - 130	109	30 - 130	<0.50	ug/L				
9374897	Pentachlorophenol	2024/05/06	112	10 - 130	87	10 - 130	<1.0	ug/L				
9374897	Phenol	2024/05/06	26	10 - 130	37	10 - 130	<0.50	ug/L				
9375219	Total Suspended Solids	2024/05/08			96	80 - 120	<10	mg/L	8.7 (1)	20		
9375251	Nitrate (N)	2024/05/07	109	80 - 120	97	80 - 120	<0.10	mg/L	NC (1)	20		
9375251	Nitrite (N)	2024/05/07	115	80 - 120	102	80 - 120	<0.010	mg/L	NC (1)	20		
9375383	Dissolved Chloride (Cl-)	2024/05/08	NC	80 - 120	101	80 - 120	<1.0	mg/L	0.53 (1)	20		
9375385	Dissolved Sulphate (SO4)	2024/05/08	NC	75 - 125	96	80 - 120	<1.0	mg/L	1.3 (1)	20		

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9375734	1,4-Dichlorobenzene	2024/05/07	115	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30		
9375734	Benzene	2024/05/07	86	70 - 130	94	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	Ethylbenzene	2024/05/07	98	70 - 130	91	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	Methylene Chloride(Dichloromethane)	2024/05/07	90	70 - 130	92	70 - 130	<2.0	ug/L	NC (1)	30		
9375734	o-Xylene	2024/05/07	90	70 - 130	83	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	p+m-Xylene	2024/05/07	103	70 - 130	96	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	Toluene	2024/05/07	95	70 - 130	87	70 - 130	<0.20	ug/L	NC (1)	30		
9375734	Total Xylenes	2024/05/07					<0.20	ug/L	NC (1)	30		
9375734	Vinyl Chloride	2024/05/07	87	70 - 130	90	70 - 130	<0.20	ug/L				
9375736	Dissolved Organic Carbon	2024/05/06	NC	80 - 120	95	80 - 120	<0.4	mg/L	1.2 (1)	20		
9375979	pH	2024/05/06			102	98 - 103			0.33 (1)	N/A		
9376043	Total Chemical Oxygen Demand (COD)	2024/05/08	101	80 - 120	101	80 - 120	<4.0	mg/L	NC (1)	20		
9376058	Alkalinity (Total as CaCO3)	2024/05/07			102	85 - 115	<1.0	mg/L	1.3 (1)	20		
9376069	Conductivity	2024/05/07			102	85 - 115	<1.0	umho/cm	0.98 (1)	10		
9377119	Total Arsenic (As)	2024/05/09	104	80 - 120	102	80 - 120	<0.001	mg/L				
9377119	Total Barium (Ba)	2024/05/09	100	80 - 120	99	80 - 120	<0.005	mg/L	1.3 (1)	20		
9377119	Total Boron (B)	2024/05/09	NC	80 - 120	95	80 - 120	<0.02	mg/L	11 (1)	20		
9377119	Total Cadmium (Cd)	2024/05/09	103	80 - 120	103	80 - 120	<0.0001	mg/L	NC (1)	20		
9377119	Total Calcium (Ca)	2024/05/09	NC	80 - 120	96	80 - 120	<0.2	mg/L	1.0 (1)	20		
9377119	Total Chromium (Cr)	2024/05/09	97	80 - 120	96	80 - 120	<0.005	mg/L	NC (1)	20		
9377119	Total Copper (Cu)	2024/05/09	99	80 - 120	98	80 - 120	<0.002	mg/L	2.0 (1)	20		
9377119	Total Iron (Fe)	2024/05/09	97	80 - 120	96	80 - 120	<0.1	mg/L	3.1 (1)	20		
9377119	Total Lead (Pb)	2024/05/09	94	80 - 120	96	80 - 120	<0.0005	mg/L	NC (1)	20		
9377119	Total Magnesium (Mg)	2024/05/09	NC	80 - 120	96	80 - 120	<0.05	mg/L	3.3 (1)	20		
9377119	Total Manganese (Mn)	2024/05/09	98	80 - 120	95	80 - 120	<0.002	mg/L	3.9 (1)	20		
9377119	Total Nickel (Ni)	2024/05/09	97	80 - 120	95	80 - 120	<0.001	mg/L				
9377119	Total Potassium (K)	2024/05/09	100	80 - 120	99	80 - 120	<0.2	mg/L	2.6 (1)	20		
9377119	Total Sodium (Na)	2024/05/09	NC	80 - 120	95	80 - 120	<0.1	mg/L	2.4 (1)	20		
9377119	Total Zinc (Zn)	2024/05/09	103	80 - 120	105	80 - 120	<0.01	mg/L	NC (1)	20		

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9377555	Mercury (Hg)	2024/05/07	93	75 - 125	94	80 - 120	<0.0002	mg/L	NC (1)	20		
9380217	Total Ammonia-N	2024/05/10	NC	75 - 125	104	80 - 120	<0.15	mg/L	5.5 (1)	20		
9380458	Total Dissolved Solids	2024/05/09			97	80 - 120	<10	mg/L	1.4 (1)	20		
9381099	Phenols-4AAP	2024/05/08	NC (3)	80 - 120	105	80 - 120	<0.0040	mg/L	1.3 (4)	20		

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Duplicate Parent ID [ZBT506-02]

(3) Matrix Spike Parent ID [ZBT507-07]

(4) Duplicate Parent ID [ZBT507-07]

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D3738
Report Date: 2024/05/10

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere, Senior Scientific Specialist

Zunaira Allem, Project Manager Assistant

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

S2437676

BUREAU VERITAS

FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name: TCEC

Site No.:

Sample: Equilization Tank

Sample ID

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes. Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Filter Device: (Y) or N — 0.45 μ or ____ μ (circle or fill in)

Purging Device: ____ A-Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device: ____

X-Other: ____

Filter Type: A — A-In-line Disposable, B-Pressure, C-Vacuum, X-Other: ____

Sample Tube Type: ____ — A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other: ____

WELL DATA

Well Elevation (at TOC) ____ (ft/msl)

Depth to Water (DTW) (from TOC) ____ (ft)

Groundwater Elevation (GWE) (Site Datum, from TOC) ____ (ft msl)

Total Well Depth (from TOC) ____ (ft)

Stick Up (from ground elevation) ____ (ft)

Casing ID ____ (in)

Casing Material ____

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (μmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (μmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: ____ Units
050224	7.7	mS >20.00	19.3	277	0.81		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

FIELD COMMENTS

Sample Appearance: opaque — Odor: leachate — Color: black — Other: ____

Weather Conditions (required daily, or as conditions change): 17°C — Direction/Speed: 5 km/h N — Outlook: ____ — Precipitation: Y or (N)

Specific Comments (including purge/well volume calculations if required): ____

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/02/24	Eric Wilson	[signature]	KWDI
/ /			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2042

Custody Tracking Form

T891801

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: EQUILIZATION TANK
Last Sample: EQUILIZATION TANK SEMI-ANNUAL
Sample Count: 2

Relinquished By				Received By			
Eric Wilson	E.Wilson	Date	2024/05/03	Sowmya. Raganoni		Date	2024/05/03
		Time (24 HR)	10:00			Time (24 HR)	12:49
		Date		ARSHDEEP KAUR		Date	2024/05/03
		Time (24 HR)				Time (24 HR)	18:25
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): Eric Wilson

# of Coolers/Pkgs: 2

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

03-May-24 12:49
Patricia Legette
C4D3738

VIK ENV-1656

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	6	3	5
N	N	Y	3	3	4
Drinking Water Metals Preservation Check Done (Circle)				YES	NO

#752419

RECD IN LONDON

COR FCD-00383/4

Page 1 of 1

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 893260

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/05/17
Report #: R8153517
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D8247
Received: 2024/05/08, 09:36

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
ABN Compounds in Water by GC/MS	4	2024/05/09	2024/05/12	CAM SOP-00301	EPA 8270 m
Alkalinity	4	N/A	2024/05/15	CAM SOP-00448	SM 24 2320 B m
Biochemical Oxygen Demand (BOD)	4	2024/05/10	2024/05/15	CAM SOP-00427	SM 24 5210B m
Chloride by Automated Colourimetry	1	N/A	2024/05/10	CAM SOP-00463	SM 24 4500-Cl E m
Chloride by Automated Colourimetry	3	N/A	2024/05/13	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	1	N/A	2024/05/13	CAM SOP-00416	SM 24 5220 D m
Chemical Oxygen Demand	2	N/A	2024/05/14	CAM SOP-00416	SM 24 5220 D m
Chemical Oxygen Demand	1	N/A	2024/05/15	CAM SOP-00416	SM 24 5220 D m
Conductance in Water - On-site	4	N/A	2024/05/13		
Conductivity	4	N/A	2024/05/15	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	4	N/A	2024/05/14	CAM SOP-00446	SM 24 5310 B m
Field Measured Dissolved Oxygen in Water	4	N/A	2024/05/13		
Mercury in Water by CVAA	4	2024/05/14	2024/05/14	CAM SOP-00453	EPA 7470A m
Total Metals by ICPMS	4	N/A	2024/05/14	CAM SOP-00447	EPA 6020B m
Ammonia-N	4	N/A	2024/05/14	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	4	N/A	2024/05/10	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	4	2024/05/09	2024/05/15	CAM SOP-00413	SM 24th - 4500H+ B
Phenols (4AAP)	1	N/A	2024/05/10	CAM SOP-00444	OMOE E3179 m
Phenols (4AAP)	3	N/A	2024/05/13	CAM SOP-00444	OMOE E3179 m
Field Measured pH (4)	4	N/A	2024/05/08		Field pH Meter
Sulphate by Automated Turbidimetry	1	N/A	2024/05/10	CAM SOP-00464	SM 24 4500-SO42- E m
Sulphate by Automated Turbidimetry	3	N/A	2024/05/13	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	4	2024/05/09	2024/05/10	CAM SOP-00428	SM 24 2540C m
Field Temperature (4)	4	N/A	2024/05/08		Field Thermometer
Total Kjeldahl Nitrogen in Water	2	2024/05/10	2024/05/14	CAM SOP-00938	OMOE E3516 m
Total Kjeldahl Nitrogen in Water	2	2024/05/10	2024/05/15	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	4	2024/05/10	2024/05/14	CAM SOP-00407	SM 24 4500-P I
Total Suspended Solids	4	2024/05/09	2024/05/10	CAM SOP-00428	SM 24 2540D m
Turbidity - On-site	4	N/A	2024/05/13		
Un-ionized Ammonia (5)	4	2024/05/08	2024/05/15	Auto Calc.	PWQO
Volatile Organic Compounds in Water	2	N/A	2024/05/12	CAM SOP-00228	EPA 8260D

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 893260

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/05/17
Report #: R8153517
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D8247
Received: 2024/05/08, 09:36

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Volatile Organic Compounds in Water	2	N/A	2024/05/13	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

(4) This is a field test, therefore, the results relate to items that were not analysed at Bureau Veritas.
(5) Un-ionized ammonia is calculated using the total ammonia result and field data provided by the client for pH and temperature.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 893260

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/05/17
Report #: R8153517
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4D8247
Received: 2024/05/08, 09:36

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D8247
Report Date: 2024/05/17

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZCR005			ZCR006			ZCR007		
Sampling Date		2024/05/06 10:20			2024/05/06 10:20			2024/05/06 13:58		
COC Number		893260			893260			893260		
	UNITS	MH18	RDL	QC Batch	L DUP	RDL	QC Batch	CFA COMP	RDL	QC Batch
Calculated Parameters										
Total Un-ionized Ammonia	mg/L	9.1	0.16	9380794	8.3	0.16	9380794	2.4	0.047	9380794
Field Measurements										
Field Conductivity	uS/cm	6250	N/A	ONSITE	6250	N/A	ONSITE	4680	N/A	ONSITE
Field Dissolved Oxygen	mg/L	1.10	N/A	ONSITE	1.10	N/A	ONSITE	6.90	N/A	ONSITE
Field Temperature	Celsius	15.4	N/A	ONSITE	15.4	N/A	ONSITE	17.4	N/A	ONSITE
Field Measured Field Turbidity	NTU	92.2	N/A	ONSITE	92.2	N/A	ONSITE	127	N/A	ONSITE
Field Measured pH	pH	7.8		ONSITE	7.8		ONSITE	7.2		ONSITE
Inorganics										
Total Ammonia-N	mg/L	429	7.5	9383843	390	7.5	9383843	374	7.5	9383843
Total BOD	mg/L	<40	40	9385023	<40	40	9385023	13	2	9385023
Total Chemical Oxygen Demand (COD)	mg/L	310	12	9384613	280	20	9386471	290	20	9386471
Conductivity	umho/cm	5000	1.0	9382974	5500	1.0	9382974	4100	1.0	9382974
Total Dissolved Solids	mg/L	2280	10	9383447	2330	10	9383447	1100	10	9383447
Total Kjeldahl Nitrogen (TKN)	mg/L	380	10	9386508	410	10	9386508	370	10	9386508
Dissolved Organic Carbon	mg/L	94	0.4	9383491	92	0.4	9383491	110	0.4	9383491
pH	pH	8.04		9382963	7.97		9382963	7.73		9382963
Phenols-4AAP	mg/L	0.015	0.0010	9386779	0.014	0.0010	9386779	0.41	0.010	9386414
Total Phosphorus	mg/L	1.6	0.030	9386695	1.6	0.030	9386695	0.35	0.030	9386695
Total Suspended Solids	mg/L	14	10	9383674	22	10	9383674	65	10	9383674
Dissolved Sulphate (SO4)	mg/L	99	10	9384832	100	10	9384832	140	1.0	9384693
Alkalinity (Total as CaCO3)	mg/L	2400	5.0	9382972	2900	5.0	9382972	1700	1.0	9382972
Dissolved Chloride (Cl-)	mg/L	130	10	9384825	140	10	9384825	140	1.0	9384691
Nitrite (N)	mg/L	<0.050	0.050	9384288	<0.050	0.050	9384288	0.915	0.010	9384288
Nitrate (N)	mg/L	<0.50	0.50	9384288	<0.50	0.50	9384288	0.39	0.10	9384288

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D8247
Report Date: 2024/05/17

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		ZCR008		
Sampling Date		2024/05/06 11:10		
COC Number		893260		
	UNITS	SUMP	RDL	QC Batch
Calculated Parameters				
Total Un-ionized Ammonia	mg/L	0.016	0.00061	9380794
Field Measurements				
Field Conductivity	uS/cm	1110	N/A	ONSITE
Field Dissolved Oxygen	mg/L	3.7	N/A	ONSITE
Field Temperature	Celsius	16.2	N/A	ONSITE
Field Measured Field Turbidity	NTU	166	N/A	ONSITE
Field Measured pH	pH	6.9		ONSITE
Inorganics				
Total Ammonia-N	mg/L	5.63	0.15	9383843
Total BOD	mg/L	10	2	9385023
Total Chemical Oxygen Demand (COD)	mg/L	100	8.0	9386471
Conductivity	umho/cm	890	1.0	9382974
Total Dissolved Solids	mg/L	545	10	9383447
Total Kjeldahl Nitrogen (TKN)	mg/L	9	1	9386508
Dissolved Organic Carbon	mg/L	33	0.4	9383491
pH	pH	7.71		9382963
Phenols-4AAP	mg/L	0.0012	0.0010	9386779
Total Phosphorus	mg/L	0.16	0.030	9386695
Total Suspended Solids	mg/L	66	10	9383674
Dissolved Sulphate (SO4)	mg/L	49	10	9384832
Alkalinity (Total as CaCO3)	mg/L	280	1.0	9382972
Dissolved Chloride (Cl-)	mg/L	82	10	9384825
Nitrite (N)	mg/L	0.073	0.010	9384288
Nitrate (N)	mg/L	0.64	0.10	9384288

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D8247
Report Date: 2024/05/17

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZCR005	ZCR006		ZCR007		ZCR008		
Sampling Date		2024/05/06 10:20	2024/05/06 10:20		2024/05/06 13:58		2024/05/06 11:10		
COC Number		893260	893260		893260		893260		
	UNITS	MH18	L DUP	RDL	CFA COMP	RDL	SUMP	RDL	QC Batch
Metals									
Mercury (Hg)	mg/L	<0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.003	0.003	9391533
Total Arsenic (As)	mg/L	<0.01	<0.01	0.01	0.020	0.001	0.003	0.001	9388068
Total Barium (Ba)	mg/L	0.10	0.09	0.05	0.10	0.005	0.057	0.005	9388068
Total Beryllium (Be)	mg/L	<0.006	<0.006	0.006	<0.0006	0.0006	<0.0006	0.0006	9388068
Total Boron (B)	mg/L	59	57	1	1.7	0.02	2.3	0.02	9388068
Total Cadmium (Cd)	mg/L	<0.001	<0.001	0.001	<0.0001	0.0001	0.0001	0.0001	9388068
Total Calcium (Ca)	mg/L	69	68	2	120	0.2	49	0.2	9388068
Total Chromium (Cr)	mg/L	<0.05	<0.05	0.05	0.011	0.005	0.007	0.005	9388068
Total Copper (Cu)	mg/L	<0.02	<0.02	0.02	0.004	0.002	0.009	0.002	9388068
Total Iron (Fe)	mg/L	<1	1	1	2.9	0.1	5.2	0.1	9388068
Total Lead (Pb)	mg/L	<0.005	<0.005	0.005	0.0015	0.0005	0.0027	0.0005	9388068
Total Magnesium (Mg)	mg/L	64	64	0.5	70	0.05	20	0.05	9388068
Total Manganese (Mn)	mg/L	0.06	0.07	0.02	0.19	0.002	0.072	0.002	9388068
Total Nickel (Ni)	mg/L	0.04	0.03	0.01	0.018	0.001	0.016	0.001	9388068
Total Potassium (K)	mg/L	88	87	2	44	0.2	18	0.2	9388068
Total Sodium (Na)	mg/L	570	560	1	140	0.1	95	0.1	9388068
Total Zinc (Zn)	mg/L	<0.1	<0.1	0.1	0.17	0.01	0.03	0.01	9388068

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Bureau Veritas ID		ZCR005	ZCR006	ZCR007		ZCR008		
Sampling Date		2024/05/06 10:20	2024/05/06 10:20	2024/05/06 13:58		2024/05/06 11:10		
COC Number		893260	893260	893260		893260		
	UNITS	MH18	L DUP	CFA COMP	RDL	SUMP	RDL	QC Batch
Semivolatile Organics								
Benzo(a)pyrene	ug/L	<4.0	<4.0	<4.0	4.0	<1.0	1.0	9384105
1,2-Dichlorobenzene	ug/L	<10	<10	<10	10	<2.5	2.5	9384105
1,3-Dichlorobenzene	ug/L	<10	<10	<10	10	<2.5	2.5	9384105
1,4-Dichlorobenzene	ug/L	<10	<10	<10	10	<2.5	2.5	9384105
Hexachlorobenzene	ug/L	<10	<10	<10	10	<2.5	2.5	9384105
1,2,4-Trichlorobenzene	ug/L	<10	<10	<10	10	<2.5	2.5	9384105
2,4-Dichlorophenol	ug/L	<6.0	<6.0	<6.0	6.0	<1.5	1.5	9384105
Pentachlorophenol	ug/L	<20	<20	<20	20	<5.0	5.0	9384105
Phenol	ug/L	<10	<10	87	10	<2.5	2.5	9384105
2,4,6-Trichlorophenol	ug/L	<10	<10	<10	10	<2.5	2.5	9384105
Di-N-butyl phthalate	ug/L	<40	<40	<40	40	<10	10	9384105
Diethyl phthalate	ug/L	<20	<20	<20	20	<5.0	5.0	9384105
Dimethyl phthalate	ug/L	<20	<20	<20	20	<5.0	5.0	9384105
Surrogate Recovery (%)								
2,4,6-Tribromophenol	%	112	124	101		56		9384105
2-Fluorobiphenyl	%	63	61	62		58		9384105
2-Fluorophenol	%	43	43	41		13		9384105
D14-Terphenyl	%	86	84	84		80		9384105
D5-Nitrobenzene	%	84	77	77		81		9384105
D5-Phenol	%	30	26	29		15		9384105

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4D8247
Report Date: 2024/05/17

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

VOLATILE ORGANICS BY GC/MS (WATER)

Bureau Veritas ID		ZCR005	ZCR006		ZCR007	ZCR008		
Sampling Date		2024/05/06 10:20	2024/05/06 10:20		2024/05/06 13:58	2024/05/06 11:10		
COC Number		893260	893260		893260	893260		
	UNITS	MH18	L DUP	RDL	CFA COMP	SUMP	RDL	QC Batch
Volatile Organics								
Benzene	ug/L	<1.0	<1.0	1.0	1.9	<0.20	0.20	9383640
1,4-Dichlorobenzene	ug/L	<2.0	<2.0	2.0	1.3	<0.40	0.40	9383640
Ethylbenzene	ug/L	6.7	5.1	1.0	2.0	0.26	0.20	9383640
Methylene Chloride(Dichloromethane)	ug/L	<10	<10	10	<2.0	<2.0	2.0	9383640
Toluene	ug/L	1.8	3.9	1.0	3.5	<0.20	0.20	9383640
Vinyl Chloride	ug/L	1.9	1.7	1.0	<0.20	<0.20	0.20	9383640
p+m-Xylene	ug/L	25	23	1.0	8.2	0.72	0.20	9383640
o-Xylene	ug/L	8.4	7.3	1.0	3.5	0.39	0.20	9383640
Total Xylenes	ug/L	33	31	1.0	12	1.1	0.20	9383640
Surrogate Recovery (%)								
4-Bromofluorobenzene	%	92	93		94	95		9383640
D4-1,2-Dichloroethane	%	105	106		101	100		9383640
D8-Toluene	%	98	97		98	98		9383640

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

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

Package 1	3.3°C
Package 2	3.0°C

Sample ZCR005 [MH18] : Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.
ABN Analysis: Due to the sample matrix, a smaller than usual portion of the sample was used for extraction and a further dilution was required. Detection limits were adjusted accordingly.
VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Metal Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Biochemical Oxygen Demand (BOD) Analysis: Elevated DL reported using the lowest dilution of sample TKN < Ammonia: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample ZCR006 [L DUP] : Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limit was adjusted accordingly.
ABN Analysis: Due to the sample matrix, a smaller than usual portion of the sample was used for extraction and a further dilution was required. Detection limits were adjusted accordingly.
VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Metal Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Biochemical Oxygen Demand (BOD) Analysis: Elevated DL reported using the lowest dilution of sample

Sample ZCR007 [CFA COMP] : ABN Analysis: Due to the sample matrix, a smaller than usual portion of the sample was used for extraction and a further dilution was required. Detection limits were adjusted accordingly.
TKN < Ammonia: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample ZCR008 [SUMP] : ABN Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
Mercury Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9383640	4-Bromofluorobenzene	2024/05/11	94	70 - 130	95	70 - 130	96	%				
9383640	D4-1,2-Dichloroethane	2024/05/11	100	70 - 130	99	70 - 130	100	%				
9383640	D8-Toluene	2024/05/11	100	70 - 130	100	70 - 130	98	%				
9384105	2,4,6-Tribromophenol	2024/05/10	113	10 - 130	106	10 - 130	63	%				
9384105	2-Fluorobiphenyl	2024/05/10	51	30 - 130	82	30 - 130	84	%				
9384105	2-Fluorophenol	2024/05/10	30	10 - 130	53	10 - 130	32	%				
9384105	D14-Terphenyl	2024/05/10	77	30 - 130	81	30 - 130	75	%				
9384105	D5-Nitrobenzene	2024/05/10	62	30 - 130	95	30 - 130	88	%				
9384105	D5-Phenol	2024/05/10	21	10 - 130	35	10 - 130	26	%				
9382963	pH	2024/05/15			102	98 - 103			0.63 (1)	N/A		
9382972	Alkalinity (Total as CaCO3)	2024/05/15			96	85 - 115	<1.0	mg/L	0.67 (1)	20		
9382974	Conductivity	2024/05/15			103	85 - 115	<1.0	umho/cm	1.8 (1)	10		
9383447	Total Dissolved Solids	2024/05/10			95	80 - 120	<10	mg/L	0 (1)	20		
9383491	Dissolved Organic Carbon	2024/05/14	NC (2)	80 - 120	97	80 - 120	<0.4	mg/L	0.78 (3)	20		
9383640	1,4-Dichlorobenzene	2024/05/11	107	70 - 130	101	70 - 130	<0.40	ug/L	NC (1)	30		
9383640	Benzene	2024/05/11	96	70 - 130	94	70 - 130	<0.20	ug/L	NC (1)	30		
9383640	Ethylbenzene	2024/05/11	90	70 - 130	87	70 - 130	<0.20	ug/L	4.3 (1)	30		
9383640	Methylene Chloride(Dichloromethane)	2024/05/11	108	70 - 130	102	70 - 130	<2.0	ug/L	NC (1)	30		
9383640	o-Xylene	2024/05/11	79	70 - 130	77	70 - 130	<0.20	ug/L	NC (1)	30		
9383640	p+m-Xylene	2024/05/11	94	70 - 130	91	70 - 130	<0.20	ug/L	4.2 (1)	30		
9383640	Toluene	2024/05/11	92	70 - 130	90	70 - 130	<0.20	ug/L	NC (1)	30		
9383640	Total Xylenes	2024/05/11					<0.20	ug/L	4.2 (1)	30		
9383640	Vinyl Chloride	2024/05/11	95	70 - 130	93	70 - 130	<0.20	ug/L				
9383674	Total Suspended Solids	2024/05/10			97	80 - 120	<10	mg/L	NC (1)	20		
9383843	Total Ammonia-N	2024/05/14	NC	75 - 125	99	80 - 120	<0.15	mg/L				
9384105	1,2,4-Trichlorobenzene	2024/05/10	35	30 - 130	56	30 - 130	<0.50	ug/L				
9384105	1,2-Dichlorobenzene	2024/05/10	34	30 - 130	56	30 - 130	<0.50	ug/L				
9384105	1,3-Dichlorobenzene	2024/05/10	31	30 - 130	51	30 - 130	<0.50	ug/L				
9384105	1,4-Dichlorobenzene	2024/05/10	30	30 - 130	53	30 - 130	<0.50	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9384105	2,4,6-Trichlorophenol	2024/05/12	82	10 - 130	94	10 - 130	<0.50	ug/L	NC (1)	40		
9384105	2,4-Dichlorophenol	2024/05/12	61	10 - 130	84	10 - 130	<0.30	ug/L	NC (1)	40		
9384105	Benzo(a)pyrene	2024/05/12	111	30 - 130	99	30 - 130	<0.20	ug/L	NC (1)	40		
9384105	Diethyl phthalate	2024/05/10	101	30 - 130	112	30 - 130	<1.0	ug/L				
9384105	Dimethyl phthalate	2024/05/10	89	30 - 130	104	30 - 130	<1.0	ug/L				
9384105	Di-N-butyl phthalate	2024/05/12	119	30 - 130	123	30 - 130	<2.0	ug/L	NC (1)	40		
9384105	Hexachlorobenzene	2024/05/10	94	30 - 130	112	30 - 130	<0.50	ug/L				
9384105	Pentachlorophenol	2024/05/12	124	10 - 130	70	10 - 130	<1.0	ug/L	NC (1)	40		
9384105	Phenol	2024/05/12	23	10 - 130	36	10 - 130	<0.50	ug/L	NC (1)	40		
9384288	Nitrate (N)	2024/05/10	NC	80 - 120	103	80 - 120	<0.10	mg/L	2.4 (1)	20		
9384288	Nitrite (N)	2024/05/10	101	80 - 120	105	80 - 120	<0.010	mg/L	NC (1)	20		
9384613	Total Chemical Oxygen Demand (COD)	2024/05/13	95	80 - 120	102	80 - 120	<4.0	mg/L	3.2 (1)	20		
9384691	Dissolved Chloride (Cl-)	2024/05/10	115	80 - 120	97	80 - 120	<1.0	mg/L	0.86 (1)	20		
9384693	Dissolved Sulphate (SO4)	2024/05/10	NC	75 - 125	96	80 - 120	<1.0	mg/L	1.5 (1)	20		
9384825	Dissolved Chloride (Cl-)	2024/05/13	NC	80 - 120	101	80 - 120	<1.0	mg/L	2.9 (1)	20		
9384832	Dissolved Sulphate (SO4)	2024/05/13	NC	75 - 125	98	80 - 120	<1.0	mg/L	0.29 (1)	20		
9385023	Total BOD	2024/05/15					<2	mg/L	8.1 (1)	30	94	80 - 120
9386414	Phenols-4AAP	2024/05/10	103	80 - 120	102	80 - 120	<0.0010	mg/L	NC (1)	20		
9386471	Total Chemical Oxygen Demand (COD)	2024/05/14	NC (4)	80 - 120	97	80 - 120	<4.0	mg/L	0 (5)	20		
9386508	Total Kjeldahl Nitrogen (TKN)	2024/05/14	NC	80 - 120	100	80 - 120	<0.7	mg/L	1.0 (1)	20	100	80 - 120
9386695	Total Phosphorus	2024/05/14	98	80 - 120	101	80 - 120	<0.030	mg/L	3.1 (1)	25	96	80 - 120
9386779	Phenols-4AAP	2024/05/10	104	80 - 120	104	80 - 120	<0.0010	mg/L	0 (1)	20		
9388068	Total Arsenic (As)	2024/05/13	106	80 - 120	104	80 - 120	<0.001	mg/L				
9388068	Total Barium (Ba)	2024/05/13	100	80 - 120	99	80 - 120	<0.005	mg/L				
9388068	Total Beryllium (Be)	2024/05/13	103	80 - 120	105	80 - 120	<0.0006	mg/L				
9388068	Total Boron (B)	2024/05/13	NC	80 - 120	101	80 - 120	<0.02	mg/L	2.0 (1)	20		
9388068	Total Cadmium (Cd)	2024/05/13	104	80 - 120	105	80 - 120	<0.0001	mg/L	NC (1)	20		
9388068	Total Calcium (Ca)	2024/05/13	NC	80 - 120	99	80 - 120	<0.2	mg/L				
9388068	Total Chromium (Cr)	2024/05/13	96	80 - 120	95	80 - 120	<0.005	mg/L	NC (1)	20		
9388068	Total Copper (Cu)	2024/05/13	99	80 - 120	100	80 - 120	<0.002	mg/L	NC (1)	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9388068	Total Iron (Fe)	2024/05/13	NC	80 - 120	100	80 - 120	<0.1	mg/L				
9388068	Total Lead (Pb)	2024/05/13	96	80 - 120	100	80 - 120	<0.0005	mg/L	NC (1)	20		
9388068	Total Magnesium (Mg)	2024/05/13	NC	80 - 120	98	80 - 120	<0.05	mg/L				
9388068	Total Manganese (Mn)	2024/05/13	NC	80 - 120	99	80 - 120	<0.002	mg/L	0.054 (1)	20		
9388068	Total Nickel (Ni)	2024/05/13	95	80 - 120	98	80 - 120	<0.001	mg/L	3.1 (1)	20		
9388068	Total Potassium (K)	2024/05/13	NC	80 - 120	98	80 - 120	<0.2	mg/L				
9388068	Total Sodium (Na)	2024/05/13	NC	80 - 120	96	80 - 120	<0.1	mg/L				
9388068	Total Zinc (Zn)	2024/05/13	101	80 - 120	108	80 - 120	<0.01	mg/L	NC (1)	20		
9391533	Mercury (Hg)	2024/05/14	100 (6)	75 - 125	96	80 - 120	<0.0002	mg/L	NC (7)	20		

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [ZCR005-08]

(3) Duplicate Parent ID [ZCR005-08]

(4) Matrix Spike Parent ID [ZCR007-06]

(5) Duplicate Parent ID [ZCR007-06]

(6) Matrix Spike Parent ID [ZCR005-07]

(7) Duplicate Parent ID [ZCR005-07]

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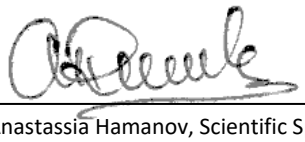
Bureau Veritas Job #: C4D8247
Report Date: 2024/05/17

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: EW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Anastassia Hamanov, Scientific Specialist

Zunaira Allem, Project Manager Assistant

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

S2437676

FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name: TCEC
Site No.: Sample: MH 18 (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Filter Device: Y or N — 0.45 µ or _____ µ (circle or fill in)

Purging Device: _____ A-Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Sampling Device: _____

X-Other: _____

Filter Type: A — A-In-line Disposable, B-Pressure, C-Vacuum, X-Other: _____

Sample Tube Type: _____ — A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other: _____

WELL DATA

Well Elevation (at TOC) _____ (ft/msl)
Depth to Water (DTW) (from TOC) _____ (ft)
Groundwater Elevation (GWE) (Site Datum, from TOC) _____ (ft msl)
Total Well Depth (from TOC) _____ (ft)
Stick Up (from ground elevation) _____ (ft)
Casing ID _____ (in)
Casing Material _____

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
050624	7.8	MS 6.25	15.4	92.2	1.10		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

Sample Appearance: translucent Odor: leachate Color: brown Other: _____

Weather Conditions (required daily, or as conditions change): 13°c Direction/Speed: 14 Km/h N Outlook: clear Precipitation: Y or (N)

FIELD COMMENTS

Specific Comments (including purge/well volume calculations if required): "L-DUP" taken

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/06/24	Eric Wilson	E. Wilson	RW21

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2021

S2437676

FIELD INFORMATION FORM

BUREAU VERITAS

WASTE MANAGEMENT

Site Name: TCEC

Site No.: ____ Sample: DUMP (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes. Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: [Y] or [N]

Filter Device: [Y] or [N] [0.45 µ] or [ ] µ (circle or fill in)

Purging Device: [ ] A-Submersible Pump B-Peristaltic Pump C-QED Bladder Pump D-Bailer E-Piston Pump F-Dipper/Bottle

Sampling Device: [ ]

Filter Type: [A] A-In-line Disposable B-Pressure C-Vacuum X-Other: ____

X-Other: ____

Sample Tube Type: [ ] A-Teflon B-Stainless Steel C-PVC D-Polypropylene X-Other: ____

WELL DATA

Well Elevation (at TOC) (ft/msl)	Depth to Water (DTW) (from TOC) (ft)	Groundwater Elevation (GWE) (Site Datum, from TOC) (ft msl)

Total Well Depth (from TOC) (ft)	Stick Up (from ground elevation) (ft)	Casing ID (in)	Casing Material

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
050624	6.9	mS 1.11	16.2	166	3.7		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

Sample Appearance: translucent Odor: leachate Color: yellow Other: ____

Weather Conditions (required daily, or as conditions change): 13°C Direction/Speed: 14Km/hN Outlook: clear Precipitation: Y or (N)

Specific Comments (including purge/well volume calculations if required): ____

FIELD COMMENTS

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/06/24	Eric Wilson	E. Wilson	RMDI
/ /			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2045

S2437676

FIELD INFORMATION FORM

WASTE MANAGEMENT

Site Name: TCE C

Site No.: ____ Sample: CFA COMP (Sample ID)

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: [Y] or [N]

Purging Device: ____ A-Submersible Pump B-Peristaltic Pump C-QED Bladder Pump D-Bailer E-Piston Pump F-Dipper/Bottle

Sampling Device: ____

X-Other: ____

Filter Device: [Y] or [N] [0.45 µ] or [____] µ (circle or fill in)

Filter Type: [A] A-In-line Disposable B-Pressure C-Vacuum X-Other: ____

Sample Tube Type: ____ A-Teflon B-Stainless Steel C-PVC D-Polypropylene X-Other: ____

WELL DATA

Well Elevation (at TOC) ____ (ft/msl)

Depth to Water (DTW) (from TOC) ____ (ft)

Groundwater Elevation (GWE) (Site Datum, from TOC) ____ (ft msl)

Total Well Depth (from TOC) ____ (ft)

Stick Up (from ground elevation) ____ (ft)

Casing ID ____ (in)

Casing Material ____

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit ____	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
05 06 24	7.2	mS 4.68	17.4	1.27	6.90		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

Sample Appearance: translucent Odor: leachate Color: yellow Other: ____

Weather Conditions (required daily, or as conditions change): 13°C Direction/Speed: NNW 4N Outlook: clear Precipitation: Y or (N)

Specific Comments (including purge/well volume calculations if required): ____

FIELD COMMENTS

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
05/06/24	Eric Wilson	E. Wilson	RWDI

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2022

Custody Tracking Form

T893260-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: MH18
Last Sample: SUMP
Sample Count: 4

Relinquished By				Received By			
Jeff Cleland		Date	2024/05/07			Date	2024/05/08
		Time (24 HR)	9:00			Time (24 HR)	09:36
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): Eric Wilson

# of Coolers/Pkgs: 2

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comm

08-May-24 09:36
Patricia Legette
C4D8247
VIK ENV-1521

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	1	2	6
Y	Y	Y	4	4	1
Y	Y	Y			

Drinking Water Metals Preservation Check Done (Circle) **YES** **NO**

COR FCD-00383/4

Page 1 of 1

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 935261

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/08/02
Report #: R8261436
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4M8360
Received: 2024/07/25, 15:19

Sample Matrix: Leachate
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Biochemical Oxygen Demand (BOD)	1	2024/07/26	2024/07/31	CAM SOP-00427	SM 24 5210B m
Conductance in Water - On-site	1	N/A	2024/07/29		
Dissolved Organic Carbon (DOC) (1)	1	N/A	2024/07/30	CAM SOP-00446	SM 24 5310 B m
Field Measured Dissolved Oxygen in Water	1	N/A	2024/07/29		
pH (2)	1	2024/07/26	2024/07/27	CAM SOP-00413	SM 24th - 4500H+ B
Field Measured pH (3)	1	N/A	2024/07/29		Field pH Meter
Field Temperature (3)	1	N/A	2024/07/29		Field Thermometer
Total Kjeldahl Nitrogen in Water	1	2024/07/29	2024/07/30	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2024/07/30	2024/07/30	CAM SOP-00407	SM 24 4500-P I
Turbidity - On-site	1	N/A	2024/07/29		
Volatile Organic Compounds in Water	1	N/A	2024/07/29	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 935261

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/08/02
Report #: R8261436
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4M8360

Received: 2024/07/25, 15:19

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

(2) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

(3) This is a field test, therefore, the results relate to items that were not analysed at Bureau Veritas.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4M8360
Report Date: 2024/08/02

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JC

RESULTS OF ANALYSES OF LEACHATE

Bureau Veritas ID		ZVE975		
Sampling Date		2024/07/23 10:30		
COC Number		935261		
	UNITS	**Equalization Tank**	**RDL**	**QC Batch**
Field Measurements				
Field Conductivity	uS/cm	17150	N/A	ONSITE
Field Dissolved Oxygen	mg/L	0.50	N/A	ONSITE
Field Temperature	Celsius	23.7	N/A	ONSITE
Field Measured Field Turbidity	NTU	132	N/A	ONSITE
Field Measured pH	pH	7.7		ONSITE
Inorganics				
Total BOD	mg/L	270	2	9539694
Total Kjeldahl Nitrogen (TKN)	mg/L	2000	50	9545257
Dissolved Organic Carbon	mg/L	950	2	9546490
pH	pH	7.67		9541369
Total Phosphorus	mg/L	11	0.20	9546166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4M8360
Report Date: 2024/08/02

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JC

VOLATILE ORGANICS BY GC/MS (LEACHATE)

Bureau Veritas ID		ZVE975		
Sampling Date		2024/07/23 10:30		
COC Number		935261		
	UNITS	Equalization Tank	RDL	QC Batch
Volatile Organics				
Benzene	ug/L	5.5	5.0	9540631
Ethylbenzene	ug/L	25	5.0	9540631
Toluene	ug/L	78	5.0	9540631
p+m-Xylene	ug/L	48	5.0	9540631
o-Xylene	ug/L	24	5.0	9540631
Total Xylenes	ug/L	72	5.0	9540631
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	97		9540631
D4-1,2-Dichloroethane	%	112		9540631
D8-Toluene	%	94		9540631

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JC

GENERAL COMMENTS

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

Package 1	4.7°C

Sample ZVE975 [Equalization Tank] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4M8360
Report Date: 2024/08/02

QUALITY ASSURANCE REPORT

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9540631	4-Bromofluorobenzene	2024/07/29	102	70 - 130	100	70 - 130	100	%				
9540631	D4-1,2-Dichloroethane	2024/07/29	109	70 - 130	107	70 - 130	106	%				
9540631	D8-Toluene	2024/07/29	99	70 - 130	101	70 - 130	95	%				
9539694	Total BOD	2024/07/31					<2	mg/L	7.4 (1)	30	100	80 - 120
9540631	Benzene	2024/07/29	106	70 - 130	103	70 - 130	<0.20	ug/L	NC (1)	30		
9540631	Ethylbenzene	2024/07/29	105	70 - 130	107	70 - 130	<0.20	ug/L	NC (1)	30		
9540631	o-Xylene	2024/07/29	104	70 - 130	106	70 - 130	<0.20	ug/L	NC (1)	30		
9540631	p+m-Xylene	2024/07/29	106	70 - 130	109	70 - 130	<0.20	ug/L	1.4 (1)	30		
9540631	Toluene	2024/07/29	104	70 - 130	105	70 - 130	<0.20	ug/L	NC (1)	30		
9540631	Total Xylenes	2024/07/29					<0.20	ug/L	1.4 (1)	30		
9541369	pH	2024/07/27			102	98 - 103			0.29 (1)	N/A		
9545257	Total Kjeldahl Nitrogen (TKN)	2024/07/30	114	80 - 120	99	80 - 120	<0.7	mg/L	3.4 (1)	20	101	80 - 120
9546166	Total Phosphorus	2024/07/30	104	80 - 120	108	80 - 120	<0.030	mg/L	1.2 (1)	25	114	80 - 120
9546490	Dissolved Organic Carbon	2024/07/30	99	80 - 120	100	80 - 120	<0.4	mg/L	3.4 (1)	20		

N/A = Not Applicable

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

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

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

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

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

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

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

(1) Duplicate Parent ID

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C4M8360
Report Date: 2024/08/02

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: JC

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere, Senior Scientific Specialist

Michael Damianidis, Project Manager Assistant

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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BUREAU VERITAS

FIELD INFORMATION FORM

WM WASTE MANAGEMENT

Site Name: TCC

Site No.:

Sample: EQUILIZATION Sample ID: Plank

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hr:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: Y or N

Purging Device:

Sampling Device:

X-Other:

A-Submersible Pump, B-Peristaltic Pump, C-QED Bladder Pump, D-Bailer, E-Piston Pump, F-Dipper/Bottle

Filter Device: Y or N 0.45 µ or ____ µ (circle or fill in)

Filter Type: A (A-In-line Disposable, B-Pressure, C-Vacuum, X-Other:)

Sample Tube Type: A (A-Teflon, B-Stainless Steel, C-PVC, D-Polypropylene, X-Other:)

WELL DATA

Well Elevation (at TOC) (ft/msl)

Depth to Water (DTW) (from TOC) (ft)

Groundwater Elevation (GWE) (Site Datum, from TOC) (ft msl)

Total Well Depth (from TOC) (ft)

Stick Up (from ground elevation) (ft)

Casing ID (in)

Casing Material

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
07 23 24	7.7	17.15	23.7	132	0.50		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

Sample Appearance: opaque Odor: sour/decay Color: brown Other:

Weather Conditions (required daily, or as conditions change): 24°C Direction/Speed: SW 4kts/hr Outlook: few clouds Precipitation: Y or N

Specific Comments (including purge/well volume calculations if required):

FIELD COMMENTS

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
07/23/2024	Maya DeForest		PWDI Air.

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2149

Custody Tracking Form

T935261-H

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: Equalization Tank
Last Sample: Equalization Tank
Sample Count: 1

Relinquished By				Received By			
Maja DeForest		Date	2024/07/24			Date	2024/07/25
		Time (24 HR)	8:15			Time (24 HR)	10:35
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): Maja DeForest

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Lab Comments:

Labeled By

Verified By

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	Y	Y	A

Drinking Water Metals Preservation Check Done (Circle) **YES** **NO**

25-Jul-24 15:19
Patricia Legette
C4M8360

A3P ENV-1652

COR FCD-00383/4

Page 1 of 1

eCOC: T935261

Expected TAT:	Standard TAT
Expected Arrival:	2024/07/25 12:00
Submitted By:	Jeffery Cleland
Submitted To:	Mississauga, ON (Env. Lab)

Invoice Information

Attn: Lisa Mertick lmertick@wm.com
Waste Management of Canada Corporation
5768 Nauvoo Rd. RR# 4
Watford , ON , N0M 2S0
Email to:
lmertick@wm.com
invoiceuploads@bureauveritas.com

Report Information

Attn: Jeffery Cleland
RWDI Inc.
4510 Rhodes Drive
Suite 530
Windsor , ON , N8W 5K5
Email to:
jeffery.cleland@rwdi.com
khalid.hussein@rwdi.com
james.hanna@rwdi.com
eric.wilson@rwdi.com
maja.deforest@rwdi.com
jake.artibello@rwdi.com

Project Information

Quote #:	C34991
PO/AFE#:	13384121
Project #:	2402553.01
Site Location:	Twin Creeks Environmental Centre

Analytical Summary

A: Standard TAT

Client Sample ID	Clnt Ref	Sampling Date/Time	Matrix	#Cont	ON-WLF-2024 TCLS - EQUALIZATIONTANK QUARTERLY
Equalization Tank	1	2024/07/23 10:30	WASTE WATER	6	A

Deadlines are estimates only and are subject to change. Please refer to your Job Confirmation report for final due dates.

Submission Information

# of Samples:	1
Details:	DOC was field filtered

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 977759

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/10/22
Report #: R8372378
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4V9823
Received: 2024/10/10, 11:17

Sample Matrix: Leachate
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
ABN Compounds in Water by GC/MS	1	2024/10/16	2024/10/17	CAM SOP-00301	EPA 8270 m
Alkalinity	1	N/A	2024/10/15	CAM SOP-00448	SM 24 2320 B m
Biochemical Oxygen Demand (BOD)	1	2024/10/11	2024/10/16	CAM SOP-00427	SM 24 5210B m
Chloride by Automated Colourimetry	1	N/A	2024/10/15	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	1	N/A	2024/10/16	CAM SOP-00416	SM 24 5220 D m
Conductance in Water - On-site	1	N/A	2024/10/21		
Conductivity	1	N/A	2024/10/15	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	1	N/A	2024/10/17	CAM SOP-00446	SM 24 5310 B m
Field Measured Dissolved Oxygen in Water	1	N/A	2024/10/21		
Mercury in Water by CVAA	1	2024/10/17	2024/10/18	CAM SOP-00453	EPA 7470A m
Total Metals by ICPMS	1	N/A	2024/10/17	CAM SOP-00447	EPA 6020B m
Ammonia-N	1	N/A	2024/10/18	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	1	N/A	2024/10/16	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	1	2024/10/11	2024/10/12	CAM SOP-00413	SM 24th - 4500H+ B
Phenol (4AAP)	1	N/A	2024/10/15	CAM SOP-00444	OMOE E3179 m
Field Measured pH (4)	1	N/A	2024/10/10		Field pH Meter
Sulphate by Automated Turbidimetry	1	N/A	2024/10/15	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	1	2024/10/11	2024/10/15	CAM SOP-00428	SM 24 2540C m
Field Temperature (4)	1	N/A	2024/10/10		Field Thermometer
Total Kjeldahl Nitrogen in Water	1	2024/10/11	2024/10/18	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2024/10/17	2024/10/17	CAM SOP-00407	SM 24 4500-P I
Total Suspended Solids	1	2024/10/11	2024/10/11	CAM SOP-00428	SM 24 2540D m
Turbidity - On-site	1	N/A	2024/10/21		
Un-ionized Ammonia (5)	1	2024/10/10	2024/10/21	Auto Calc.	PWQO
Volatile Organic Compounds in Water	2	N/A	2024/10/17	CAM SOP-00228	EPA 8260D

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your P.O. #: 13384121
Your Project #: 2402553.01
Site#: 500
Site Location: ON07
Your C.O.C. #: 977759

Attention: Khalid Hussein - Twin Creeks

RWDI Inc.
600 Southgate Drive
Guelph, ON
Canada N1G 4P6

Report Date: 2024/10/22
Report #: R8372378
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4V9823
Received: 2024/10/10, 11:17

using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

(4) This is a field test, therefore, the results relate to items that were not analysed at Bureau Veritas.
(5) Un-ionized ammonia is calculated using the total ammonia result and field data provided by the client for pH and temperature.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

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Bureau Veritas Job #: C4V9823
Report Date: 2024/10/22

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: N

RESULTS OF ANALYSES OF LEACHATE

Bureau Veritas ID		AFNU36			AFNU37		
Sampling Date		2024/10/09 01:30			2024/10/09 13:00		
COC Number		977759			977759		
	UNITS	Equalization Tank	RDL	QC Batch	Equalization Tank	RDL	QC Batch
Calculated Parameters							
Total Un-ionized Ammonia	mg/L				61	0.64	9693724
Field Measurements							
Field Conductivity	uS/cm				16740	N/A	ONSITE
Field Dissolved Oxygen	mg/L				1.78	N/A	ONSITE
Field Temperature	Celsius				18.7	N/A	ONSITE
Field Measured Field Turbidity	NTU				>999	N/A	ONSITE
Field Measured pH	pH				8.0		ONSITE
Inorganics							
Total Ammonia-N	mg/L				1440	15	9703932
Total BOD	mg/L	<400	400	9698091			
Total Chemical Oxygen Demand (COD)	mg/L				2900	200	9698096
Conductivity	umho/cm				20000	1.0	9699307
Total Dissolved Solids	mg/L				8250	20	9697148
Total Kjeldahl Nitrogen (TKN)	mg/L	2700	100	9698119			
Dissolved Organic Carbon	mg/L	960	4	9707376			
pH	pH	7.93		9698719			
Phenols-4AAP	mg/L				0.133	0.040	9701204
Total Phosphorus	mg/L	8.5	0.40	9705573			
Total Suspended Solids	mg/L				38	10	9697115
Dissolved Sulphate (SO4)	mg/L				54	20	9699333
Alkalinity (Total as CaCO3)	mg/L				7300	5.0	9699303
Dissolved Chloride (Cl-)	mg/L				2000	20	9699332
Nitrite (N)	mg/L				<0.20	0.20	9699312
Nitrate (N)	mg/L				<2.0	2.0	9699312

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Bureau Veritas Job #: C4V9823
Report Date: 2024/10/22

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: N

ELEMENTS BY ATOMIC SPECTROSCOPY (LEACHATE)

Bureau Veritas ID		AFNU37		
Sampling Date		2024/10/09 13:00		
COC Number		977759		
	UNITS	Equalization Tank	RDL	QC Batch
Metals				
Mercury (Hg)	mg/L	<0.003	0.003	9706269
Total Arsenic (As)	mg/L	0.15	0.01	9703624
Total Barium (Ba)	mg/L	0.29	0.05	9703624
Total Boron (B)	mg/L	15	0.2	9703624
Total Cadmium (Cd)	mg/L	<0.001	0.001	9703624
Total Calcium (Ca)	mg/L	83	2	9703624
Total Chromium (Cr)	mg/L	0.45	0.05	9703624
Total Copper (Cu)	mg/L	<0.02	0.02	9703624
Total Iron (Fe)	mg/L	2	1	9703624
Total Lead (Pb)	mg/L	<0.005	0.005	9703624
Total Magnesium (Mg)	mg/L	230	0.5	9703624
Total Manganese (Mn)	mg/L	0.19	0.02	9703624
Total Nickel (Ni)	mg/L	0.24	0.01	9703624
Total Potassium (K)	mg/L	730	2	9703624
Total Sodium (Na)	mg/L	2000	1	9703624
Total Zinc (Zn)	mg/L	0.2	0.1	9703624

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (LEACHATE)

Bureau Veritas ID		AFNU37		
Sampling Date		2024/10/09 13:00		
COC Number		977759		
	UNITS	Equalization Tank	RDL	QC Batch
Semivolatile Organics				
Benzo(a)pyrene	ug/L	<10	10	9703097
1,2-Dichlorobenzene	ug/L	<25	25	9703097
1,3-Dichlorobenzene	ug/L	<25	25	9703097
1,4-Dichlorobenzene	ug/L	<25	25	9703097
Hexachlorobenzene	ug/L	<25	25	9703097
1,2,4-Trichlorobenzene	ug/L	<25	25	9703097
2,4-Dichlorophenol	ug/L	<15	15	9703097
Pentachlorophenol	ug/L	<50	50	9703097
Phenol	ug/L	<25	25	9703097
2,4,6-Trichlorophenol	ug/L	<25	25	9703097
Di-N-butyl phthalate	ug/L	<100	100	9703097
Diethyl phthalate	ug/L	<50	50	9703097
Dimethyl phthalate	ug/L	<50	50	9703097
Surrogate Recovery (%)				
2,4,6-Tribromophenol	%	83		9703097
2-Fluorobiphenyl	%	42		9703097
2-Fluorophenol	%	22		9703097
D14-Terphenyl	%	76		9703097
D5-Nitrobenzene	%	47		9703097
D5-Phenol	%	21		9703097

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C4V9823
Report Date: 2024/10/22

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: N

VOLATILE ORGANICS BY GC/MS (LEACHATE)

Bureau Veritas ID		AFNU36			AFNU37		
Sampling Date		2024/10/09 01:30			2024/10/09 13:00		
COC Number		977759			977759		
	UNITS	Equalization Tank	RDL	QC Batch	Equalization Tank	RDL	QC Batch
Volatile Organics							
Benzene	ug/L	<10	10	9697171			
1,4-Dichlorobenzene	ug/L				<20	20	9697171
Ethylbenzene	ug/L	<10	10	9697171			
Methylene Chloride(Dichloromethane)	ug/L				<100	100	9697171
Toluene	ug/L	22	10	9697171			
Vinyl Chloride	ug/L				<10	10	9697171
p+m-Xylene	ug/L	17	10	9697171			
o-Xylene	ug/L	<10	10	9697171			
Total Xylenes	ug/L	17	10	9697171			
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	103		9697171	103		9697171
D4-1,2-Dichloroethane	%	109		9697171	109		9697171
D8-Toluene	%	97		9697171	97		9697171

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

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

Package 1	10.0°C
Package 2	9.0°C

Sample AFNU36 [Equalization Tank] : Biochemical Oxygen Demand (BOD) Analysis: Elevated DL reported using the lowest dilution of sample

VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample AFNU37 [Equalization Tank] : ABN Analysis: Due to the nature of the sample, a smaller amount was used for the analysis and a further dilution was required. Detection limits were adjusted accordingly.

Metals Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Nitrite/Nitrate: Due to colour interferences, sample required dilution. Detection limits were adjusted accordingly.

VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.
Mercury Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9697171	4-Bromofluorobenzene	2024/10/17	102	70 - 130	102	70 - 130	105	%				
9697171	D4-1,2-Dichloroethane	2024/10/17	112	70 - 130	109	70 - 130	109	%				
9697171	D8-Toluene	2024/10/17	98	70 - 130	99	70 - 130	97	%				
9703097	2,4,6-Tribromophenol	2024/10/16	85	10 - 130	83	10 - 130	64	%				
9703097	2-Fluorobiphenyl	2024/10/16	74	30 - 130	74	30 - 130	74	%				
9703097	2-Fluorophenol	2024/10/16	54	10 - 130	43	10 - 130	48	%				
9703097	D14-Terphenyl	2024/10/16	86	30 - 130	87	30 - 130	85	%				
9703097	D5-Nitrobenzene	2024/10/16	85	30 - 130	81	30 - 130	77	%				
9703097	D5-Phenol	2024/10/16	37	10 - 130	28	10 - 130	32	%				
9697115	Total Suspended Solids	2024/10/11			100	80 - 120	<10	mg/L	NC (1)	20		
9697148	Total Dissolved Solids	2024/10/15			102	80 - 120	<10	mg/L	0 (1)	20		
9697171	1,4-Dichlorobenzene	2024/10/17	97	70 - 130	99	70 - 130	<0.40	ug/L	NC (1)	30		
9697171	Benzene	2024/10/17	87	70 - 130	86	70 - 130	<0.20	ug/L	NC (1)	30		
9697171	Ethylbenzene	2024/10/17	86	70 - 130	87	70 - 130	<0.20	ug/L	NC (1)	30		
9697171	Methylene Chloride(Dichloromethane)	2024/10/17	85	70 - 130	84	70 - 130	<2.0	ug/L	NC (1)	30		
9697171	o-Xylene	2024/10/17	90	70 - 130	92	70 - 130	<0.20	ug/L	NC (1)	30		
9697171	p+m-Xylene	2024/10/17	87	70 - 130	88	70 - 130	<0.20	ug/L	NC (1)	30		
9697171	Toluene	2024/10/17	83	70 - 130	84	70 - 130	<0.20	ug/L	NC (1)	30		
9697171	Total Xylenes	2024/10/17					<0.20	ug/L	NC (1)	30		
9697171	Vinyl Chloride	2024/10/17	78	70 - 130	79	70 - 130	<0.20	ug/L	NC (1)	30		
9698091	Total BOD	2024/10/16					<2	mg/L	11 (1)	30	99	80 - 120
9698096	Total Chemical Oxygen Demand (COD)	2024/10/16	NC (2)	80 - 120	100	80 - 120	<4.0	mg/L	17 (3)	20		
9698119	Total Kjeldahl Nitrogen (TKN)	2024/10/18	NC (4)	80 - 120	99	80 - 120	<0.7	mg/L	0.072 (5)	20	98	80 - 120
9698719	pH	2024/10/12			101	98 - 103			0.63 (1)	N/A		
9699303	Alkalinity (Total as CaCO3)	2024/10/15			99	85 - 115	<1.0	mg/L	0.89 (1)	20		
9699307	Conductivity	2024/10/15			101	85 - 115	<1.0	umho/cm	0.51 (1)	10		
9699312	Nitrate (N)	2024/10/16	94	80 - 120	96	80 - 120	<0.10	mg/L	NC (1)	20		
9699312	Nitrite (N)	2024/10/16	107	80 - 120	108	80 - 120	<0.010	mg/L	NC (1)	20		
9699332	Dissolved Chloride (Cl-)	2024/10/15	105	80 - 120	97	80 - 120	<1.0	mg/L	2.6 (1)	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9699333	Dissolved Sulphate (SO4)	2024/10/15	NC	75 - 125	94	80 - 120	<1.0	mg/L	0.59 (1)	20		
9701204	Phenols-4AAP	2024/10/15	98	80 - 120	98	80 - 120	<0.0040	mg/L	NC (1)	20		
9703097	1,2,4-Trichlorobenzene	2024/10/16	59	30 - 130	56	30 - 130	<0.50	ug/L				
9703097	1,2-Dichlorobenzene	2024/10/16	61	30 - 130	59	30 - 130	<0.50	ug/L				
9703097	1,3-Dichlorobenzene	2024/10/16	52	30 - 130	50	30 - 130	<0.50	ug/L				
9703097	1,4-Dichlorobenzene	2024/10/16	55	30 - 130	53	30 - 130	<0.50	ug/L				
9703097	2,4,6-Trichlorophenol	2024/10/16	93	10 - 130	94	10 - 130	<0.50	ug/L				
9703097	2,4-Dichlorophenol	2024/10/16	80	10 - 130	78	10 - 130	<0.30	ug/L				
9703097	Benzo(a)pyrene	2024/10/16	109	30 - 130	108	30 - 130	<0.20	ug/L	NC (1)	40		
9703097	Diethyl phthalate	2024/10/16	98	30 - 130	96	30 - 130	<1.0	ug/L				
9703097	Dimethyl phthalate	2024/10/16	96	30 - 130	95	30 - 130	<1.0	ug/L				
9703097	Di-N-butyl phthalate	2024/10/16	102	30 - 130	101	30 - 130	<2.0	ug/L	NC (1)	40		
9703097	Hexachlorobenzene	2024/10/16	86	30 - 130	85	30 - 130	<0.50	ug/L				
9703097	Pentachlorophenol	2024/10/16	86	10 - 130	90	10 - 130	<1.0	ug/L				
9703097	Phenol	2024/10/16	43	10 - 130	35	10 - 130	<0.50	ug/L				
9703624	Total Arsenic (As)	2024/10/16	97	80 - 120	98	80 - 120	<0.001	mg/L	NC (1)	20		
9703624	Total Barium (Ba)	2024/10/16	88	80 - 120	94	80 - 120	<0.005	mg/L	1.7 (1)	20		
9703624	Total Boron (B)	2024/10/16	NC	80 - 120	92	80 - 120	<0.02	mg/L				
9703624	Total Cadmium (Cd)	2024/10/16	93	80 - 120	93	80 - 120	<0.0001	mg/L				
9703624	Total Calcium (Ca)	2024/10/16	NC	80 - 120	97	80 - 120	<0.2	mg/L				
9703624	Total Chromium (Cr)	2024/10/16	96	80 - 120	97	80 - 120	<0.005	mg/L	NC (1)	20		
9703624	Total Copper (Cu)	2024/10/16	94	80 - 120	93	80 - 120	<0.002	mg/L				
9703624	Total Iron (Fe)	2024/10/16	94	80 - 120	98	80 - 120	<0.1	mg/L	1.6 (1)	20		
9703624	Total Lead (Pb)	2024/10/16	91	80 - 120	95	80 - 120	<0.0005	mg/L	NC (1)	20		
9703624	Total Magnesium (Mg)	2024/10/16	89	80 - 120	93	80 - 120	<0.05	mg/L				
9703624	Total Manganese (Mn)	2024/10/16	93	80 - 120	94	80 - 120	<0.002	mg/L	0.87 (1)	20		
9703624	Total Nickel (Ni)	2024/10/16	89	80 - 120	93	80 - 120	<0.001	mg/L				
9703624	Total Potassium (K)	2024/10/16	NC	80 - 120	96	80 - 120	<0.2	mg/L				
9703624	Total Sodium (Na)	2024/10/16	NC	80 - 120	97	80 - 120	<0.1	mg/L	2.4 (1)	20		
9703624	Total Zinc (Zn)	2024/10/16	95	80 - 120	100	80 - 120	<0.01	mg/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9703932	Total Ammonia-N	2024/10/18	94	75 - 125	92	80 - 120	<0.15	mg/L	NC (1)	20		
9705573	Total Phosphorus	2024/10/18	93	80 - 120	96	80 - 120	<0.030	mg/L	4.8 (1)	25	103	80 - 120
9706269	Mercury (Hg)	2024/10/18	101	75 - 125	100	80 - 120	<0.0002	mg/L	NC (1)	20		
9707376	Dissolved Organic Carbon	2024/10/17	99	80 - 120	102	80 - 120	<0.4	mg/L	2.2 (1)	20		

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Duplicate Parent ID

(2) Matrix Spike Parent ID [AFNU37-06]

(3) Duplicate Parent ID [AFNU37-06]

(4) Matrix Spike Parent ID [AFNU36-03]

(5) Duplicate Parent ID [AFNU36-03]

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Bureau Veritas Job #: C4V9823
Report Date: 2024/10/22

RWDI Inc.
Client Project #: 2402553.01
Site Location: ON07
Your P.O. #: 13384121
Sampler Initials: N

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere, Senior Scientific Specialist

Louise Harding, Scientific Specialist

Michael Damianidis, Project Manager Assistant

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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FIELD INFORMATION FORM

BUREAU VERITAS

WASTE MANAGEMENT

Site Name: TLEC

Site No.:

Sample: EQ DILIZATION **Sample ID** TANK

This Waste Management Field Information Form is Required
This form is to be completed, in addition to any State Forms. The Field Form is submitted along with the Chain of Custody Forms that accompany the sample containers (i.e. with the cooler that is returned to the laboratory).

Laboratory Use Only/Lab ID:

PURGE INFO

PURGE DATE (MM DD YY)	PURGE TIME (2400 Hr Clock)	ELAPSED HRS (hrs:min)	WATER VOL IN CASING (Gallons)	ACTUAL VOL PURGED (Gallons)	WELL VOLs PURGED

Note: For Passive Sampling, replace "Water Vol in Casing" and "Well Vols Purged" w/ Water Vol in Tubing/Flow Cell and Tubing/Flow Cell Vols Purged. Mark Changes, Record field data below.

PURGE/SAMPLE EQUIPMENT

Purging and Sampling Equipment ... Dedicated: (Y) or N

Purging Device: ____ A-Submersible Pump B-Peristaltic Pump C-QED Bladder Pump D-Bailer E-Piston Pump F-Dipper/Bottle

Sampling Device: ____

X-Other: ____

Filter Device: (Y) or N (0.45 µ) or ____ µ (circle or fill in)

Filter Type: A A-In-line Disposable B-Pressure C-Vacuum X-Other: ____

Sample Tube Type: A A-Teflon B-Stainless Steel C-PVC D-Polypropylene X-Other: ____

WELL DATA

Well Elevation (at TOC) ____ (ft/msl)

Depth to Water (DTW) (from TOC) ____ (ft)

Groundwater Elevation (GWE) (Site Datum, from TOC) ____ (ft msl)

Total Well Depth (from TOC) ____ (ft)

Stick Up (from ground elevation) ____ (ft)

Casing ID ____ (in)

Casing Material ____

Note: Total Depth, Stick Up, Casing ID, etc. are optional and can be from historical data, unless required by Site/Permit. Well Elevation, DTW, and GWE must be current, obtained from site.

STABILIZATION DATA (Optional)

Sample Time (2400 Hr Clock)	Rate/Unit	pH (std)	Conductance (SC/EC) (µmhos/cm @ 25°C)	Temp. (°C)	Turbidity (ntu)	D.O. (mg/L - ppm)	eH/ORP (mV)	DTW (ft)
		1st	1st					
		2nd	2nd					
		3rd	3rd					
		4th	4th					
Input Range for 3 consec. readings or Permit/State requirements:		+/-	+/-	+/-	+/-	+/-	+/-	

Stabilization Data Fields are Optional *(i.e. complete stabilization readings for parameters required by WM, Site, or State). These fields can be used where four (4) field measurements are required by State/Permit/Site. If a Data Logger or other Electronic format is used, fill in final readings below and submit electronic data separately to Site. If more fields above are needed, use separate sheet or form.*

FIELD DATA

SAMPLE DATE (MM DD YY)	pH (std)	CONDUCTANCE (µmhos/cm @ 25°C)	TEMP. (°C)	TURBIDITY (ntu)	DO (mg/L - ppm)	eH/ORP (mV)	Other: Units
10 09 24	8.0	16.74	18.7	>999 ~~11.78~~	1.78		

Final Field Readings are required *(i.e. record field measurements, final stabilized readings, passive sample readings before sampling for all field parameters required by State/Permit/Site.)*

FIELD COMMENTS

Sample Appearance: Opaque Odor: Strong leachate odor Color: Dark Other: ____

Weather Conditions (required daily, or as conditions change): 12°C Direction/Speed: 25 km/h NW Outlook: partly cloudy Precipitation: Y or (N)

Specific Comments (including purge/well volume calculations if required):

EQ TANK Semi-Annual & Quarterly taken.

I certify that sampling procedures were in accordance with applicable EPA, State, and WM protocols (if more than one sampler, all should sign):

Date	Name	Signature	Company
10 09 24	Jake Arbitelli		RUPE
/ /			

DISTRIBUTION: WHITE/ORIGINAL - Stays with Sample, YELLOW - Returned to Client, PINK - Field Copy

Field Information Form v-3.1 06/20

2136

Custody Tracking Form

T977759

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: Equalization Tank
Last Sample: Equalization Tank
Sample Count: 2

Relinquished By				Received By			
J Arbik		Date	27/10/24			Date	28/10/24
		Time (24 HR)	14:06			Time (24 HR)	11:17
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): E. Wilson

# of Coolers/Pkgs: 2

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	10	10	10
Y	Y	Y	8	10	9
Drinking Water Metals Preservation Check Done (Circle)				YES	NO

~~10-Oct-24 11:17~~

T-39

Patricia Legette

C4V9823

KK5 ENV-1183

COR FCD-00383/4

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