APPENDIX E – SURFACE WATER MANAGEMENT PLAN

Brady Road Resource Management Facility
Surface Water Management Plan

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KGS Group 13-0107-015
May 2014

Prepared By

Tony J. Kuluk, P.Eng.
Solid Waste Management/Environmental Specialist

Approved By

Rob Sinclair, P. Eng
Department Head Environmental

KGS Group
Winnipeg, Manitoba

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Kontzamanis Graumann Smith MacMillan Inc.

KGS GROUP CONSULTING ENGINEERS

3rd Floor
865 Waverley Street
Winnipeg,
Manitoba
R3T 5P4
204.896.1209
fax: 204.896.0754
www.kgsgroup.com

May 20, 2014 File No. 13-0107-015

The City of Winnipeg
Water and Waste Department
Solid Waste Services Division
1120 Waverley Street
Winnipeg, Manitoba
R3T 0P4

ATTENTION: Mr. Irvin Slike
Project Coordinator

RE: City of Winnipeg
Brady Road Landfill Surface Water Management Plan

Dear Mr. Slike:

We are pleased to submit one (1) paper copy and one (1) electronic PDF copy of the Draft Report on the Brady Road Landfill Surface Water Monitoring Plan.

Please contact Tony Kuluk, P.Eng. or the undersigned with your comments.

Yours truly,

Rob Sinclair, P.Eng.
Department Head Environmental

TJK/kp

cc: J. Bert Smith, P.Eng.
Marci Friedman Hamm, P.Geo.

EXECUTIVE SUMMARY

In December, 2011, The City of Winnipeg filed an Environment Act Proposal for licensing the Brady Road Resource Management Facility (BRRMF).The review carried out in preparing this proposal indicated significant improvements required including overall site drainage. Funding for site improvements was approved in the 2012 and 2013 Capital Budget.

In February, 2013, The City issued a Request for Proposal for Professional Consulting Services for a Surface Water Management Plan for the BRRMF. This project included modelling clean and impacted runoff, designing the surface water management system, preparation of an erosion control plan, and reviewing, relevant operations plans, surface, groundwater and leachate monitoring plans and leachate seep control plans. In May, 2013, KGS Group was awarded a contract to carry out this work.

In December, 2013, the Province issued Environment Act Licence No. 3081 for the BRRMF. On April 23, 2014 a revised license was issued (No. 3081 R).

KGS Group has completed this work as documented in the accompanying report. The system is designed to separately manage clean and impacted runoff, with retention facilities (ponds) to provide for containment, testing and treatment of impacted runoff prior to release. The system considers top to bottom runoff control with erosion protection measures where required in system components. Relevant operations, leachate seep control and surface water, groundwater and leachate monitoring plans and practices have been reviewed and suggestions have been provided for improvements.

Throughout the report, references have been made to relevant licence requirements and implications for the surface water management and monitoring systems.

The report includes drawings of the system design and important reference information and presents conclusions (Section 16.0) and recommendations (Section 17.0) for system implementation, operations and licencing requirements.

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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

The City of Winnipeg awarded a contract to KGS Group on May 16, 2013 for professional engineering services to prepare a surface water management plan for the Brady Road Resource Management Facility (BRRMF) in response to Request for Proposal No. 21-2013.

Prudent surface water management is key to optimizing the overall site operation. KGS Group has carried out a thorough and rigorous approach to address water management, recognizing that positive drainage and maximizing separation of clean runoff from impacted water is fundamental to achieving environmental compliance for the future success of the BRRMF. A practical and cost effective surface water management plan helps minimize future risks to the operation while enhancing leachate control and reducing overall costs.

1.2 SITE BACKGROUND

The BRRMF is located in the south end of the City of Winnipeg as shown on Figure 1 and Dwg No.13-0107-015 CS. The current site activities are bordered by the Perimeter Highway on the north, Waverley Street on the east, Brady Road and the R.M. of Macdonald on the West, and Rue des Trappistes on the South. The site opened in 1973. Waste disposal took place from 1973 to 1978 in the southwest portion of the property, with development from 1986 to present in the northeast. The site area is 790 hectares, however the waste disposal areas have a footprint of approximately 25 ha in the southwest, and approximately 70 ha in the northeast. As of December 2013, approximately 9.0 M metric tonnes of waste were deposited at the site with an annual disposal rate of approximately 400,000 metric tonnes per year. Residential land use is present within 500 m of the site to the east and within 120 m north of the site (Waverly West development). Other surrounding land use is agricultural. Groundwater beneath the site is saline and is not used as potable water for rural residences. Residential developments are served by City of Winnipeg water services.

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1.3 KGS GROUP REPORT

This report outlines the design for the surface water management system for the BRRMF as well as a review of related monitoring and relevant operating procedures and leachate seepage retrofit mitigation measures employed at the site to date. The reviews are based on previous reports prepared for the City of Winnipeg and data supplied by the City of Winnipeg including the operating plan, leachate, groundwater and surface water monitoring and leachate seepage with retrofit measures details. Recent (2008 to 2012) monitoring data has been compiled from tables provided by the City of Winnipeg. All other monitoring data is on file with the City of Winnipeg Water and Waste Department, Solid Waste Services Division.

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2.0 SCOPE OF WORK

2.1 PROJECT OBJECTIVE

KGS Group has prepared a Surface Water Management Plan for The City of Winnipeg. Manitoba Conservation has issued Environment Act Licence No. 3081R (Licence) for the BRRMF (Appendix A) that includes conditions 41 (j) and k, requirements for submitting plans for surface and groundwater management including monitoring and reporting parameters within 6 months of the licence date (initial target date: June 23, 2014). The objective of this project was to prepare a comprehensive surface water management plan including a review of the current monitoring program and relevant operating procedures and to identify any gaps that require additional work to define conditions, or meet anticipated requirements of the final environmental license.

2.2 OVERVIEW

The Scope of Work for the Surface Water Management Study included:

1. Identify and Hydraulically Model Surface Water
2. Design the Surface Water Management System
3. Construction Management
4. Prepare an Erosion Control Plan
5. Review Operational and Leachate Control Plans including Surface Water Monitoring, Groundwater Monitoring and Leachate Monitoring

2.3 METHODOLOGY

2.3.1 Detailed Methodology

A detailed methodology for Items 1 through 5 is included below focusing on key activities that were carried out for completing this work:

Meetings - An initial meeting with the Solid Waste Services Division (SWSD) was held to confirm the proposed work plan. Subsequent regular review meetings were held throughout the project as required. Milestone meeting records are included in Appendices 1, 2 and 3.

Data Transfer - All relevant data was transferred from the Solid Waste Services Division, in electronic format. As well, information was provided on the proposed fill plan, and timing and information for the Community Resource Recovery Centre (CRRC) to be constructed at the BRRMF.

Topographic Survey - An aerial topographic survey was carried out in active work areas to update earlier survey data. Ground surveys were carried out to identify the location and elevations of all culverts at and around the BRRMF and at select locations in ditches.

Consultation with Province - Meetings were held with Manitoba Conservation (see Appendices 2 and 3) to confirm their requirements under the licence, as well as any other current or proposed requirements that apply to this work.

Water Source Identification and Hydraulic Modelling - Each identified water source was analyzed and hydraulically modelled in volume and treatment requirements.

Design Criteria – Specified design criteria were used for the stormwater management works (twenty-five (25) year event) and the erosion control measures (two (2) year event). Consideration was included for minimizing impacted runoff and leachate production.

Assessment of Seepage Control Works - The seepage control works constructed by the SWSD were reviewed and inspected after spring runoff and significant rainfall events to assess effectiveness. Recommendations were prepared for designs and practices for on-going control measures.

Detailed Design - Detailed designs were prepared for all drainage works including ditches and other runoff conveyances, stormwater retention basins, structures and erosion control measures. A high degree of consideration was given to those works or methods that can be easily be constructed by existing contractor resources available at the site using readily available and easily managed materials. The size of the impacted water retention facilities were determined based on optimum landfill operations and these facilities were located as close to the active operations as possible.

Treatment of Impacted Water - Cost effective and practical treatment alternatives for stored impacted water were identified. Some of the treatment measures to be considered for impacted water requiring treatment include aeration with odour control and freeze desalination in winter months to facilitate volume reduction of impacted water. Impacted water that meets City sewer use discharge requirements could be directed into a nearby sewer system as a possible future option.

Contract Administration/Contract Management - Contract administration/construction management are provided for construction of recommended drainage works as required.

Monitoring Plans and Operating Procedures - The current surface water and groundwater monitoring plans and relevant landfill operating procedures were reviewed for adequacy and recommendations were prepared for ongoing monitoring including additional monitoring related to the operation of the new drainage works, and for operating practices related to the proposed drainage works.

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Executive Summary - An Executive Summary was provided for this report as required.

Scope Change in Orders - In August, 2013, the need arose for additional topographical information to enable the calculation of volume of refuse disposed of in the past 12 months. This was undertaken under Scope Change Order No. 1. Also, Scope change order No. 2 was issued to change the substantial completion date to December 20, 2013.

2.3.2 Methodology - Monitoring and Operating Procedures

2.3.2.1 Review of Current Surface and Groundwater Monitoring Program

Regulatory and Compliance Issues

- Evaluate existing surface and groundwater monitoring program.
- Contact appropriate staff within Manitoba Conservation and Manitoba Water Stewardship to identify general and site specific groundwater and surface water requirements for the landfill under existing regulations.
- Evaluate requirements under the draft environmental license.
- Discuss future compliance considerations with provincial staff including any pending or proposed legislation or best management practices as well as a period of 2 to 3 years to define general quality trends and associated treatment requirements.

Surface Water Monitoring Program

- Establish off-site compliance point(s)
- Establish off-site water quality discharge targets with Manitoba Environment
- Establish an adequate number of upstream points to define each contributing source/drainage area independently so that areas contributing various contaminants can be isolated if they occur.
- Identify potential leachate seep locations to be monitored
- Establish parameters to be monitored and sampling frequency
- Consider the need for flow monitoring to assess loading of parameters of concern if needed or practical
- Assess sample collection methods including equipment, minimizing cross-contamination, sample replicates and blanks, laboratory analysis tests, chain of custody and recordkeeping and laboratory certification and quality assurance/quality control.
- Propose recommendations for changes in the surface water monitoring program based on the proposed drainage works and their operation including existing ponds, new ponds, and new wetland areas and ditching.

Groundwater Monitoring Program

- Evaluate the number and location of sampling points in the overburden and bedrock aquifer in relation to upgradient and downgradient groundwater flow system.
- Assess groundwater elevation monitoring.

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- Identify representative leachate well locations for sampling and monitoring leachate level mounding within the landfill.
- Establish parameters to be monitored and sampling frequency.
- Assess sample collection methods including equipment, purging procedures, in-field filtering for metals, special procedures for volatile organics or other organic contaminant sampling, minimizing cross-contamination, sample replicates and blanks, laboratory analysis tests, chain of custody and recordkeeping and laboratory certification and quality assurance/quality control.
- Assess groundwater quality data to define on-site and potential off-site groundwater impacts

2.3.2.2 Landfill Operating Procedures for Leachate Management

- Evaluate existing leachate program.
- Identify leachate monitoring issues.
- Propose ongoing program.

2.3.2.3 Landfill Operating Procedures for Water Management

- Consider The City's Draft Landfill Operating Procedures in the development of the Surface Water Management plan so that the two plans effectively manage waste materials and resulting surface water flows.
- Identify areas of the draft Operating Plan requiring revision or further development.
- Develop recommendations to minimize the area of the four current working faces to reduce impacted water volumes.
- Assess surface water quality sampling data early in the project to determine the general quality range of clean and impacted surface water.
- Further development of non-surface water related portions of the draft Operating Procedures is not included in the scope for this project.

2.3.2.4 Information Provided by the City of Winnipeg

- Recent background reports
- Recent, tabulated Groundwater, surface water and leachate monitoring data
- Plans showing location of all groundwater, surface water, leachate and gas monitoring locations. GPS locations of monitoring points.
- Drilling logs for subsurface installations (wells, piezometers and gas probes).
- Written protocols for environmental sampling.

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3.0 BACKGROUND REVIEW

3.1 BACKGROUND DOCUMENTS

Recent reports reviewed for this study are summarized below, with full references in Section 19.

- ***Brady Road Landfill Hydrogeologic Study prepared by UMA Engineering Ltd. 1987.***

  Contains a definition of hydrogeological and geological conditions as well as recommendations for landfill design parameters, environmental protection measures and monitoring programs.

- ***Environment Act Proposal Brady Road Resources Recycling Facility prepared by Winnipeg Water and Waste Department Solid Waste Services Division, and Environmental Impact Assessment of Brady Road Landfill and Future Resources Management Facility prepared by Stantec, December 2011.***

  Contains project information in support of the Environment Act Proposal and licencing process. Includes information on background geology, hydrogeology and hydrology, analysis of groundwater flow, groundwater monitoring data, leachate monitoring data, surface water flow, surface water quality, and predictive estimates of environmental effects on groundwater and surface water.

- ***Brady Road Resources Management Facility Operating Plan Version 1.0 prepared by Stantec, December 2011.***

  Sections pertinent to this study are described. Contains a section on monitoring including analytical methods and reporting. Includes groundwater performance standards and assessment criteria, monitoring well installation, sampling and measurements, analytical parameters and well maintenance. Includes performance standards and assessment criteria for surface water and sampling measurements. Includes monitoring plan for leachate and landfill gas. Includes detailed safe work procedures and job hazard analysis sheets (JHA) for leachate, gas and groundwater sampling.

- ***Brady Road Landfill Environmental Sampling Standards of Operation, prepared by City of Winnipeg Solid Waste Services Division, Planning and Environmental Branch, December 4, 2012.***

  Contains detailed procedures for groundwater, leachate, surface water and gas sampling.

- ***Groundwater and Leachate Chemistry at the Brady Landfill Prepared by Stantec, February 2011***

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Contains an assessment of groundwater and leachate quality. Similar information is incorporated into the December 2011 Environmental Impact Assessment.

- ***Leaf and Yard Composting Facility and Pilot Biosolids Composting Facility at Brady Road Resource Management Facility Final Conceptual Design and Operations Report, prepared by CH2MHill, December 2012***

  Part of the report contains a summary of hydrology, geology and hydrogeology and groundwater and surface water quality for the whole facility. Includes a recommended monitoring program for the Yard waste Composting and Pilot Biosolids Compost facility.

3.2 SITE DEVELOPMENT AND OPERATIONS

Surface water sedimentation and treatment features are not currently part of the operation of the BRRMF, but are being designed as part of the Surface Water Management Plan for implementation.

3.2.1 Resource Recovery Focus

On October 19, 2011, City of Winnipeg Council approved the Garbage Recycling Master Plan. The aim of this plan is to ultimately achieve a greater than 50% waste diversion rate through increased recycling and composting. The focus of the Brady Road Landfill area is to change from waste burial to resource recovery, and therefore this site was renamed the Brady Road Resource Management Facility (BRRMF). The BRRMF will host composting facilities and one of four planned Community Resource Recovery Centres.

3.2.2 Environment Act Proposal

In December, 2011, the City filed an Environment Act proposal with the Province for licensing the BRRMF. An extensive review of the Brady Road Landfill site was conducted to prepare the application for submission. This review indicated the need for significant drainage, roadway and other site improvements. In keeping with best practices for landfill operations, runoff from active landfill areas would be directed to retention ponds and tested for acceptability for release to local surface water drainage features. Criteria for discharge would be proposed. A wetlands treatment system would also be considered. Clean run-off would connect directly to external

drainage. Funding for the site improvements was approved in the 2012 and 2013 Solid Waste Disposal Fund Capital Budgets.

Site development and operations are described in the Brady Road Environment Act Proposal, available at http://gov.mb.ca/conservation /eal/registries/5556_bradyroad/index.html

3.2.3 Primary Site Features

In 2012, work commenced on construction of leaf and yard waste and biosolids composting facilities south of Charette Road between the old and more recent disposal areas.

Waste areas are shown in Appendix E-2 and include:

- An older complete burial area adjacent to Brady Road (near well 7)
- A second older completed burial area in the west portion of the property consisting of 6 cells deposited from 1974 though 1978
- A more recent disposal area containing cells constructed 1970 through present in the north east portion of the property.

Site development consisted of excavation 5 to 6 m below ground surface and filling above ground to design height.

A leachate collection system has been present in cells since 1987 in the northeast portion of the property (Appendix E-2). Perimeter leachate collection only is present in 1976 to 1978 cells in the west portion of the property.

3.2.4 Previous and Recent Work on Surface Water Management

There has already been some progress towards changes to the site drainage system with the construction of the Leaf and Yard Waste and Biosolids Composting area at the BRRMF. The composting area has two 25 year, 24 hour event storm event storage ponds for impacted runoff from the composting operations, one for the leaf and yard waste composting operation and one for the biosolids composting operation. Clay borrow pits for pad construction were located in areas identified for potential engineered wetlands/retention ponds. Also, the main drainage ditch traversing the BRRMF has been rerouted to bypass the composting operation and feed

through two prior constructed borrow pits, ultimately connecting to the main drainage ditch downstream.

In 2013, a landfill gas (LFG) collection and flaring project was completed on the most recently closed portion of the landfill. During the course of this project the need arose to ensure that there was no conflict between the proposed drainage works and the LFG system components such as the pumped condensate drain points and header system. Ditch designs were prepared to ensure adequate separations from the LFG system components.

In 2013, work continued for intercepting leachate seeps and directing the leachate into the leachate collection system. An engineering review of the seep control measures is included in this project, as well as development of construction standards and practices for subsequent leachate seepage control.

In 2013 work began to provide additional disposal capacity in advance of the new landfill cell planned to be operational in 2014. Design of a new main haul road and the CRRC at the BRRMF were initiated in 2013. Also, Manitoba Infrastructure and Transportation proposed a new alignment for the Perimeter Highway north of the BRRMF. All of these developments required consideration in the development of the surface water management plan.

A portion of the west landfill collection ditch was constructed in 2013 according to the ditch design prepared.

On December 23, 2013, the Province has issued an Environment Act licence for the BRRMF which was revised in April, 2014. Conditions of this license include the requirement for submission of plans for operation, monitoring and contingency response for the surface water management system. Also, according to licence condition 117, if required, a Water Rights Licence may be required for drainage works that cause water to leave the development a minimum of ten (10) days prior to construction. The three types of surface water to be considered are clean runoff, impacted water (clean water that has come in contact with waste, segregated storage areas, and composting pad, etc.) and leachate.

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3.3 SURFACE WATER, LOCAL GEOLOGY AND HYDROGEOLOGY

Surface Water - Regional surface water enters the site from land drainage ditches from the north along Brady Road and from the west along Charette Road. The Charette Road ditch ends near the west end of the site at Brady Road. Internally, clean runoff is to be separated from impacted runoff and the impacted runoff is to be tested and treated if necessary prior to release. Drainage leaves the site through a weir, then enters a tributary of the Westendorf Coulee, also known as the Grandmont Drain, a tributary of the La Salle River. The La Salle River is located 1.5 km south east of the landfill.

Regional Geology -Surficial units consist of (in descending order): Lake Agassiz deposits (consisting of an upper complex zone of silty clay and clay above glaciolacustrine silty clay); silt till; and Paleozoic Carbonate bedrock.

Site Geology and Hydrogeology - Site geology and hydrogeology is summarized in the UMA (1987) report, the Brady Road Resources Management Facility Operating Plan (City of Winnipeg 2011) and the Environmental Assessment (Stantec 2011). Ground surface elevation is approximately 234 m. The upper glaciolacustrine clay has a thickness between 11 and 16 m with weathered olive-brown clay found in the upper 5 to 8 m and grey clay found below that depth. Silt till with a thickness of 1.5 to 13 m is found below the clay. The total overburden thickness ranges from 16 to 29 metres. Bedrock consists of Ordovician Age white dolomitic limestone of the Red River Formation.

The water table elevation in the clay is typically within 1.5 m of ground surface. Before spring runoff in 2009 the water table elevation was typically el. 232 to 233 m. The piezometric surface in the till was lower, typically el 226 to 229 m. The piezometric surface in the bedrock is found at a depth of 7 to 9 m below ground surface (el 225 to 227 m) during non-spring conditions, and up to el 229 m in spring, 5 m below ground surface. Groundwater flow is to the northeast with a low average horizontal hydraulic gradient ranging from 0.0003 m/m in the southwest to 0.002 m/m in the northeast based on 2009 conditions. Vertical gradients are downward through the clay to the till, but minimal through the till to the bedrock. The till often reflects bedrock elevations and as such has limited downward gradient as noted above. Vertical flows downward through the lacustrine deposits are minimal to non-existent based on bedrock water quality data.

Leachate elevations are mounded and are 7 to 8 m above original prairie level in the prior wet weather cell in the southeast leg of the eastern fill area and are perched in other areas of the site, contributing to leachate seeps and breakouts.

No domestic wells were found within a 3 km radius of the site (CH2MHill 2012). Groundwater in this area is brackish/saline. The local residential areas are serviced by the City of Winnipeg Water System.

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4.0 REGULATORY AND COMPLIANCE ISSUES

A surface water management plan has been prepared and relevant landfill operating procedures and the existing surface and groundwater monitoring programs have been evaluated. The leachate monitoring program has also been evaluated. A separate consultation process is recommended with the City of Winnipeg and Manitoba Conservation regarding specific information and groundwater requirements. A discussion of compliance considerations is also recommended with provincial staff, including any pending or proposed legislation or best management practices.

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5.0 REGIONAL SURFACE WATER DRAINAGE SYSTEM

5.1 REGIONAL DRAINAGE

The region surrounding the site is primarily drained by the La Salle River, Westendorf Coulee and municipal roadside ditches. Drainage is generally to the east and south and is generally received by the La Salle river prior to entering the Red River (see Figure 2). The Westendorf Coulee, also known as Grandmont Creek, is a tributary to the La Salle River that originates northeast of the facility and drains in an easterly to southeasterly direction. Flow is intermittent.

The location and drainage direction of municipal ditches in the vicinity of Brady Road Landfill is also shown on Figure 2. Municipal ditches surrounding the site are primarily first-order drains with the exception of the municipal ditch associated with Rue des Trappistes, which is a second order drain.

5.2 EXTERNAL DRAINAGE ENTERING BRRMF

External drainage originating from agricultural lands enters the site from the west and flows into the main ditch running north of Charette Road as shown on Figure 2. The flow entering the BRRMF typically peaks in the spring but remains dry for the rest of the year except after storm events, when flow can be present for several days. Regional drainage changes to the west have reduced, but not eliminated external flows entering the site.

The potential to reduce the width (or footprint) of the main ditch north of Charette Road was considered during the assignment to provide more space for either road widening, or more area for future landfilling north of the road. Re-routing the upstream catchment area to the ditch on Rue des Trappistes was also considered, to completely eliminate external flow.

Reducing the footprint was not recommended because it would require infilling a significant length of the ditch. The base of the ditch could be backfilled to a new invert by displacing softened soils expected in the bottom of the ditch. This new base however would not be stable enough to backfill and compact the side-slopes so as to achieve the intended reduced ditch width/footprint. Alternatively coarse graded granular fill could be used for backfill, or soft soils in

the bottom of the ditch could be excavated and backfilled with well compacted clay. Similarly, soft soils on the side-slope would require removal and backfilling with either compacted granular or clay soil.

This construction would be very risky during spring to fall storm events since there would be no practical means to divert flows during construction. The only practical alternative would be to construct during seasons with low potential for rainfall, however this increases the risk of construction during freezing weather where only granular backfill would be acceptable, with a significantly higher cost. Also, the modelling carried out for the proposed site drainage system demonstrated adequate flow containment but with little excess capacity, therefore reducing the width of the Charette Road ditch is not recommended.

The complete diversion of external flow is another possibility, however this was not examined in detail since the proposed system does not require this. The cost-benefit of this alternative can be examined as a separate exercise if desired. One factor to be considered in such an examination would be the future on-site water needs, given that the groundwater underlying the site is naturally saline and unsuitable for some purposes. On site water needs such as irrigation, wetting compost, fire-fighting, dust suppression and washing, may be more practically met from surface water flows. Such needs may require that enough flow be available from all sources including external sources to replenish storage in constructed ponds at the site. Diverting external flows would be a disadvantage in this case. If a cost benefit analysis was positive resulting a diversion actually being completed, the reduced flows entering from off site would result in a net improvement in the hydraulic performance of the proposed system.

5.3 DRAINAGE LEAVING BRRMF

Drainage leaving the BRRMF is controlled by a concrete weir structure at the east limit of the site which discharges to the Westendorf Coulee and then to the La Salle River. The La Salle River at its nearest point, is located approximately 1,500 m south and east of the BRRMF. The La Salle River watershed contains flat to rolling terrain, and drains in an easterly direction from its headwaters east of Portage La Prairie, Manitoba, to its outlet at the Red River, south of St. Norbert, Manitoba. The La Salle River has a gross drainage area of approximately 2400 km^2 at the point where it enters the Red River (Stantec 2011).

Analysis of available streamflow data in the La Salle River (Stantec 2011) indicates that streamflow varies considerably monthly (and from year to year). Annual streamflow usually peaks in April during the spring freshet; on average, and 70 to 75% of the annual runoff volume occurs annually from the beginning of March to the end of May. The La Salle River experiences periods of zero flow, and as a result is classified as an intermittent stream.

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6.0 EXISTING INTERNAL SURFACE WATER DRAINAGE SYSTEM

6.1 EXISTING SYSTEM

The existing internal drainage system does not include any segregation of clean runoff from potentially impacted runoff flows. The majority of the on-site runoff joins the main ditch traversing the site from the west, along the north side of Charette Road and then runs along the south and east side of the easternmost completed landfilled area and then to the discharge point at the weir at the east limit of the site.

In 2012, initial changes to this system began as the result of the implementation of the leaf and yard waste and biosolids compost facilities and leachate seepage control works. The composting area has two 25 year event stormwater storage ponds for impacted runoff from the composting operations, one for the leaf and yard waste and one from the biosolids composting operation. Clay borrow pits for compost pad construction were located in areas identified for potential engineered wetlands. Also, the main ditch traversing the BRRMF has been rerouted to bypass to the west of the composting operation and feed through the two previously constructed borrow pits (clean water ponds). Flow then proceeds south of the proposed dry ponds area and then connects to the main ditch downstream.

The drainage system including the numerous existing culvert installations are shown on attached Dwg No.13-0107-015 G01. Reducing the number of culvert installations as much as possible has been a design objective in order to minimize maintenance requirements and the potential for blockage and overflow if culverts are not adequately maintained. Annual surveillance of the large number of existing culverts alone requires a significant effort, and it is recommended that a review be undertaken to identify redundant existing culverts.

The existing concrete weir structure at the east limit of the BRRMF appears to be in good condition. Also, there is a blockage on Manitoba Infrastructure and Transportation (MIT) lands downstream of the weir that prevents water levels from draining down to the sill level of the weir. The SWSD will be obtaining an easement to permit cleaning out this blockage.

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7.0 PROPOSED NEW DRAINAGE SYSTEM DESIGN CONCEPTS

7.1 DESIGN AND OPERATING PRINCIPLES

The following design/operating principles apply to this work:

1. Leachate and impacted runoff production must be minimized, with no surface water ponding on the landfill, final cover placed over completed areas and use of the smallest possible number and size of tipping faces.
2. Top to bottom runoff control must be utilized on the landfill to minimize cover erosion and exposure of the underlying refuse.
3. Clean water drainage must be separated from impacted water, with impacted water directed to adequate storage facilities for testing and treatment, if required, prior to release.
4. Conveyance ditches must be designed and maintained to run dry. They must not retain runoff water.
5. Unlined engineered wetlands or dry ponds may be utilized for clean water flow equalization, minor nutrient removal and suspended solids settling.
6. Lined retention basins must be utilized for storage of impacted runoff.
7. The storm water management works shall be designed for the twenty-five (25) year, 24 hour storm event and the erosion control measures shall be designed for the two (2) year event.
8. The need for mechanical systems and manpower resources for operating the system must be minimized.

7.2 SYSTEM DESIGN CONCEPTS

Licence condition 112 requires impacted and non-impacted surface water to be managed to prevent uncontrolled release from the Development.

Licence condition 113 requires permanent and temporary dyke structures and surface drainage to divert non-impacted surface water from active areas and Development Components under construction to the Surface Water Management System according to the plan.

Licence condition 115 requires submission of a surface water design plan within 6 months of the Licence date (due October 23, 2014). The plan is to include three tiers of Water Management addressing clean, impacted and leachate water with water management from all surface elevations of the Development.

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One of the principle determining factors in development of the concept and design for the new drainage system is the position of Manitoba Conservation regarding the need for liners for any retained impacted runoff. Manitoba Conservation has advised the City that it will be permissible to direct clean water to an engineered wetlands. Impacted water, however, will require any retention facilities including engineered wetlands are to be underlain by a one metre thick impervious constructed clay liner or equivalent artificial liner (reference Appendix B-1). This advice was further clarified as it pertained to ditches (reference Appendix B-2).

The design, therefore, focuses on the following:

- Minimizing the catchment that is considered impacted. The system must consider top to bottom management of runoff in the landfilled areas, not only to minimize the amount of impacted water and leachate generated but to adequately contain the runoff so as not to erode completed landfill slopes and expose refuse. Section 15.0 contains discussion on this topic.

- Designing the system to drain dry where possible in order to minimize the potential for ponding and vertical migration of any impacted runoff. For example, all ditches are designed to run dry (i.e. they will not store runoff) and therefore do not require liners. This does however, necessitate a regular ditch maintenance program to ensure that there is no significant water retention in the ditches. Section 15.0 contains full discussion of the recommended operating practices.

- Any stored runoff emanating from active disposal, the composting areas and material storage areas must be contained with a 1 meter clay liner with a permeability 1 x 10^{-7} cm/sec., or equivalent.

Clean Runoff

As described in the attached Appendix B-3, the surface water management plan classifies the following runoff at the site as clean runoff.

Clean water is external water that enters the site or is clean runoff at the site and does not require liners for any retention of runoff.

Runoff from the periphery of completed landfill areas that are capped with one meter of clay is also considered to be clean runoff and therefore, does not require liners for retention. Runoff from the older closed landfill cells south of Charette Road is considered to be clean once the remnants of the prior composting operation have been removed by December, 2014. There has

been no reported incidence of leachate seeps south of Charette Road over a considerate period of time and the final cover is assumed to be intact and adequate. Runoff from the more recent and future landfill areas does, however, have the provision for retention, so that if there is a leachate breakout that cannot be contained at source (refer to Section 8.5 for a full discussion of the current and proposed leachate seep control program), and the breakout significantly impacts the runoff quality, beyond acceptable release limits, the runoff can be captured and treated prior to release. Based on the action plans already in place for such leachate seeps, developed by the SWSD in these instances, the need for capturing runoff would be the exception rather than the rule. In the unlikely event that significant leachate migration of contaminants into the soil in ditches, or at the base of a dry pond was initiated by an event, the contingency action would be to determine the extent of migration and remove the impacted soil. Removing soil is a more cost-effective approach than installing and maintaining a costly liner for what likely will be an infrequent occurrence. The underlying soils provide additional protection against vertical migration of a leachate release. The probability and associated risk with groundwater contamination from this part of the drainage system is insignificant. The following provides support for this position.

In the December, 2011 BRRMF Licence application Environmental Impact Statement (Stantec 2011) it was concluded that; “the concentration of the potential future contaminants present in the leachate will be below the MOE guideline for non-potable groundwater in the aquifer downstream of the Brady Road landfill property boundaries”. This conclusion was based on conservative assumptions and inputs, which results in an overestimation of the future potential for aquifer contamination.

The potential for limited leachate migration is reinforced by studies from the excavation and removal of the former Cadboro Road East landfill (completed in 2012) located approximately 3 km north of the BRRMF. Excavations and testing of the soil at the base of the landfill demonstrated that over the approximate 60 years landfill life, the concentration of analytes within one meter or less of the base of the landfill were below CCME guidelines(Stantec 2011). This extent of migration is consistent with UMA (1987) estimates of the rate of vertical migration. The Cadboro Road site is in a similar geological and hydrogeological setting as the BRRMF with a significant depth of impervious clay soil and till overlying the bedrock aquifer, which is naturally saline and non-potable. Although the leachate head over the bedrock at the BRRMF is

higher than at the Cadboro site, these conclusions and findings are still applicable and important relative to vertical leachate migration.

The worst case scenarios with potential impacted runoff would involve water with contaminant concentrations many orders of magnitude less than present in leachate, due to significant surface water dilution. The probability and risk of significant impact on groundwater with vertical migration of impacted runoff would be far less than with leachate within landfill cells, which in itself is quite low.

Furthermore, any ponded runoff would not be within excavations as deep as in the landfill cells, therefore there would be a much greater depth of soil separation between the ponded runoff and the underlying aquifer than with leachate in landfill cells, which decreases the probability and risk. These potential risks are even further mitigated by the proactive actions already taken and further proposed in this report to control any leachate seeps at source and not allow them to escape into the drainage system.

CRRC Pond (Also known as 4R Depot)

When the CRRC has been fully implemented, the segregated storage area will be decommissioned.

The above considerations are also a factor for the proposed pond design for the runoff from the Community Resource Recovery Centre (CRRC). It was concluded that the CRRC pond could be an unlined pond primarily because of the safe guards for preventing contamination of runoff but also because of the natural protection afforded by the geological and hydrogeological setting for the reasons stated above. Specifically, the run-dry design is used which is not intended to retain water. The design allows for the ability to store, test and treat runoff if necessary, as a contingency in the unlikely event that the site generates impacted water needing detention.

The reasons why the site is not likely to generate significantly impacted water are as follows:

- The majority of the site footprint is for traffic movement and landscaping
- Hazardous materials are all to be contained and temporarily stored in approved waterproof containers, so that precipitation and runoff will not come in contact with these materials. Also, this site will be a continuously staffed facility and the site operating plan will include containment and cleanup plans for any accidental spills. Furthermore, any such spills will be relatively minor in size since the site will only be receiving material from residential sources

and not commercial or industrial scale sources which could have larger volumes.
- Electronics will be shrink-wrapped to prevent precipitation and run-off from coming in contact with these materials.
- The refuse material and household recyclable materials collected will be contained in water-tight containers
- Any bulky materials collected (building materials or leaf and yard waste) will not be significant generators of impacted runoff (any more than they are at their point of origin) and they will not be stored at the site for long periods of time but will be moved frequently to processing areas due to limited storage capacity at the CRRC site.
- Licence condition 87 requires preventing spills at the CRRC from contaminating runoff.

Impacted Runoff

- Impacted runoff will be directed to lined retention facilities where the runoff will be tested and treated if necessary prior to release. These retention facilities will incorporate an approved liner consisting of one meter of compacted clay or an approved synthetic liner. This measure is conservative since the low risk from vertical migration also applies to the impacted runoff to some extent, because of the favourable lowly permeable geological and hydrogeological setting.

- Although not strictly a requirement under the terms of this project, drainage from the new proposed landfill cells has been considered and discussed with the SWSD. The plan is to maintain a lined basin at the base of the new cells to collect runoff from active landfill operations. The runoff collected will be tested and treated if necessary prior to release. Licence condition 55 (e) requires that details of a drainage system to prevent water from entering the waste disposal cell and to channel the surface runoff into the surface water management system for the Development, be submitted at least 60 days prior to construction of a new waste disposal cell or infill waste disposal cell.

Future Landfill Development

Considered in the site drainage concept is the major new landfill area planned to the west of the existing landfill area and north of Charette Road, as shown on Drawing No.13-0107-015 G02.

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8.0 DRAINAGE SYSTEM DESIGN

8.1 SYSTEM MODELLING

With the conceptual design as discussed in Section 4, modelling was carried out for the preferred ditch and retention pond designs as discussed in the following sub-sections.

The Brady Road Resource Management Facility drainage system is conceptualized in Figure 3. For modelling purposes, the drainage system is comprised of 2 systems – namely the clean water system and the runoff from the current and future capped landfill areas north of Charette Road. The Land Collector Ditch (LCD) is constructed around the periphery of the landfill. The Land Drainage Ditch (LDD) drains the water that originated off-site or from areas within the Brady Road site not impacted by any landfill. Runoff to each ditch was analysed by use of the XPSWMM hydrological and hydraulic routing model.

The XPSWMM model was used to compute runoff hydrographs from the catchment areas and to route the runoff through the land collector and land drainage ditches. The model consists of a runoff component and a hydraulic routing component. The runoff component generates surface and subsurface runoff based on rainfall hyetographs, antecedent conditions, land use, and topography. The drainage area for computation of runoff is defined as subcatchment areas as shown on Figure 4.

The hydraulic flow routing model for open channel flow receives hydrograph input at specific node locations and performs dynamic routing of the stormwater throughout the major storm drainage system.

8.1.1 Runoff Model

Sub-Catchment Delineation

Figure 4 shows the facility property and the assumed sub-basin delineation. Each sub-basin is defined with parameters of area, width, percent impervious and land slope. The runoff from each sub-catchment is directed to a location or node on the drain network Infiltration is

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determined using the Green Ampt infiltration procedure using parameters dependent on the soil type. The infiltration rates for the landfill model assumed parameters applicable to clay soils.

TABLE 1
BELOW LISTS THE SUB-CATCHMENT RUNOFF DATA

Subcatchment Name	Drain to Node	Area (ha)	Slope	Width m	Impervious Percentage %
CA1	Node120		0.001	1600	0
CA1	Node120	22.781	0.001	450	0
CA10	Node140	8.833	0.001	200	0
CA11	Node148	1.469	0.001	70	0
CA12	Node75	2.948	0.03	300	0
CA13	Node94	1.781	0.04	185	0
CA2	Node121	4.732	0.005	190	0
CA3	Node122	8.095	0.03	450	0
CA4	Node123	11.319	0.03	225	0
CA5	Node127	7.165	0.03	430	0
CA6	Node130	3.084	0.03	210	0
CA7	Node136	16.508	0.03	130	0
CA8	Node132	42.728	0.001	650	0
CA9	Node146	9.767	0.001	250	100
CW Ponds 1 and 2	Node144	2.889	0	120	100
IA1	Node42	15.27	0.12	180	0
IA10	Node15	5.279	0.12	267	0
IA11	Node61	3.918	0.12	169	0
IA12	Node109	12.777	0.12	435	0
IA13	Node107	11.701	0.12	450	0
IA14	Node112	13.302	0.12	420	0
IA15	Node114	19.961	0.12	385	0
IA16	Node62	12.253	0.001	100	0
IA17	Node65	8.239	0.03	150	0
IA18	Pond 1	7.728	0	200	100
IA2	Node156	4.075	0.12	125	0
IA3	Node38	14.474	0.12	455	0
IA4	Node37	8.707	0.12	333	0
IA5	Node31	7.495	0.12	258	0
IA6	Node57	16.659	0.12	448	0
iA7	Node55	10.302	0.12	304	0
IA8	Node49	17.569	0.12	320	0
IA9	Node25	7.902	0.12	346	0

Rain Storm Data

The design runoff was determined for single storm events. Design rain storms were based on the City of Winnipeg Intensity-Duration-Frequency (IDF) curves. A number of versions of IDF Curves have been developed by the City of Winnipeg, with each revision conducted to include additional rainfall data. The latest revision to the IDF curves was computed in 2011 but the City has not approved these curves for use since the curves were judged to define rainfall intensities that were lower than previous versions. As a result, the 1974 McLaren IDF curves have been adopted for this study.

The IDF curves were used to define rain storm hyetographs using the Chicago distribution with a 10-minute time step. Table 2 below lists the 10-minute duration rainfall depths for return periods from 2 year to 100 year.

TABLE 2
CITY OF WINNIPEG 10-MINUTES RAINFALL INTENSITIES

Duration (minutes)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
0	0.390	0.518	0.551	0.664	0.756	0.837
10	0.397	0.527	0.561	0.676	0.770	0.853
20	0.404	0.537	0.572	0.689	0.785	0.870
30	0.412	0.548	0.584	0.703	0.801	0.887
40	0.420	0.558	0.596	0.717	0.817	0.905
50	0.428	0.570	0.608	0.732	0.834	0.924
60	0.437	0.582	0.621	0.748	0.852	0.944
70	0.446	0.594	0.634	0.764	0.871	0.964
80	0.455	0.607	0.649	0.781	0.890	0.986
90	0.465	0.621	0.664	0.799	0.911	1.009
100	0.475	0.635	0.679	0.818	0.933	1.033
110	0.486	0.650	0.696	0.838	0.955	1.058
120	0.498	0.666	0.714	0.859	0.980	1.085
130	0.510	0.683	0.732	0.882	1.005	1.113
140	0.523	0.701	0.752	0.905	1.032	1.143
150	0.536	0.720	0.772	0.930	1.061	1.174
160	0.551	0.740	0.794	0.957	1.091	1.208
170	0.566	0.761	0.818	0.985	1.123	1.243
180	0.582	0.784	0.843	1.015	1.158	1.281
190	0.600	0.808	0.870	1.047	1.194	1.322
200	0.618	0.834	0.898	1.082	1.234	1.366
210	0.638	0.862	0.929	1.119	1.276	1.412
220	0.659	0.892	0.962	1.159	1.322	1.463

Duration (minutes)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
230	0.682	0.924	0.998	1.202	1.372	1.517
240	0.707	0.959	1.037	1.249	1.425	1.577
250	0.734	0.998	1.080	1.300	1.484	1.641
260	0.764	1.039	1.126	1.356	1.548	1.712
270	0.796	1.085	1.177	1.418	1.618	1.789
280	0.831	1.135	1.234	1.486	1.696	1.874
290	0.871	1.191	1.296	1.561	1.782	1.969
300	0.914	1.253	1.366	1.645	1.879	2.075
310	0.963	1.323	1.444	1.740	1.987	2.194
320	1.018	1.402	1.534	1.847	2.110	2.329
330	1.081	1.492	1.635	1.970	2.250	2.483
340	1.152	1.596	1.753	2.111	2.413	2.662
350	1.236	1.717	1.891	2.277	2.603	2.870
360	1.334	1.861	2.054	2.474	2.829	3.117
370	1.451	2.033	2.252	2.712	3.102	3.415
380	1.595	2.244	2.495	3.004	3.437	3.782
390	1.773	2.509	2.801	3.374	3.862	4.245
400	2.003	2.854	3.202	3.856	4.416	4.849
410	2.312	3.319	3.747	4.513	5.171	5.670
420	2.748	3.986	4.534	5.460	6.261	6.854
430	3.418	5.021	5.768	6.947	7.973	8.710
440	4.582	6.853	7.978	9.608	11.041	12.033
450	7.142	10.970	13.007	15.664	18.036	19.625
460	17.617	28.178	34.073	41.035	47.422	52.284
470	**69.002**	**109.499**	**128.150**	**154.334**	**179.017**	**211.242**
480	23.306	37.547	45.494	54.789	63.368	70.237
490	12.170	19.207	23.140	27.867	32.156	35.090
500	8.224	12.727	15.164	18.262	21.039	22.892
510	6.233	9.495	11.197	13.484	15.517	16.884
520	5.039	7.578	8.857	10.667	12.263	13.356
530	4.243	6.315	7.326	8.822	10.135	11.051
540	3.675	5.422	6.249	7.526	8.640	9.433
550	3.249	4.758	5.453	6.567	7.536	8.236
560	2.917	4.245	4.841	5.831	6.687	7.316
570	2.651	3.836	4.357	5.247	6.015	6.587
580	2.433	3.503	3.963	4.773	5.470	5.996
590	2.251	3.226	3.638	4.381	5.020	5.506
600	2.096	2.993	3.364	4.051	4.640	5.093
610	1.963	2.792	3.130	3.770	4.317	4.741
620	1.847	2.619	2.929	3.527	4.038	4.437
630	1.745	2.468	2.753	3.315	3.795	4.172
640	1.655	2.334	2.598	3.129	3.580	3.938
650	1.575	2.215	2.461	2.963	3.391	3.731
660	1.503	2.108	2.338	2.816	3.221	3.546
670	1.437	2.012	2.228	2.683	3.069	3.379
680	1.378	1.925	2.128	2.563	2.931	3.229
690	1.324	1.846	2.037	2.454	2.806	3.092
700	1.274	1.774	1.955	2.354	2.691	2.967

Duration (minutes)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
710	1.229	1.707	1.879	2.263	2.587	2.852
720	1.187	1.646	1.809	2.179	2.491	2.747
730	1.147	1.589	1.745	2.102	2.402	2.649
740	1.111	1.537	1.685	2.030	2.319	2.559
750	1.077	1.488	1.630	1.963	2.243	2.475
760	1.046	1.442	1.578	1.901	2.172	2.397
770	1.016	1.399	1.530	1.843	2.105	2.324
780	0.988	1.359	1.485	1.789	2.043	2.256
790	0.962	1.322	1.443	1.738	1.985	2.192
800	0.937	1.287	1.403	1.690	1.930	2.132
810	0.914	1.253	1.366	1.645	1.878	2.075
820	0.892	1.222	1.330	1.602	1.829	2.021
830	0.871	1.192	1.297	1.562	1.783	1.970
840	0.851	1.164	1.265	1.524	1.740	1.922
850	0.832	1.137	1.235	1.487	1.698	1.877
860	0.815	1.111	1.207	1.453	1.659	1.834
870	0.797	1.087	1.179	1.420	1.621	1.792
880	0.781	1.064	1.154	1.389	1.586	1.753
890	0.766	1.042	1.129	1.360	1.552	1.716
900	0.751	1.021	1.105	1.331	1.519	1.680
910	0.736	1.000	1.083	1.304	1.488	1.646
920	0.723	0.981	1.061	1.278	1.459	1.613
930	0.710	0.963	1.041	1.253	1.430	1.582
940	0.697	0.945	1.021	1.230	1.403	1.552
950	0.792	0.928	1.002	1.207	1.377	1.523
960	0.773	0.911	0.984	1.185	1.352	1.496
970	0.756	0.896	0.966	1.164	1.328	1.469
980	0.739	0.880	0.950	1.144	1.305	1.443
990	0.723	0.866	0.933	1.124	1.282	1.419
1000	0.708	0.852	0.918	1.105	1.261	1.395
1010	0.693	0.838	0.903	1.087	1.240	1.372
1020	0.680	0.825	0.888	1.070	1.220	1.350
1030	0.666	0.812	0.874	1.053	1.201	1.329
1040	0.654	0.800	0.861	1.036	1.182	1.308
1050	0.642	0.788	0.847	1.021	1.164	1.288
1060	0.630	0.776	0.835	1.005	1.147	1.269
1070	0.619	0.765	0.823	0.991	1.130	1.250
1080	0.608	0.755	0.811	0.976	1.113	1.232
1090	0.598	0.744	0.799	0.962	1.097	1.215
1100	0.588	0.734	0.788	0.949	1.082	1.198
1110	0.578	0.724	0.777	0.936	1.067	1.181
1120	0.569	0.715	0.767	0.923	1.053	1.165
1130	0.560	0.705	0.756	0.911	1.039	1.150
1140	0.552	0.696	0.746	0.899	1.025	1.135
1150	0.543	0.688	0.737	0.887	1.012	1.120
1160	0.535	0.679	0.727	0.876	0.999	1.106
1170	0.527	0.671	0.718	0.865	0.986	1.092
1180	0.520	0.663	0.709	0.854	0.974	1.079

Duration (minutes)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
1190	0.513	0.655	0.701	0.844	0.962	1.065
1200	0.506	0.647	0.692	0.834	0.951	1.053
1210	0.499	0.640	0.684	0.824	0.939	1.040
1220	0.492	0.632	0.676	0.814	0.928	1.028
1230	0.486	0.625	0.669	0.805	0.918	1.016
1240	0.479	0.618	0.661	0.796	0.907	1.005
1250	0.473	0.612	0.654	0.787	0.897	0.993
1260	0.467	0.605	0.646	0.778	0.887	0.982
1270	0.462	0.598	0.639	0.770	0.877	0.972
1280	0.456	0.592	0.632	0.762	0.868	0.961
1290	0.451	0.586	0.626	0.753	0.859	0.951
1300	0.445	0.580	0.619	0.746	0.850	0.941
1310	0.440	0.574	0.613	0.738	0.841	0.931
1320	0.435	0.568	0.606	0.730	0.832	0.922
1330	0.430	0.563	0.600	0.723	0.824	0.912
1340	0.425	0.557	0.594	0.716	0.815	0.903
1350	0.421	0.552	0.588	0.709	0.807	0.894
1360	0.416	0.547	0.583	0.702	0.799	0.886
1370	0.412	0.541	0.577	0.695	0.792	0.877
1380	0.407	0.536	0.571	0.688	0.784	0.869
1390	0.403	0.531	0.566	0.682	0.777	0.860
1400	0.399	0.527	0.561	0.675	0.769	0.852
1410	0.395	0.522	0.556	0.669	0.762	0.844
1420	0.391	0.517	0.551	0.663	0.755	0.837
1430	0.387	0.513	0.546	0.657	0.748	0.829
1440	0.383	0.508	0.541	0.651	0.742	0.822

The design of the ditches and culvert crossing were based on the 25-year return rainfall hyetograph values. The peak 10-minute intensity is 154.3 mm/hr and the accumulated 24 hour rainfall depth is 96.4 mm.

8.1.2 Hydraulic Model Setup

The Brady Road ditch systems were defined as a link-node system in XPSWMM with the nodes representing the upstream and downstream end of the connecting channels. In the model the upstream and downstream end of each channel is defined as “nodes” and the channels are defined as “links”. Channel data is listed in Table 3. Data for the channels include the channel name, the upstream and downstream node names, the shape of the channel, the base width, left and right side slopes, the channel length and the upstream and downstream invert elevations.

TABLE 3
CHANNEL DATA

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) m	Bottom Width m	Left-hand Side Slope	Right-hand Side Slope	Length m	Upstream Invert	Invert Elevation m	Conduit Slope
Link3	Node14	Node15	Trapezoidal	4	2	4	4	102.64	231.330	231.270	0.058
Link54	Node15	Pond 1	Trapezoidal	4	2	4	4	81.46	231.270	231.250	0.041
Link4	Node16	Node15	Trapezoidal	4	2	4	4	58.17	231.321	231.270	0.105
Link5	Node17	Node16	Trapezoidal	4	2	4	4	57.67	231.381	231.321	0.105
Link6	Node18	Node17	Trapezoidal	4	2	4	4	29.99	231.412	231.381	0.105
Link7	Node19	Node18	Trapezoidal	4	2	4	4	39.41	231.453	231.412	0.105
Link8	Node20	Node19	Trapezoidal	4	2	4	4	46.99	231.502	231.453	0.105
Link9	Node21	Node20	Trapezoidal	4	2	4	4	72.31	231.578	231.502	0.105
Link10	Node22	Node21	Trapezoidal	4	2	4	4	89.70	231.672	231.578	0.105
Link11	Node23	Node22	Trapezoidal	4	2	4	4	106.01	231.783	231.672	0.105
Link12	Node24	Node23	Trapezoidal	4	2	4	4	77.07	231.864	231.783	0.105
Link13	Node25	Node24	Trapezoidal	4	2	4	4	63.08	231.930	231.864	0.105
Link15	Node26	Node25	Trapezoidal	4	2	4	4	48.92	231.981	231.930	0.105
Link14	Node27	Node98	Trapezoidal	4	2	4	4	44.83	232.105	232.058	0.105
Link16	Node28	Node27	Trapezoidal	4	2	4	4	49.83	232.157	232.105	0.105
Link17	Node29	Node28	Trapezoidal	4	2	4	4	68.76	232.229	232.157	0.105
Link18	Node30	Node29	Trapezoidal	4	2	4	4	71.16	232.303	232.229	0.105
Link19	Node31	Node30	Trapezoidal	4	2	4	4	82.80	232.390	232.303	0.105
Link20	Node32	Node31	Trapezoidal	4	2	4	4	56.94	232.450	232.390	0.105
Link22	Node34	Node32	Trapezoidal	4	2	4	4	105.71	232.561	232.450	0.105
Link23	Node35	Node34	Trapezoidal	4	2	4	4	58.87	232.632	232.561	0.121
Link24	Node36	Node35	Trapezoidal	4	2	4	4	109.38	232.746	232.632	0.105
Link25	Node37	Node36	Trapezoidal	4	2	4	4	72.51	232.822	232.746	0.105
Link26	Node38	Node37	Trapezoidal	4	2	4	4	176.22	232.906	232.822	0.105
Link27	Node39	Node38	Trapezoidal	3	2	4	4	161.99	232.855	232.855	0.058
Link28	Node40	Node39	Trapezoidal	4	2	4	4	87.95	232.855	232.855	0.058
Link29	Node41	Node40	Trapezoidal	4	2	4	4	250.71	232.855	232.855	0.058
Link31	Node42	Node43	Trapezoidal	4	2	4	4	41.46	232.627	232.604	0.058
Link32	Node43	Node44	Trapezoidal	4	2	4	4	92.54	232.604	232.564	0.058
Link33	Node44	Node99	Trapezoidal	4	2	4	4	66.14	232.564	232.528	0.058
Link35	Node45	Node48	Trapezoidal	4	2	4	4	167.50	232.413	232.312	0.058
Link36	Node48	Node49	Trapezoidal	4	2	4	4	79.54	232.312	232.265	0.058
Link37	Node49	Node50	Trapezoidal	4	2	4	4	164.02	232.265	232.170	0.058
Link38	Node50	Node51	Trapezoidal	4	2	4	4	103.98	232.170	232.109	0.058
Link39	Node51	Node102	Trapezoidal	4	2	4	4	34.52	232.109	232.089	0.058
Link40	Node53	Node54	Trapezoidal	4	2	4	4	42.46	231.954	231.929	0.058
Link41	Node54	Node55	Trapezoidal	4	2	4	4	250.22	231.929	231.784	0.058
Culvert 82	Node55	Node157	Circular	1.35	1.35	0	0	20.00	231.784	231.784	0
Culvert 83	Node55	Node157	Circular	1.35	1.35	0	0	20.00	231.784	231.784	0
Link43	Node56	Node57	Trapezoidal	4	2	4	4	54.38	231.638	231.607	0.058
Link44	Node57	Node58	Trapezoidal	4	2	4	4	22.92	231.607	231.593	0.058
Link45	Node58	Node59	Trapezoidal	4	2	4	4	10.68	231.593	231.587	0.058
Link46	Node59	Node60	Trapezoidal	4	2	4	4	76.14	231.587	231.542	0.058
Link47	Node60	Node61	Trapezoidal	4	2	4	4	50.09	231.542	231.513	0.058
Link48	Node61	Node62	Trapezoidal	5	2	4	4	35.91	231.513	231.492	0.058
Link49	Node62	Node63	Trapezoidal	5	2	4	4	54.12	231.492	231.461	0.058
Link50	Node63	Node64	Trapezoidal	5	2	4	4	66.05	231.461	231.422	0.058
Link51	Node64	Node65	Trapezoidal	4	2	4	4	78.39	231.422	231.377	0.058
Link52	Node65	Node66	Trapezoidal	4	2	4	4	50.33	231.377	231.347	0.058
Link53	Node66	Node14	Trapezoidal	4	5	4	4	30.08	231.347	231.330	0.058
Link139	Pond 1	Weir2	Circular	0.6	0.6	0	0	118.30	231.250	231.250	0
Link56	Node68	Weir2	Trapezoidal	3	3	4	4	47.86	231.500	231.500	0.1
Link103	Weir2	Node118	Circular	0.6	0.6	0	0	44.77	231.250	231.250	0
Link58	Node70	Pond 3	Trapezoidal	3	3	4	4	61.75	231.500	231.250	0.12
Link101	Pond 3	Node117	Circular	0.6	0.6	0	0	43.20	231.250	231.250	0
Pond3Out	Pond 3	Node72	Circular	1.2	1.2	0	0	69.37	231.250	231.250	0.05
Link60	Node72	Node73	Trapezoidal	3	2	4	4	30.12	231.250	231.250	0.19
Link61	Node73	Node147	Natural	3	-	0	0	46.72	231.250	231.250	0
Link62	Node74	Node75	Natural	3	-	0	0	117.59	231.250	231.250	0

TABLE 3 (CONTINUED)
CHANNEL DATA

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (Height) m	Bottom Width m	Left-hand Side Slope	Right-hand Side Slope	Length m	Upstream Invert	Invert Elevation m	Conduit Slope
Link70	Node75	Node96	Trapezoidal	3	2	4	4	76.62	231.250	231.134	0.152
Link72	Node76	Node95	Trapezoidal	3	2	4	4	89.18	231.003	230.868	0.152
Link75	Node77	Node93	Trapezoidal	3	2	4	0	92.80	230.713	230.572	0.152
Link79	Node78	Node90	Natural	3	-	0	0	35.82	230.750	230.500	0
Link67	Node79	Node80	Natural	3	-	0	0	192.48	230.500	229.840	0
Link138	Node80	Node149	Circular	1.6	1.6	0	0	29.28	229.840	229.720	0.561
Link69	Node81	Node116	Natural	3	-	0	0	82.19	230.000	230.000	0
Link81	Node89	Node79	Natural	3	-	0	0	54.50	230.500	230.500	0
Link80	Node90	Node89	Natural	3	-	0	0	109.21	230.500	230.500	0
Link78	Node91	Node78	Natural	3	-	0	0	49.13	230.750	230.750	0
Link77	Node92	Node91	Natural	3	-	0	0	140.76	230.500	230.750	0
Link76	Node93	Node151	Natural	3	-	0	0	47.71	230.572	230.500	0.152
Link74	Node94	Node77	Trapezoidal	3	2	4	4	50.55	230.790	230.713	0.152
Link73	Node95	Node94	Trapezoidal	3	2	4	4	51.08	230.868	230.790	0.152
Link71	Node96	Node76	Trapezoidal	3	2	4	4	86.03	231.134	231.003	0.152
Link82	Node98	Node26	Trapezoidal	3	2	4	4	74.09	232.058	231.981	0.105
Link83	Node99	Node100	Trapezoidal	4	2	4	4	155.84	232.528	232.487	0.058
Link84	Node100	Node45	Trapezoidal	4	2	4	4	132.35	232.487	232.413	0.058
Link85	Node102	Node103	Trapezoidal	4	2	4	4	45.81	232.089	232.062	0.058
Link86	Node103	Node104	Trapezoidal	4	2	4	4	43.09	232.062	232.037	0.058
Link87	Node104	Node106	Trapezoidal	4	2	4	4	75.85	232.037	231.993	0.058
Link89	Node105	Node53	Trapezoidal	4	2	4	4	34.96	231.975	231.954	0.058
Link88	Node106	Node105	Trapezoidal	4	2	4	4	31.78	231.993	231.975	0.058
Link91	Node107	Node113	Trapezoidal	3	2	4	4	549.80	232.129	232.129	0
Link98	Node108	Node113	Trapezoidal	3	2	4	4	93.33	232.196	232.129	0.06
Link90	Node109	Node107	Trapezoidal	4	2	4	4	723.77	232.563	232.129	0.06
Link95	Node110	Node111	Trapezoidal	4	2	4	4	88.11	232.841	232.787	0.06
Link96	Node111	Node112	Trapezoidal	4	2	4	4	257.69	232.787	232.621	0.06
Link97	Node112	Node108	Trapezoidal	4	2	4	4	707.60	232.621	232.196	0.06
Link92	Node113	Node102	Trapezoidal	3	2	4	4	67.04	232.129	232.089	0.06
Link94	Node114	Node110	Trapezoidal	3	2	4	4	720.92	233.273	232.841	0.06
Link99	Node115	Node81	Natural	3	-	0	0	91.81	230.000	230.000	0
Link100	Node116	Node82	Natural	3	-	0	0	59.07	230.000	230.000	0
Link102	Node117	Node73	Circular	0.6	0.6	0	0	67.82	231.250	231.250	0
Link104	Node118	Pond 3	Circular	0.6	0.6	0	0	53.90	231.250	231.250	0
Link109	Node120	Node121	Natural	2.5	-	0	0	159.20	232.500	232.750	0
c73	Node121	Node122	Circular	1.4	1.4	0	0	47.48	232.465	232.357	0
c74	Node121	Node122	Circular	1.4	1.4	0	0	47.48	232.443	232.319	0.257
Link111	Node122	Node123	Natural	2.5	-	0	0	186.39	232.750	232.500	0
Link112	Node123	Node124	Natural	2.5	-	0	0	149.19	232.500	232.750	0
Link113	Node124	Node126	Natural	2.5	-	0	0	146.21	232.750	232.500	0
Link114	Node126	Node127	Natural	2.5	-	0	0	113.81	232.500	232.500	0
Link115	Node127	Node153	Natural	2.5	-	0	0	123.20	232.500	232.250	0
Link116	Node128	Node152	Natural	2.5	-	0	0	118.38	232.250	232.250	0
Link117	Node129	Node130	Circular	1.2	1.2	0	0	42.77	231.920	232.500	0
Link118	Node130	Node134	Natural	2.5	-	0	0	82.65	232.500	232.500	0
Link128	Node132	Node133	Natural	2.5	-	0	0	113.12	231.500	231.500	0
Link129	Node133	Node139	Natural	2.5	-	0	0	111.69	231.500	231.250	0
Link119	Node134	Node135	Natural	2.5	-	0	0	96.81	232.500	232.250	0
Link120	Node135	Node136	Natural	2.5	-	0	0	142.48	232.250	232.250	0
Link121	Node136	Node137	Natural	2.5	-	0	0	103.71	232.250	232.250	0
Link122	Node137	Node138	Natural	2.5	-	0	0	85.12	232.250	232.250	0
Link123	Node138	Node144	Natural	2.5	-	0	0	69.09	232.250	232.250	0
Link130	Node139	Node140	Natural	2.5	-	0	0	153.92	231.250	231.250	0
Link131	Node140	Node141	Natural	2.5	-	0	0	95.29	231.250	231.250	0
Link132	Node141	Node142	Natural	2.5	-	0	0	161.57	231.250	231.000	0
Link133	Node142	Node143	Natural	2.5	-	0	0	139.07	231.000	231.000	0
Link134	Node143	Node73	Natural	2.5	-	0	0	54.43	231.000	231.250	0
Link135	Node144	Node146	Natural	2.5	-	0	0	129.59	232.250	232.000	0
Link127	Node146	Node132	Natural	2.5	-	0	0	203.69	232.000	231.500	0
Link136	Node147	Node148	Circular	1.2	1.2	0	0	19.08	230.756	230.593	0
Link137	Node148	Node74	Natural	3	-	0	0	86.17	231.250	231.250	0
Link68	Node149	Node115	Natural	3	-	0	0	56.71	230.000	230.000	0
D/S Weir	Node150	Node92									
Link141	Node151	Node150	Trapezoidal	3	3	4	4	15.10	230.500	230.500	0
Link142	Node152	Node129	Circular	1	1	0	0	41.59	232.030	231.920	0
Link143	Node153	Node128	Circular	1	1	0	0	23.72	232.000	232.000	0
Link30	Node156	Node41	Trapezoidal	4	4	4	4	130.34	232.709	232.709	0.058
Link42	Node157	Node56	Trapezoidal	4	4	4	4	249.92	231.784	231.638	0.058

8.1.3 Model Results

The XPSWMM model was run using the 25-year rainfall event. Discharges in all the drains Computed flows in the Land collector and land drainage ditches have been summarized in Table 4. The results at 20 key locations in the system as shown on Figure 5.

TABLE 4
LCD AND LDD PEAK DISCHARGE SUMMARY

Name	Drain	Point	Maximum D/S Water Elevation (m)	Maximum U/S Water Elevation (m)	Max Flow (cms)	Max Velocity
Link92	LCD	1	233.481	233.492	4.058	0.4
Link38	LCD	2	233.482	233.486	4.768	0.74
Link3	LCD	3	232.789	232.799	7.512	0.86
Link4	LCD	4	232.789	232.789	5.496	0.76
Link54	LCD	5	232.779	232.789	12.838	1.88
Pond1Out	LCD	7	-	-	4.865	-
Pond2Out	LCD	9	-	-	4.271	-
Pond3Out	LCD	11	-	-	3.237	-
Link109	LDD	12	233.826	233.832	2.555	0.19
Link118	LDD	13	232.983	233.035	1.246	0.37
Link123	LDD	14	232.876	232.886	2.682	0.63
Link127	LDD	17	232.635	232.65	1.592	0.49
Link134	LDD	18	232.626	232.626	1.224	0.31
Link61	LDD	19	232.621	232.626	3.199	0.26
Link141	LDD	20	231.665	231.668	3.2	0.41

Land Collector Ditch

The results for the land collector ditch have been summarized in Table 4 above:

Eight key locations have been selected to illustrate the result for the LCD as shown on Figure 5. The runoff from the proposed future landfill area is discharged into the periphery ditch, which outlets to the main LCD from the main landfill area at Point 1. The combined discharge from the proposed future landfill area is 4.058 m^3/s. Point 2 shows the computed flow in the main LCD immediately upstream from the confluence as 4.77 m^3/s. The combined flows from Points 1 and 2 together with additional runoff from the landfill downstream results in a peak discharge from the west side of the landfill site (Point 3) at 7.512 m^3/s. The peak flow from the east at Point 4 is

5.496 m^3/s, which when combined with the flow from the west at Point 3 of 7.512 m^3/s results in a total discharge of 12.838 m^3/s.

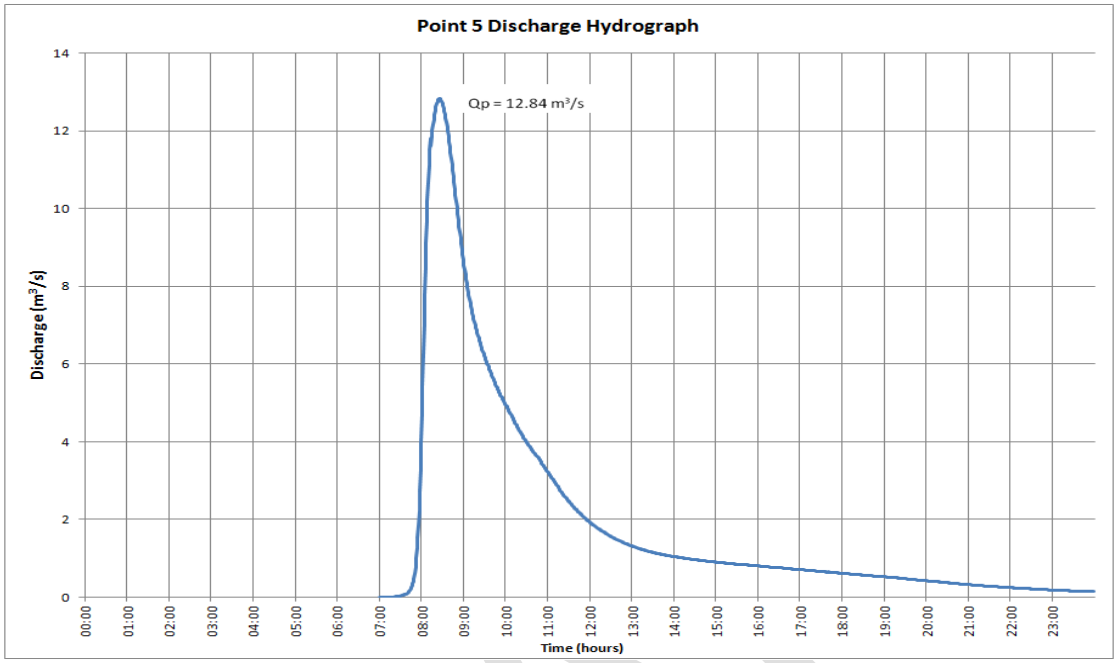


Figure 6 - Discharge Hydrograph at Point 5

Downstream from Point 5, the flow is routed through the 3 dry ponds. Outflow from each of the dry ponds is controlled by downstream weirs. Assuming that the ponds are dry at the time of the design rain event, the routed outflow is reduced by storage attenuation to a peak of 3.237 m^3/s.

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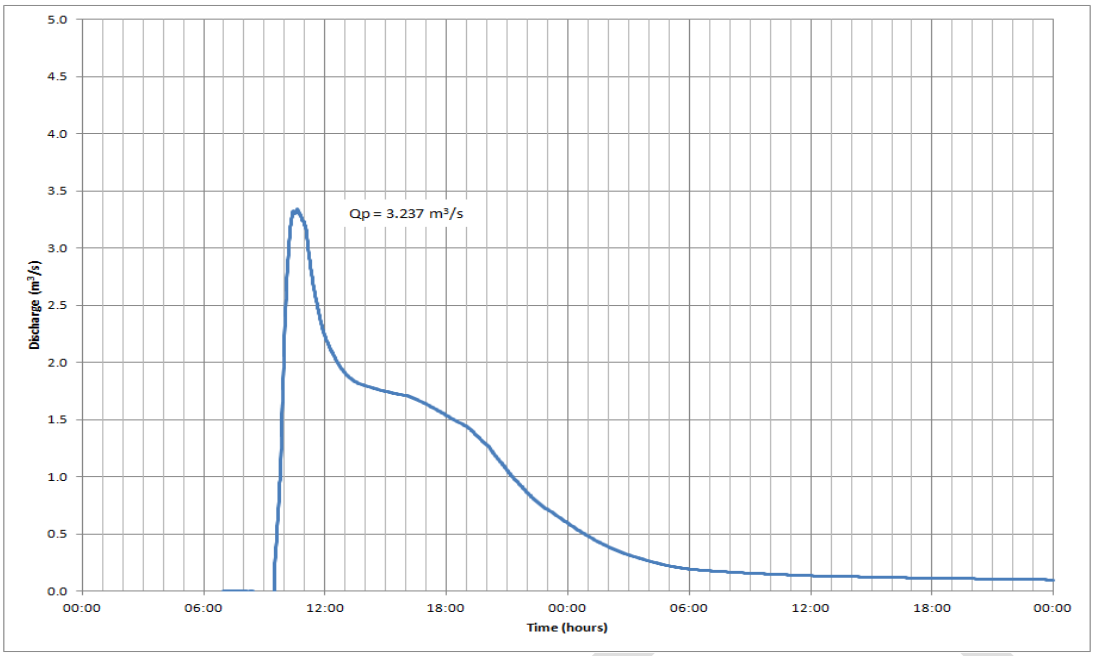


Figure 7 - Dry Pond Outflow – Point 11

Land Drainage Ditch

Discharge from the land collector ditch is summarized at 7 key locations as illustrated on Figure 5. Point 12 include runoff from the most western portion of the landfill site and includes runoff from off-site drainage in the RM of McDonald. The north ditch along Charette Rd is the former Kronsgart Drain. The majority of the watershed from west of Brady Road was diverted south to the LaSalle River as shown on 13-0107-015_Fig01.dwg.The computed discharge at Brady Road is defined by Point 12 at 2.55 m^3/s.

The LDD turns to the south and crosses Charette Road at Point 13. The peak discharge at Point 13 is 1.24 m3/s, which is approximately 50% of the peak flow at Point 12.

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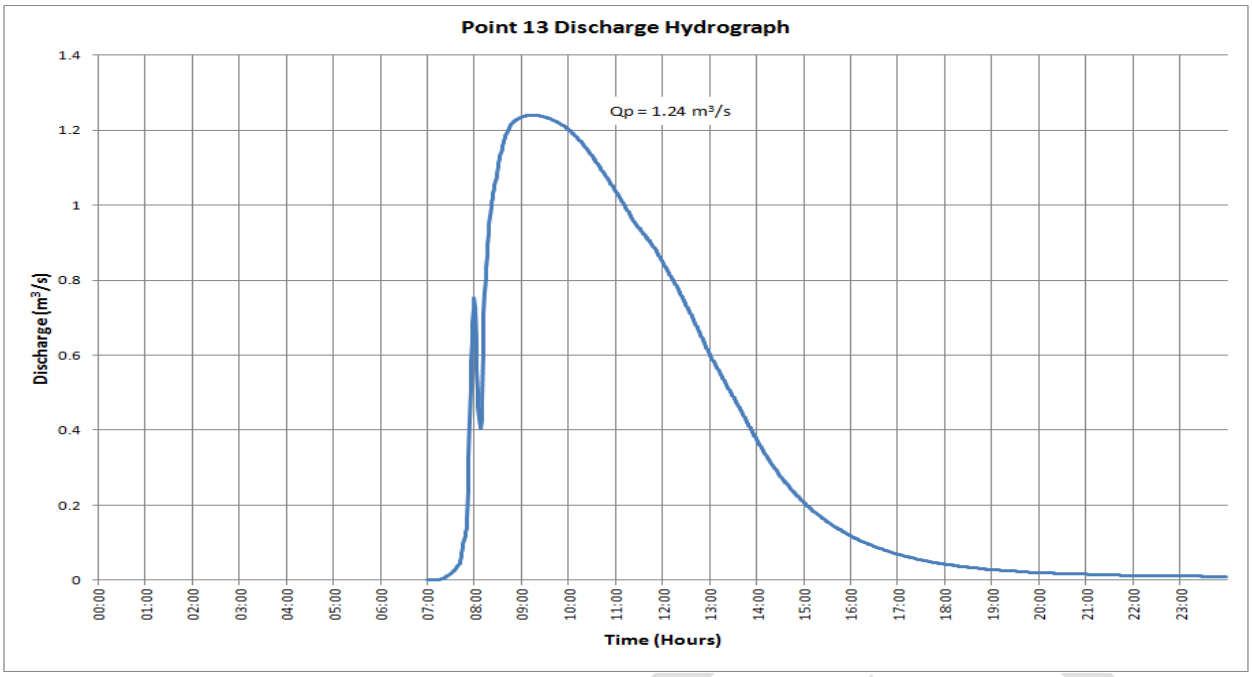


Figure 8 - LDD Ditch Flow at Point 13

At Point 14 the LDD enters the Clean Water Ponds 1 and 2. The peak discharge in the drain entering the ponds is 2.682 m^3/s. When routed through the ponds, the flow is reduced to a peak discharge of 1.592 m^3/s (Point 17). At Point 18, the LDD flow is combined with the outflow from the dry ponds from the LCD system and results in a combined peak discharge of 3.199 m^3/s (Point 19).

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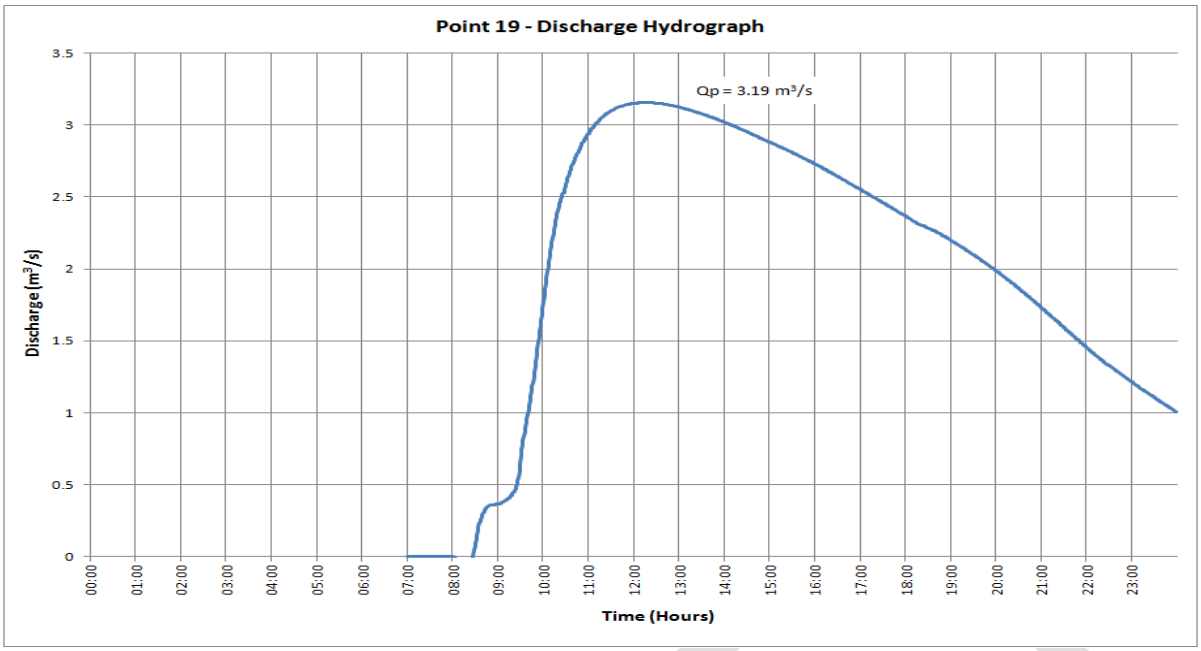


Figure 9: Combined Flow LDD and LCD – Point 19

Point 20 is located at the east limits of the Brady Road at the weir. The peak discharge at this location includes the combined discharge from the LCD and LDD drainage systems. The peak discharge at this location is 3.2 m^3/s.

8.2 DITCH DESIGN

The preferred typical cross section for the landfill collector ditch design is shown on Drawing Number G06. The base width is 2 meters, with side slopes of 3:1. Flatter side slopes can be used where ditch side slopes are adjacent to roadways. Flatter slopes were also considered for ease of vegetation maintenance, however, for ditches along the perimeter of landfill areas, flatter slopes would result in significant landfilling air space loss, therefore 3:1 slopes are recommended. The ditch depth, and containment berm height where required were determined based on the 25 year design return rainstorm and the predicted water level as determined by the modelling, with a 0.5 meter freeboard allowance.

The typical cross section for ditches draining the elevated active landfill area is shown on Drawing Number 13-0107-015 G10. This ditch has a base width of 1 meter, with containment

berms to keep the ditch invert above the one meter final clay cover on the completed landfill slopes. The containment berms are to tied into the active area berms, thereby directing active area drainage into the drainage ditch. In this way the "top-to-bottom" drainage control requirement is met.

8.3 DESIGN OF RETENTION PONDS

The original concept for the BRRMF incorporated wetlands for retention basins to allow for sediment settling due to velocity reduction as flows spread out into the pond, surge flow dampening, and some treatment. There was also the potential for using the wetlands for aesthetic, recreational or educational purposes. The location of the wetlands was to be within the general area of the clay borrow pits utilized for the compost areas construction. Typically, constructed or engineered wetlands can be used to control stormwater flows and quality through natural processes.

For the shallower pond embankments and slopes, 3H:1V slopes were utilized, while for the deeper sections, 4H:1V slopes were used.

Active Area Collection Pond

Impacted water from the active area will be directed to a small lined pond (active collection pond) where it will be tested and treated if necessary prior to release. Ponds holding impacted runoff require one meter compacted clay of permeability 1×10^{-7} cm/sec or equivalent synthetic liner. The quality of this water source is unknown and therefore is difficult to design a wetlands system for treating this source. Furthermore, because of the location of this pond, it is likely that there would be insufficient area to provide the residence time/retention capacity necessary for storage and treatment. This pond has been designed with an overflow with erosion protection to prevent uncontrolled overtopping, erosion and potential containment failure in the event of storm of greater intensity than the design has allowed for, and requires pumping to be emptied, similar to the compost storm water ponds at this site, designed by others.

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Dry Ponds

To collect the runoff from the west and east landfill collector ditches, a series of three dry collection ponds have been utilized (see Dwg No.13-0107-015 G01) primarily to equalize flows, however, they will also serve to settle sediment. This design takes maximum advantage of the existing borrow pit topography and allows for closing off of a wide range of flows, to avoid the necessity of treating large volumes of runoff in the event of a leachate breach. The dry ponds are designed to run dry, however as a contingency, gated culvert low level outlets have been provided thereby allowing the runoff to be stored if necessary.

These ponds were considered as candidates for wetlands. As discussed earlier, in Section 7.0, the focus with this runoff is to contain and deal with any impacted water flows at source, therefore, there is little justification for utilizing wetlands for treatment purposes at this location. Furthermore, such a water feature, which would have a substantial size, would attract waterfowl, potentially adding significantly to the existing bird control program at this site. Also, being close to the landfill and the main drainage ditch, this location would also not be amenable for public access for aesthetic, recreational, or educational purposes.

Although not recommended at this time, the use of wetlands for runoff from landfill collector ditches should be re-examined in 2 to 3 years' time, once the hydraulic performance and water quality in this part of the drainage system is determined and once the water quality objectives for the Development have been established, pursuant to Licence condition 119. If at this point it is decided that wetlands would be beneficial, and that bird control can be managed, the conversion of the dry ponds to wetlands would require a nominal depth excavation. The slide gates at the weirs could be used to help control water levels. To prevent accumulation of thatch within wetlands, periodic harvesting of dead vegetation is required. Since there is insufficient grade to permit a gravity drain to dewater the reed bed for harvesting thatch, pumping would be required to dewater the wetlands for this purpose.

CRRC Pond

The CRRC pond is also designed as a dry pond, with the capability of retaining flows as a contingency. Similar to the dry ponds discussed earlier, there is little justification for utilizing

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wetlands for treatment purposes here.

Leaf and Yard Waste and Biosolids Compost Facilities Stormwater Ponds

Lined ponds have been designed by others (CH2MHill 2012) for collection, testing and treatment (if required) of runoff from the leaf and yard waste and biosolids composting facilities. Some modifications will likely be required to the outlet works for the ponds to be compatible with this surface water management plan.

New Landfill Cell Considerations

Although the design is not a part of this project, consideration was given to impacted drainage from the new landfill cells to be constructed starting at the northwest corner of the existing current landfill area and proceeding south adjacent to the existing landfill. The cells are to be designed so as to leave lined retention capacity on one side of the cell excavation to direct drainage from portions of the operation without final cover. Similar to the active area pond, the runoff collected in these retention basins will be tested and treated if necessary prior to release into the landfill collector ditch.

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8.4 EROSION CONTROL

Project requirements specify that Erosion control is to be provided for a 2 year storm event and that the erosion control measures are to be justified by demonstrated examples in other landfills or solid waste facilities. The design of erosion control is primarily based on the anticipated tractive forces on the soils, the slope of the flow surface, and the ability of the soil particles to resist erosion given the forces and slopes present. For this project, since no surface water is designed to flow over waste materials, there are no specific design features because of the works being located at a landfill. Therefore, as the soil properties govern the design, experience with erosion control in the Winnipeg area, especially for embankments and ditches similar to the ones at BRRMF has been a key consideration in the design. There are, however, some erosion control materials that may be utilized at a landfill because of the availability of alternatives to traditional materials as described in the following discussion.

Erosion control in the form of graded rock riprap underlain by geotextile fabric has been provided for ditches or other drainage features where the grade or slope is steeper than 5% (such as for active area drainage) and at locations where scour due to velocity and flow impingement or eddying is anticipated such as at sharp bends in the ditch. The geotextile takes the place of a granular filter transition layer, and is effective in clays, as well as permitting a shallower overall filter and riprap thickness.

Typically the rock used for riprap would be the locally available dolomitic limestone. However, crushed recycled concrete or waste rock would be equally acceptable, provided that the particle sizes conform to the specified gradation and the particle shapes are angular, conducive to interlocking to form a stable mat under scour conditions.

Except for the active area ditching, all other ditches are at modest gradients and are not anticipated to experience flow velocities in excess of one meter per second for the 2 year storm event. No erosion control is required in such instances. As a contingency however, ditch checks may be utilized to slow flows prior to vegetation becoming established and should erosion become evident in any section of the ditching. See Section 15.2.3 for information on the use of ditch checks.

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Measures that can be employed to prevent and or help to arrest erosion on finished landfill slopes include compacting final cover and track-packing with heavy equipment up and down the slopes to slow erosion. The track cleat indentations parallel to the slope disrupt the flow. Using sheep foot compaction equipment on the slopes is another means of creating indentations on finished cover for enhancing vegetative growth by retaining some moisture from runoff. When combined with a fibrous cover of topsoil, wood chips, straw mulch or compost, these measures can be particularly effective in reducing gullying and increasing vegetative growth.

For landfill finished slopes the SWSD has been conducting cover vegetation trials using seed mixtures recommended by City parks personnel. There are other vegetative types that can be considered if needed including the types successfully implemented on the Red River Floodway slopes. Fugitive landfill gas emissions through the final cover can be toxic to vegetation, however, with the landfill gas extraction system, such emissions should be reduced in areas controlled by this system.

Recommended seeding mixes and specifications for finished landfill slopes and ditches as an alternative to City of Winnipeg specifications are included in Appendix C. These seed mixes have been successfully used in the recent Red River Floodway Expansion Project to control erosion on clay slopes and should be directly applicable to this project. It is recommended that once completed, active areas have been covered with one meter of clay, the finished slopes be covered with a minimum organic cover layer of 50 to 100 mm of leaf and yard waste compost prior to seeding. Composted biosolids can also be used for the organic cover layer, or as a subsequent fertilizer provided the application rate does not exceed the requirements in the Nutrient Management Regulation and runoff quality is not impacted.

8.5 REVIEW OF LEACHATE SEEP CONTROL MEASURES

8.5.1 Past Leachate Seeps and Controls

The BRRMF has experienced leachate seeps in a number of locations as the result of high perched or static leachate levels (refer to KGS leachate study). To control these occurrences and prevent leachate from escaping into the surface water system, the SWSD has implemented leachate seep controls consisting of cover and a collection component (if required) to direct the seeps into the existing leachate collection system. The key to this program is to conduct

sufficient surveillance to provide early identification of seeps and, if seeps are found, to implement the appropriate response and follow up in a timely manner.

It appears that seeps have been encountered on the slopes of the landfill at the BRRMF more frequently now than in the past for a number of reasons. Firstly, the design of the side slope construction changed in the late 1980's. Prior to that time, lifts advanced by constructing solid clay outer slope berms offset and superimposed over each other as the fill lifts advanced vertically, to contain the waste and to provide a buttress against which to fill. This left a fairly thick clay outer slope that could contain any lateral leachate seepage, more so than the 1 meter final cover now being utilized. In addition to requiring significant quantities of clay, this method of construction resulted in slope failures within the thick clay outer slope that have been experienced at a number of landfills in the City utilizing this method of filling. To conserve clay at enhance slope stability, outer slopes are now constructed with compacted waste outer berms instead of clay.

Secondly, the fill heights in the 1980s were about one-third the present height of 30 meters and therefore the finished height and time that the footprint was without final cover was less, resulting in less runoff infiltration.

There were a few notable leachate seep control measures employed at the BRRMF which provided experience for the current design. The area north and east of Manhole No. 31 has experienced chronic leachate seeps. According to one of the previous site foremen at BRRMF, this area was operated as a wet weather area and also received some slurry/sludge type materials which may account for all or part of the high leachate head in the area. In 2006, in an effort to both drain any leachate perching downward and to provide an opportunity for collecting and pumping the leachate, four large diameter holes were drilled into the side slope and outfitted with sleeves to allow for pumping. These sumps did not provide much vertical drainage but did allow for pumping. The amount that could be pumped, however, was limited because of long infiltration recovery times likely due to fines from the presumed slurry/sludge material deposited, migrating towards and plugging voids around the sumps. The rate of pumping and drawdown in these sumps may have contributed to the lines plugging the voids.

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Another major seep occurred in the south-facing slope of the 1992 cell, north of Charette Road and east of pumping Manhole No. 8 in the late winter of 2010. This seep may have its origin in a ponded area that existed on the top of the landfilled area to the west of the seep. Initially a trench was dug to contain the flow, which was periodically pumped out and hauled for treatment to the NEWPCC or discharged into a nearby leachate manhole. When it became apparent that the flow was not dissipating, an in-ground piped collection system was installed leading to a manhole for storage. The manhole employs a level control pumping system to pump the leachate into pumping Manhole No. 8, where it is pumped out as part of other flows into this manhole. Flow of leachate in this installation has been steady since it was constructed, however in October, 2013 it dissipated for a short period. Flow resumed concurrent with additional filling over the seep area, and this may be due to the additional fill surcharging underlying waste and squeezing the leachate out as pore space is reduced.

The designs employed most recently for leachate seep controls by the SWSD are appended as Appendix D. For the most part the designs employ a plastic pipe weeping tile type of collection system installed in shallow collection trenches so as not to expose large flows. The pipes are directed to the nearest existing leachate collection pumping manhole. Where the nearest existing pumping manhole is too distant, a new pumping manhole is installed. Once a system is installed, any new nearby seeps can be directed into the system using granular filled trenches connected to the main collection trenches.

These designs have been independently reviewed by KGS Group as well as inspected to the extent possible on site. The designs used have been performing as intended and the designs used appear to be acceptable. There are some additional suggestions for the designs and leachate seep control process as outlined in the following section.

With the system improvements required in order to meet the Environment Act Licence requirements, the occurrence and severity of leachate breakouts are expected to significantly diminish and likely may be eliminated in the long term, thereby minimizing any risk of runoff contamination or vertical leachate migration from the site drainage system.

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8.5.2 Recommended Protocols for Leachate Seeps

A protocol for seep control is required in the landfill operating procedures. The accountability for the protocol needs to be clearly assigned. The group assigned this task needs to have sufficient access to funding and equipment in order to carry out mitigation of seeps quickly and efficiently. The resources required can be readily estimated from several similar previous work programs. A suggested protocol and comments on the control measures utilized thus far are as follows:

Programmed Surveillance for Early Identification of Seeps

Weekly inspections of the landfill are recommended. This can be combined with inspections required for other landfill performance requirements. Seeps are readily identifiable in non-winter conditions, however, with winter snow cover, seeps may not be visible until staining or frost mounding becomes evident. In the winter months, however, the leachate flows generally freeze and the frozen material can be scraped and placed in an impacted runoff storage pond, until remedial actions are initiated. Co-disposal of the frozen leachate at the working face will require approval by the Director according to Licence condition 94.

Cover/Containment

Perched leachate levels can break out on outer slopes if there is insufficient final cover or insufficient compaction of the cover, such as with uncompacted frozen clay cover. If this is suspected, applying additional compacted cover may be sufficient to contain the breakout.

If the breakout cannot be contained with additional cover and compaction, provision must be made to contain the breakout on the slope if possible by creating a clay containment dyke. If containment on the slope is not practical, the seepage can be directed to the base of the slope where a containment dyke and/or an excavation can be used to collect the seepage. The leachate thus collected can be either pumped into a nearby manhole or into a truck and hauled for treatment to the NEWPCC.

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Assessment

After seepage is contained with temporary measures, an assessment must quickly be carried out to determine the cause of the seepage if possible, and a longer term solution developed. Areas of significant surface ponding can be readily identified. Any such ponding should be immediately rectified by grading and filling with compacted clay and care taken to prevent any future ponding. Drilling or test pitting can be carried out to establish if the source is perched leachate and whether the solution is to direct the perched leachate further down by drilling or excavation. However, because of the non-homogeneous nature of the landfill materials and the resulting potential for convoluted flow within the mass, identifying sources of seeps can be very difficult and is often not successful.

If downward drainage back into the landfill is not the solution, alternative seep control is required.

Seep Control Measures Design and Operation

If the source of the seep is perched leachate and draining the leachate downward is not possible, seep control measures similar to those now implemented can be employed to collect the seepage and direct it to an existing or newly constructed manhole.

The seep control designs utilized have collector lines that are installed in shallow trenches extended into the seeps. As indicated earlier, these trenches are kept shallow so as not to intercept large flows that may be difficult to contain during the construction period as experienced during the installation of landfill gas headers. Since it is virtually impossible to predict the flows that will result, it is problematic (risky) to trench too deep.

There is a concern that the seep controls could create a pathway for air intrusion into the landfill, creating a chimney convection effect that could lead to spontaneous combustion. The seep control system also could be a pathway for air intrusion as the result of draw from a landfill gas collection system, again providing a mechanism for spontaneous combustion. Therefore, it is important that the piping and granular filled trenches of such systems are adequately covered with clay and/or a synthetic liner to provide a cover equivalent to a final clay cap (e.g. one meter of compacted clay). Furthermore, while the drains are flowing full, or if the invert of the pipe,

outlet is below the normal liquid level, in the manhole it discharges into, there is little likelihood of air intrusion via the pipe outlet. If this is not the case, a u-trap can be installed prior to the outlet to provide a seal. Such a trap would need to be installed below frost level or frost-proofed and during extended periods of no flow, would need to be charged with water to maintain the seal. Such measures would also prevent landfill gas from escaping via seep control piping, provided pressures were not excessive. Preventing landfill gas escape from leachate collection components is a requirement under Licence condition 92 (h).

Shallow buried drains will be subject to freezing. As such, these installations are seasonally dependent for functioning unless a cover with a suitable layer of straw, compost or wood chips is used to keep the drains functional throughout the winter period.

Any new seeps are being drained into nearby installed systems where available using shallow trenches filled with recycled glass cullet. The same comments regarding adequate cover and freeze protection apply here.

The seep control designs utilized by the SWSD are considered to be adequate for short term use. One of the risks with the designs over the longer term is the potential for clogging of the granular media from suspended solids and mineral and biological processes with leachate, which are also concerns in the design of conventional leachate underdrain systems at landfills. These clogging mechanisms can be worsened with the use of glass cullet for drainage, if the cullet has not been adequately screened to remove small particle sizes as well as metals, plastic and paper. Also, the current designs do not include access for flushing of the perforated collection piping. Therefore, where such systems are intended for long term use, addressing the clogging issue is necessary with retrofitting as required.

A concerted effort to place impervious daily, intermediate and final cover, and eliminate and prevent all sources of ponding will relieve the sources of seeps with time. Also, during years of exceptionally high snowfall, snow clearing off the areas estimated to be contributing to seeps can be beneficial in reducing flows.

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Additional Considerations

Leachate seepage/escape can also occur by air-lifting (because of landfill gas pressure) out of the surface of the landfill, or more spectacularly, as geysers out of cleanout pipes in leachate collection systems. These occurrences can be alleviated through landfill gas pressure relief and, in the case of cleanout pipes, providing a return fitting into an adjoining manhole. With the operation of landfill gas collection systems, these types of problems should diminish.

The normal protocol is to install landfill gas corrections and flare or utilization systems within one year of achieving final topography. This not only reduces pressure within the landfill close to the peak gas production period, but also reduces stress on finished slopes vegetation. Maintaining this vegetation is important to protecting the integrity of the landfill cap and thus being able to contain leachate on slopes.

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9.0 SURFACE WATER MONITORING PROGRAM

9.1 EXISTING PROGRAM

The location of the current surface water sampling points is shown in Appendix E-1. Surface water data is summarized through 2012 on Tables B-1 and B-2, based on data transmitted by the City of Winnipeg. Applicable regulatory criteria are added to the tables for comparison. Surface water quality data through mid 2012 has been assessed and presented by others (Stantec 2011, CH2MHill 2012) and is not repeated in this report; however, the surface water quality data has been used to refine the proposed monitoring program

The existing surface water program as of 2012 is detailed below:

Locations:

Upstream	SWQ25-1 (Brady Road off-site)
Downstream Weir	SWQ25-2
East Pond	
West Pond	
Westendorf Coulee	SWQ25-3 (Off-site)
La Salle River	SWQ25-4 (Off-site)
Red River	SWQ25-5 (Off-site)

Frequency

Sampling frequency is three times per year in spring, summer and fall. Targeted months are during the spring thaw in late April or early May, in late July or early August, and in late October. The Westendorf Coulee was sampled only in May 2012.

Parameters

Parameters include inorganics, nutrients and dissolved metals (filtered in the field).

Sampling methodology

Grab samples are collected in a sampling container. Metals samples are field filtered using a bailer and in-line filter. Bacteria samples are run through the bailer prior to sealing in bottles. Duplicate samples and blanks were not taken in 2012 in the surface water program, but are included as of 2013.

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9.2 SURFACE WATER MONITORING ISSUES

9.2.1 Environment Act Licence

Environment Act Licence condition No. 120 specifies that the City of Winnipeg submit a surface water sampling and analysis plan for approval within 6 months of the licence date (initial target date: June 23, 2014). Licence condition 119 requires sampling and evaluation of specified parameters for the 2014 and 2015 monitoring season and submission of a report prior to February 2016 on the water quality objectives for the Development to be approved by the Director.

A plan of proposed surface water monitoring location is shown in Figure 10. The plan includes the layout of the proposed surface water management system components.

Upstream Sampling Point Location

Most of the surface water enters the site from the west along the east-west section of Brady Road, where the sampling point SW25-1 is located. Some runoff also enters from the north, along the north-south section of Brady Road. An additional on-site sampling point east of Brady Road before the landfill is proposed to sample both these sources, which enter the ditch along the north side of Charette Road through two separate culverts near the west property boundary.

Off-site Compliance Point

The off-site compliance point at the downstream weir (SWQ25-2) is located at the east property boundary.

Off-site Water Quality Compliance

The monitoring and report required according to Licence condition 119 will address water quality criteria objectives for off-site water quality compliance, for approval by the Director.

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Ponds

Sampling for ponds should be tied to the operation of the pond, either for retention, or as a dry pond.

Intermediate Sampling Points Land Drainage Ditch

An adequate number of intermediate sampling points along the flow path are required to define each contributing source or drainage area independently so that areas contributing various contaminants can be isolated if they occur.

Leachate Seeps

Leachate seep locations should be identified and monitored as part of the leachate management response procedures. If on-going monitoring is required it should be done under the leachate monitoring program.

Off-site Downstream Sampling

Continued sampling of the Westendorf Coulee downstream of the weir, the LaSalle River and the Red River is not proposed for the long term monitoring program. Additional contaminant inputs from urban runoff are likely from Waverley St. and developed areas north of the Westendorf Coulee and East of Waverly Street, which would make it difficult to identify contaminant sources. Should additional nutrient loading studies be done, sampling of these points can be reinstated in a targeted study. Flow monitoring should be measured at the downstream weir (SWQ25-2) in order to assess loading of parameters of concern, should these parameters exceed concentrations in upstream samples and/or Manitoba Water Quality Standards, Objectives and Guidelines.

Methodology

Sample replicates and blanks should be taken for each event.

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Contingency Measures

A method for stopping off-site flow at the weir is needed as a contingency method.

9.3 PROPOSED PROGRAM

9.3.1 Overview

The proposed surface water monitoring system is outlined below and is shown on Table 5 including locations, parameter sets and frequency. Detailed parameters are shown in Table 5. The numbering system used by the City of Winnipeg has been retained for consistency. Proposed sampling locations include upstream surface water, downstream surface water at the compliance point, ponds and intermediate locations along the south collector ditch. An additional off-site drainage point on the north branch of the Westendorf Coulee is also proposed.

Compliance parameters have been set in the Licence (Appendix A). This parameter list has been used for the upstream and downstream sampling points with modifications at other locations interior to the site. Since the surface water management system is designed to run dry for most of the year, surface water sampling will be keyed to periods of runoff, including the spring thaw, and at least two other major runoff events. This will require that sampling schedules be flexible enough to accommodate sampling on short notice.

Sampling for impacted water and dry ponds has been specified only prior to discharge events. Sampling for the clean water ponds is similar to sampling for the perimeter ditching.

9.3.2 Upstream Off-site Monitoring

Locations

- SWQ25-1 Brady Road (drainage from west)
- SWQ25-12 Charette Road Ditch (drainage from the north)

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Frequency

- Grab sampling three times per year: spring runoff, summer runoff event and fall runoff event

Parameters

- Sets A through G

9.3.3 Off-site Discharge Compliance Point

Locations

The location of the off-site compliance point remains the same. At present the weir has water year round on most years due to suspected sedimentation downstream of the weir. When this problem is remedied, the gradient is high enough so that the ditch is expected to be dry during most of the year. This will require sampling tailored to spring thaw and runoff events as proposed. A continuous monitoring station can be established and grab samples can be taken after storm events as selected by weekly on-site surveillance. Clean out of ditches downstream of this location is recommended in order to prevent standing water in this area.

- SWQ25-2 Weir

Frequency

Grab sampling three times per year: spring runoff, summer runoff event and fall runoff events. Continuous sampling proposed for designated parameters. Weekly sampling proposed for designated parameters.

Parameters

- Sets A through G for the 3 major runoff samples
- Set G Weekly from spring thaw to freeze up (April to November). These parameters can be taken in the field, or can be submitted to the laboratory for analysis.
- Contingency sampling for Sets A and B for indicator and nutrient parameters if increases in field parameters are seen.
- Flow Volume

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9.3.4 Ponds

Locations

Ponds on the site are classified as follows:

Impacted Water Ponds
- SWQ-25-6 Active Area Collection Pond
- SWQ-25-7 Biosolids Storm Water Pond
- SWQ-25-8 Leaf and Yard Waste Storm Water Pond

Clean Water Pond
- SWQ-25-9 a and b Clean Water Pond 1 and 2

Dry Ponds
- SWQ-25-10 CRRC Pond
- SWQ-25-11 a, b, c Southeast Dry Ponds 1, 2 and 3

Frequency

- Active area collection pond- periodic testing to determine if discharge to the on-site landfill collector ditch is allowed, or if water is to be disposed as leachate.
- Leaf and yard waste storm water pond- testing only if discharge to landfill collector ditch is required.
- Biosolids pond- would be tested after treatment and prior to discharge.
- Clean water pond- sampled during spring and summer runoff.
- Southeast dry pond and the CRCC dry pond- contingency sampling only when the culvert gates are dropped to allow water retention and a subsequent discharge is required.

Parameters

- Parameters for sampling prior to discharge will be specified for each pond after further consultation with Manitoba Conservation regarding discharge requirements.
- Parameters for the clean water pond will be Sets A, B, C, D, E, F and G.

9.3.5 Land Drainage Ditch

Locations

Intermediate sampling in the south collector ditch is proposed before and after each discharge point to the collector ditch. This monitoring should be conducted to operate the site efficiently to minimize sedimentation and nutrient discharge as required in the licence.

- SWQ-25-13 a and b Upstream and downstream of CRCC pond
- SWQ-25-14 a and b Upstream and downstream of Clean Water Ponds 1 and 2

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- SWQ-25-15 a and b Upstream and downstream of Dry Pond 3

Frequency

- Sampling twice per year during spring and summer runoff

Parameters

- Sets A, B, C, D, E, F and G.

9.3.6 Additional Off-site Drainage

Location

The landfill collector ditch along the north perimeter of the landfill is designed to route water away from the north east portion of the site where the north branch of Westendorf Coulee begins. Sampling is proposed where this branch meets the Manitoba Hydro substation access road, west of Waverley Street to demonstrate that the north perimeter ditch is diverting runoff effectively.

- SWQ-25-16

Frequency

- Sampling twice per year during spring runoff and in August

Parameters

- Sets A, B, C, D, E, F and G

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10.0 GROUNDWATER MONITORING PROGRAM

10.1 EXISTING GROUNDWATER PROGRAM

10.1.1 Location

The location of the current groundwater sampling points is shown in Appendix E-2. Groundwater data is summarized through 2012 on Tables C-1 through C-8, based on data transmitted by the City of Winnipeg. Applicable regulatory criteria are added to the tables for comparison. Groundwater quality data through mid 2012 has been assessed and presented by others (Stantec 2011, CH2MHill 2012) and is not repeated in this report; however, the groundwater quality data has been used to refine the proposed monitoring program

The existing program includes 9 bedrock wells and 17 overburden wells completed in clay or till. A total of 52 samples are analyzed per year.

Upgradient Background Brady Road

- GWQ 25-6N60DR clay
- GWQ 25-6N60E Top of Till
- GWQ 25-W6 Bedrock

Downgradient Site Perimeter East

- GWQ 25-W8 bedrock

- GWQ 25-5N62D clay
- GWQ 25-5N62E till
- GWQ 25-W11 bedrock

Cross Gradient Site Perimeter North

- GWQ 25-6N63E clay
- GWQ 25-6N63F till
- GWQ 25-W9 bedrock

- GWQ 25-6N57DR clay
- GWQ 25-6N57F till
- GWQ 25-W10 bedrock

***Downgradient Former* Disposal Cells in west of site**

- GWQ25-W7 bedrock

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Former Disposal Cells 1974-1978 (one cell further east)

- ***Downgradient (east)***
  GWQ 25-6N67E clay
  GWQ 25-6N67F till
  W12 bedrock

- ***Cross gradient (south)***
  GWQ25-4N34B clay
  GWQ 25-6N34DR till
  GWQ 4N34 C- clay clay

Cross Gradient Site Perimeter South

- GWQ 25-6N58DR top of till
- GWQ 25-6N58F till
- GWQ 25-W4 bedrock

- GWQ 25-6N59DR clay
- GWQ 25-6N59F till
- GWQ 25-W5 bedrock

Water Elevation - Recorded at time of sampling. Dedicated water level transducers are installed in 5 bedrock wells (W5, 9, 10 and 11), one till well 4N43DR and 1 clay well 4N43C.

10.1.2 Parameters

The parameters currently sampled include:

- Inorganic Parameters
- Nutrients
- Organic Indicators (TOC)
- Metals (including total chromium and hexavalent chromium)
- Bacteria (total coliform, fecal coliform and *E. coli)*
- PAHs (including naphthalene, benzo a pyrene and anthracene
- VOCs (including vinyl chloride)
- Pesticides/Herbicides (not including diazinon and 2,4,D)
- PCB's

A previous one-time screening of the following parameters occurred in 2010:

- Dioxin in 3 bedrock wells
- Nonylphenols and Ethoxylates in 3 bedrock wells

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10.1.3 Frequency

Sampling frequency for all well and parameters is twice per year in May and October

10.1.4 Compliance Points and Criteria

Compliance points and criteria had not been determined pending issue of the Environment Act licence.

10.2 GROUNDWATER MONITORING ISSUES

10.2.1 Environment Act Licence

Environment Act Licence condition 123 specifies that the City of Winnipeg submit a groundwater monitoring sampling and analysis plan for approval within 6 months of the licence date (initial target date: October 23, 2014). Licence condition 122 specifies that the concentration values of specified parameters not exceed background levels in groundwater at the compliance boundary. Based on the groundwater flow direction the compliance boundary is the east property boundary. Licence condition 125 requires submission of a Contingency Action Plan within 6 months of the licence date (initial target date: October 23, 2014). Conditions 124 through 129 outline reporting requirements. This section on groundwater monitoring proposes a general framework which can be further developed in the groundwater monitoring plan.

10.2.2 Number and Location of Points

The number and location of sampling points in the overburden and bedrock aquifer were assessed in relation to upgradient and downgradient positions in the groundwater flow system. The locations of the current monitoring points are based on the groundwater flow directions interpreted at various times in the past. The groundwater flow direction shown in the most recent Environmental Assessment (Stantec 2011) is northeast. Given the scale of the development and the fracture flow system, additional wells are recommended both to intercept groundwater flow northeast and east should it occur.

Two additional monitors installed between W11 and W8 are recommended to provide downgradient coverage for the monitoring system. In addition, two monitors between W8 and W5 are recommended to capture any flow in the east direction. The monitors should consist of well nests in the till and bedrock. Bedrock wells should be constructed as 150 mm diameter wells in order to retain flexibility for instrumentation, or for future use to collect groundwater in a contingency scenario.

The emphasis in the monitoring system should be on horizontal movement in the bedrock aquifer and to a lesser extent in the till. Monitoring in the clay should be continued at a reduced frequency in areas close to waste.

In the area of new waste development, monitoring wells in clay, till and bedrock should be constructed between the area of new waste development west of the landfill and the existing waste area, so that the new area can be monitored independently.

10.2.3 Groundwater Elevation Monitoring

Groundwater elevation monitoring should continue with both manual measurements and transducers to measure pressure temperature and possibly conductivity. Locations should be selected to focus on the bedrock aquifer and to detect any current or future regional influences on the groundwater system including industrial pumping, groundwater cooling.

10.3 PROPOSED PROGRAM

10.3.1 Overview

The proposed groundwater monitoring system is outlined below and is shown on Table 6 including locations, parameter sets and frequency. Detailed parameters are shown on Table 6. Proposed new wells are numbered following the City of Winnipeg system for consistency. The program focuses on bedrock monitoring, with a secondary focus on till monitoring downgradient of waste areas. Monitoring of clay wells and till wells in other flow positions is continued on a less frequent basis.

Parameters chosen correspond to those required for evaluation in Licence condition 122 with the several adaptations. Organic indicators (COD, BOD) are not required, however they are proposed for consistency with surface water licence requirements. Specific parameters are required for PAHs (3 parameters), VOCs (1 parameter) and Pesticides/Herbicides (2 parameters). The City of Winnipeg practice has been to report a full screen since it must be run to report any of the parameters. This practice should be continued. The analysis screens for pesticides and herbicides currently run by the City should be modified to include diazinon and 2,4,-D, which are required by the licence. In addition, the pesticide and herbicide screen chosen should be examined to insure it includes any parameter that is found to be significantly elevated in the leachate.

A core set of parameters are proposed for each sampling period to include inorganic parameters, nutrients, metals and field parameters. Bacteria are proposed to be sampled only in bedrock wells which are likely to have less interference from suspended sediment than the till and clay wells. An extended set of parameters including cyanide, PAHs petroleum hydrocarbons, VOCs and Pesticide Herbicides is proposed to be sampled for each sampling period in downgradient bedrock wells and less frequently in other bedrock wells and downgradient till wells. Extended parameters are not proposed to be sampled in clay wells with the exception of the upgradient well.

Sampling frequency is proposed to be twice per year in May and October for the bedrock wells and downgradient till wells, and once per year in May for clay wells and other till wells. Sampling every other year is proposed for several wells distant from the waste areas.

10.3.2 Location

The proposed program includes 13 bedrock wells and 21 overburden wells completed in clay or till. A total of 26 samples from the bedrock and 23 samples from overburden wells would be analyzed each year (total 59 samples) with 4 additional samples every other year (total of 63 samples)

Upgradient Background Brady Road

- GWQ 25-6N60DR clay
- GWQ 25-6N60E top of till
- GWQ 25-W6 bedrock

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Downgradient Site Perimeter East

- GWQ 25-W8 bedrock

- GWQ 25-5N62D clay
- GWQ 25-5N62E till
- GWQ 25-W11 bedrock
-

Proposed New Wells

- GWQ-25-N-13A till
- GWQ-25-W-13 bedrock
- GWQ-25-W-14A till
- GWQ-25-W-14 bedrock
- GWQ-25N-15A till

- GWQ-25-W-15 bedrock
- GWQ-25N-16A till

Cross Gradient Site Perimeter North

- GWQ 25-6N63E clay
- GWQ 25-6N63F till
- GWQ 25-W9 bedrock

- GWQ 25-6N57DR clay
- GWQ 25-6N57F till
- GWQ 25-W10 bedrock

***Downgradient Former* Disposal Cells in west of site**

- GWQ25-W7 bedrock

Former Disposal Cells 1974-1978 *(one cell further east)*

- ***Downgradient (east)***
  GWQ 25-6N67E clay
  GWQ 25-6N67F till
  W12 bedrock

- ***Cross gradient (south)***

  GWQ25-4N34B clay
  GWQ 25-6N34DR till
  GWQ 4N34 C clay

Cross Gradient Site Perimeter South

- GWQ 25-6N58DR top of till
- GWQ 25-6N58F till
- GWQ 25-W4 bedrock

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- GWQ 25-6N59DR clay
- GWQ 25-6N59F till
- GWQ 25-W5 bedrock

10.3.3 Parameters

- Set A- Inorganic Parameters
- Set B- Nutrients
- Set C- Cyanide
- Set D- Organic Indicators (COD, BOD, TOC)
- Set E- Metals (including total chromium and hexavalent chromium)
- Set F Bacteria (total coliform, fecal coliform. and *E. coli)*
- Set G- Field parameters
- Set H- PAHs (including naphthalene, benzo a pyrene and anthracene
- Set I- Petroleum Hydrocarbons (including CCME Petroleum fraction 1-4 and BTEX)
- Set J- VOCs (including vinyl chloride)
- Set K- Pesticides/Herbicides (including diazinon and 2,4,D)
- Water elevation is to be recorded at time of sampling.
- Dedicated water level transducers are to be installed at selected wells.

10.3.4 Frequency

The sampling frequency is shown on Table 6.

10.3.5 Compliance Points and Criteria

Compliance points will be the bedrock groundwater at the east property boundary (bedrock wells GWQ-25-W10, GWQ-25-W11, GWQ-25-W8, New wells GWQ-25-W13, GWQ-25-W-14, GWQ-25-W15.)

Licence condition 122 requires that the development not cause the concentration values of a specified list of parameters to exceed background levels in groundwater at the compliance boundary.

Licence condition 125 requires that a contingency action plan be implemented in the event that the monitoring program identifies any parameter in surface or groundwater at the property boundary as a result of the operation of the Development in excess of background levels. The

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Contingency plan is required to assess the significance of the exceedance in relation to applicable groundwater and surface water criteria and actions to be taken to mitigate the contamination if required.

Components of the contingency plan may include:

- Evaluation of concentrations against historic baseline concentration in well
- Evaluation of concentrations against upgradient concentration
- Evaluation of concentrations against other downgradient wells
- Evaluation of concentrations against non-potable groundwater criteria
- Evaluation of concentrations against potable groundwater criteria
- Identification of potential sources of contamination
- Identification of actions to be taken to mitigate the contamination if required (leachate control, surface water control)

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11.0 LEACHATE MONITORING PROGRAM

11.1 EXISTING LEACHATE PROGRAM

The location of the current leachate sampling points is shown in Appendix E-2 and E-3. Leachate quality data is summarized through 2012 on Tables D-1 through D-15, based on data transmitted by the City of Winnipeg. Applicable regulatory criteria are added to the tables for comparison. Leachate quality data through mid 2012 has been assessed and presented by others (Stantec 2011, CH2MHill 2012) and is not repeated in this report; however, the leachate quality data has been used to refine the proposed monitoring program

11.1.1 Location

The leachate monitoring program consists of measurement of leachate elevation at 45 locations and sampling of leachate at each of the 8 manholes of the collection system. The North End Water Pollution Control Center requires annual leachate sampling at each manhole for a range of extended parameters to comply with their Federal reporting requirements.

Leachate Elevation Sampling Points- 45 locations

Manholes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 ,11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 30, 31, 32, 33, 34, 42, 43, 44, 45
SMP 1, 2, 3,
L88
P102,101,105, L87
P103
P104

Elevation is measured monthly from May through January.

Leachate Quality Sampling Points- 8 locations

MH 34- Former Disposal Cells 1976 Cell 5 and 7
MH 27- Former Disposal Cells 1974 through 1976 cell 2, 3, 4, 6, 8, and 9
MH 31- Wet Weather Cell
MH 33- remainder of cells south of Charette Rd
MH 3- 1986 to 1988 Cells
MH 8- 1989 and 2002 Cells
MH 24-1990 to 1997 cells (MH21 is connected to MH24 and is not sampled separately)
MH 13- 1990 to 1997 cells

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11.1.2 Parameters

- Inorganic Parameters
- Nutrients
- Cyanide
- Organic Indicators (dissolved organic carbon)
- Total Metals (including total chromium and hexavalent chromium
- Dissolved Metals (filtered, including total chromium and hexavalent chromium)
- Bacteria (total coliforms and *E. coli,* not fecal coliforms*)*
- PAHs
- VOCs (including vinyl chloride)
- Pesticides and herbicides (not including diazinon or 2,4-D)
- Toxaphene
- Phenols
- Speciated oil and grease

One time previous screening- 2010

- EPA 8270 Base/Neutral Extractables in Leachate
- Dioxins and furans
- Nonylphenols and Ethoxylates
- Gross alpha, gross beta radio chemistry

11.1.3 Frequency

Leachate samples are analyzed once per year in the summer.

11.2 LEACHATE MONITORING ISSUES

11.2.1 Environment Act Licence

The Environment Act Licence condition 100 specifies that the City of Winnipeg submit a Leachate Sampling and Analysis Plan and submit it within one (1) year of the licence date (initial target date: April 23, 2015). Licence condition 101 directs the City of Winnipeg to implement the plan. Other conditions 91 through 99 refer to the leachate management system. This section on leachate monitoring can serve as reference for the development of the Leachate Sampling and Analysis Plan.

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11.2.2 Leachate Elevation

Licence condition 97 specifies that the leachate collection system be designed to monitor leachate head according to the Leachate Management Plan. Instrumentation should be installed to comply with this condition. Licence condition 99 specifies that leachate elevation be taken twice per year; in spring and fall and after each maintenance cleaning of the leachate system. Manual measurements of leachate elevation should be tied closely to the pumping program. Measurements should be taken before and after pumping to assess the effectiveness of the pumping. Leachate elevations should continue to be taken at the gas extraction wells which are located throughout the waste cells.

11.2.3 Leachate Quality

Leachate quality sampling provides information on potential contaminant migration to the groundwater. It also is required annually for current disposal at the North End Water Pollution Control Centre (NEWPCC). Leachate quality data is also being used to evaluate pre-treatment or alternative treatment options, which would require approval under Licence condition 91.

Older closed locations may be able to be sampled on a less frequent basis. Parameters for leachate quality should include all the parameters specified in the Environment Act Licence Appendices F & G plus any additional parameters proposed for groundwater and surface water monitoring. The specific pesticide and herbicide parameters listed in the licence should be added to the scans if they are not already included. Sampling of other extended organic parameters should be evaluated for screening purposes based on the historical data record and in consultation with the NEWPCC.

The sample frequency should be selected to evaluate variation in quality between years. Sampling more than once per year for a small set of indicators pertinent to leachate disposal and treatment should be considered. Annual sampling of a full range of parameters should be continued. Sampling of other extended organic parameters may include a reduced number of locations and reduced screening frequency.

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Special sample collection method should be implemented for organics sampling including minimizing volatilization of parameter for VOCs and special precautions for exotic organics minimizing cross-contamination, sample replicates and blanks, laboratory analysis tests, chain of custody and recordkeeping and laboratory certification and quality assurance/quality control.

Total and dissolved metals (filtered samples) are both being analyzed at the present time. A rationale for total or dissolved analysis should be given.

11.3 PROPOSED PROGRAM

A proposed program should be outlined in the Leachate Sampling and Analysis Plan to be submitted by April 23, 2015.

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12.0 REPORTING AND CONTINGENCY ACTION PLAN

12.1 GROUNDWATER AND SURFACE WATER REPORT

Reporting for groundwater and surface water will be conducted in accordance with Licence conditions 124 to 129. A groundwater and surface water report will be prepared and submitted in the Annual Report to Manitoba Conservation and Water Stewardship each year by April 15. The format of the report will be submitted to Manitoba Conservation and Water Stewardship for approval. An executive summary of the report will be prepared, submitted to Manitoba Conservation and Water Stewardship and made available to the public on the City of Winnipeg web site, at the City of Winnipeg Millennium Library and at the BRRMF site office. The report will compare the analytical results obtained for the sampling with the results from previous sampling events to show trends and variances. The report will identify any significant variations, the cause of any variations and any actions taken.

12.2 CONTINGENCY ACTION PLAN

A Contingency Action Plan is to be prepared by June 23, 2014 (initial target date) as specified in Environment Act Licence conditions 125 and 126. The Contingency Action Plan will be implemented in the event that the monitoring program identifies any parameter in surface water or groundwater at the property boundary, as a result of the operation of the Development, in excess of background levels. The Contingency plan shall assess the significance of the exceedance in relation to applicable groundwater and surface water criteria and actions to be taken to mitigate the contamination, if required.

The environment officer will be notified of all incidents requiring contingency action plan implementation regarding groundwater or surface water pollution within seven days of identification of an incident. The notification report will include the nature of the incident, the area affected when determined, immediate actions taken and follow up action proposed to be taken.

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12.3 LEACHATE MANAGEMENT SYSTEM REPORTING

Any leachate breakout which leaves the development will be reported to the Environment Officer within 24 hours in accordance with Licence condition 96.

If the leachate level exceeds the maximum identified in the Leachate Management Plan actions approved in the Leachate Management Plan will be taken to reduce the potential impact to the environment in accordance with Licence condition 97. This may include reporting.

For waste cells developed after August 1, 2013 a report will be made to the Environment Officer within 24 hours of the end of any 7 day period where the maximum depth of leachate in the cell exceeds the maximum head above the crown of the collection system cell bottom piping, as indicated in the approved Leachate Management Plan (Condition 98).

An annual report will be prepared containing a record of all events that required reporting (regarding leachate breakout and leachate elevation conditions). The report will also contain the leachate elevation, historical trends and an assessment of the effectiveness of the leachate collection system in maintaining less that the maximum specified head as required by Licence condition 99.

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13.0 EVALUATION OF SAMPLING METHODOLOGY

Sample collection methods were assessed for groundwater, surface water and leachate monitoring including equipment, purging procedures, in-field filtering for metals, special procedures for volatile organics or other organic contaminant sampling, minimizing cross-contamination, sample replicates and blanks, laboratory analysis tests, chain of custody and recordkeeping and laboratory certification and quality assurance/quality control. Recommendations are summarized below:

Safety Procedures- Safety procedures should be reviewed and documented for all contact with wells/and risers that may contain landfill gas (sampling programs, and leachate pumping programs). This should consider both explosive hazards from methane and toxic hazards from hydrogen sulphide. The procedures should provide instruction on monitoring when approaching and opening wells/ manholes and risers. Appropriate personal protection and personal monitoring devices should be specified and emergency procedures should be developed, including procedures detailing which sampling tasks are not appropriate for working alone. The appropriate City of Winnipeg Safety procedures should be referenced in the sampling manual including for explosive and toxic gasses, and procedures for working alone.

Surface Water Sampling- For surface water sampling where sample collection bottles are used to transfer sample, a new bottle should be used for each sample to minimize the potential for cross contamination. Collection of samples directly into bacteria bottles is recommended as is the current practice

Volatile Organics- A small diameter submersible pump or dedicated positive displacement pump is used for sampling. Wattera tubing is used for VOC sampling. Special precautions should be used to minimize volatilization in wells sampled with Wattera tubing. A Wattera VOC tubing kit (8 ft length of small diameter tube) can be used to be inserted in the standard tube after purging. When sampling, the well is pumped slowly, then pumping is stopped. The small tube acts as a siphon after the large tube stops pumping, producing a laminar flow. One disposable small tube is used for each of the wells.

To minimize volatilization in wells sampled with a 3 inch submersible pump, only purging should be done with the pump. After the well recovers, sample it with a weighted single use bailer lowered to the approximate screen or open hole elevation of the bedrock in the well. This method will not only reduce aeration, but should decrease turbidity as well. A filter can be attached to the bottom of the bailer for the metals samples.

Filtering- Groundwater samples for metals should be filtered. Metals samples of surface water should continue to be filtered to meet the requirements of the Environment Act Licence for dissolved metals analysis. Mercury samples should not be filtered as the analysis is for total mercury. Leachate samples metals samples are currently analyzed filtered and not filtered to obtain data on both dissolved and total components. This practice should be evaluated and continued if necessary.

Duplicate Sampling- Duplicate sampling at 10% of samples should be continued. A field blank should be analyzed for all parameters (laboratory supplied water) and a trip blank analyzed for VOCs (laboratory supplied unopened bottle).

Laboratories-Analyses for VOCs and metals can be done at a lab separate from other inorganics; however, the lab doing the inorganics analysis should report an ion balance and each lab should supply a report on their laboratory QA/QC.

Detection Limits-Detection limits should be Health Canada Canadian Drinking Water Quality Guidelines and Ontario MOE Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (Table 2 Full Depth Generic Site Condition in a Potable Groundwater Water Condition). Detection limits for VOC and metals packages should conform to these standards as much as possible.

City of Winnipeg Data Base-The City of Winnipeg water quality data historic database should continue to be developed and upgraded. A quality control system for data compilation should be established including recording the lab number for each analysis so that it can be checked quickly against original reports. Units of measurement should be shown for each analysis and conversions made as necessary. Historical data should be added to the tables developed for this study after final review.

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14.0 COMPILATION OF WATER QUALITY RESULTS

Water quality results have been compiled for 2011 through fall 2012 results to complement existing summaries (CH2MHill 2012), as shown in Appendix E, G and H. Compliance criteria and reference criteria for these results have been included at the bottom of each table. An evaluation of the data through early 2012 has been conducted by others (CH2MHill 2012, Stantec 2012) and is not within the scope of this study.

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15.0 LANDFILL OPERATING PROCEDURES FOR SURFACE WATER MANAGEMENT

15.1 SYSTEM OPERATION CONCEPTS AND PROCEDURES

The focus for operation of the surface water management system is to:

- control runoff at the source in order to minimize leachate generation, contaminated runoff and leachate head buildup within the landfill cells
- efficiently convey runoff without erosion of landfill cover or drainage components and to minimize sedimentation and sediment transport off-site
- isolate and contain leachate and contaminated runoff for testing and treatment as required prior to release

By comparison, Licence condition 118 regarding operation of the surface water management system requires the surface water management system to be operated to minimize sedimentation within the waterways, odour and pest problems and to maximize nutrient reduction.

The procedure for surface water system operation must be specified in the landfill operating procedures. The draft procedures have been reviewed relative to the surface water management plan. Further development of non-surface water related portions of the draft operating procedures is not included in the scope for this project. Initial recommended changes have been noted on relevant pages in Appendix I. These are high level changes only and do not incorporate the detailed requirements as set out in this report.

15.2 SYSTEM OPERATIONS

15.2.1 System Surveillance and response

Licence condition 114 d) requires routine inspection of all erosion and sediment control structures and completion of any necessary maintenance or repair within 15 days of identification of the deficiency. It is recommended that these routine inspections take place weekly and they can be combined with other site inspections such as for litter and odour.

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In addition to assessing the condition of erosion and sediment control structures, the inspections should identify any unreported spillage of fuel or oil from vehicles, maintenance or storage tanks, chemicals from the CRRC, leachate from leachate haul vehicles, storage tanks or at leachate manholes and risers, dewatered sewage sludge from haul vehicles, or any leachate seeps. Any such spillage or seeps must be properly managed prior to any storm event that could result in contaminated runoff entering the surface water management system.

Licence Condition 92 requires a Leachate Management Plan to be submitted within 1 (one) year (due December 23, 2014). This plan should include provision for adequate pumping to ensure that leachate levels at leachate manholes are maintained at levels that will prevent any escape into the surface drainage system. The plan should also include immediate repair of any cracks or leaking joints at leachate manholes or risers and maintaining adequate compacted clay backfill around the manholes. The recommended protocols for leachate seeps in section 8.5.2 of this report should also be included in this plan.

Weather conditions should be monitored continuously and with an impending storm event, inspections should be carried out to identify any new leachate seeps or other spillage of concern requiring attention to ensure that runoff will not be contaminated. Any such occurrences should be re-inspected during (where possible) and after the storm with testing as required to ensure that any such preventative actions taken have been effective.

In the event that inspections and testing identifies that seepage or spills have escaped into the drainage system, the Contingency Action Plan would be initiated as required in Licence condition 125, which plan must be submitted within 6 months of the Licence (initial target date: June 23, 2014). This action plan should include measures such as retaining potentially contaminated flows within the system as described in following section 12.2.4.

Failure of the contingency actions and leachate leaving the Development, requires reporting according to Licence Condition 96. Depending on the severity of the occurrence, the Emergency Response Plan could be triggered according to Licence conditions 130 and 131.

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15.2.2 Runoff Control at Source

Minimizing the size and number of tipping faces reduces the potential for leachate generation and contaminated runoff since the extent of refuse exposed to precipitation is less. This is partly reflected in Licence condition 58.

Compaction of the refuse at the tipping faces is important not only to maximize air space for disposal but to create a mass that is less prone to excessive settlement. Poorly compacted refuse because of its non-homogeneity can create differential settlement which can result in ponding and cracking in cover material placed over the refuse. This in turn can result in leachate generation from runoff infiltrating the refuse from ponded water or through cracks in the cover. Adequately compacted impervious cover materials and maintaining positive drainage off the cover is also important to minimize leachate generation and contaminated runoff. This applies for all cover requirements, daily, intermediate and final cover. It is especially important not to have any ponding on the cover surface. It is very important to have positive drainage at all times in the active operating area. These requirements are included in Licence condition 59.

As indicated on Dwg No.13-0107-015 G10, clay berms should be constructed around the operating areas to direct surface runoff to the swale which conveys runoff from the active area to the Active Area Collection Pond. This is a requirement of Licence condition 113.

Soft materials such as dewatered sewage sludge or dead animals or slaughterhouse waste should not be placed close to the outside slopes of the landfill so as not to cause slope instability. Placing such materials close to the outside slopes could also lead to squeezing out of such materials out onto the slope from the surcharge of additional filling. If such special wastes are exposed on the outside slopes either through slope instability or squeezing, they could be a source of runoff contamination.

15.2.3 Runoff Conveyance Components Operation

Licence condition 114 contains the following operational conditions respecting the ditches and surface water management features:

- ditches or surface water management features are not to be constructed during periods of heavy rain;

- all construction material is to be placed and/isolated where it will not erode into any watercourse;

- effective long-term sediment and erosion control measures such as sedimentation ponds and short-term sediment and erosion control measures such as silt fencing are to be implemented, to prevent soil-laden runoff, and /or silt from entering any watercourse during construction and operation of a component of the development, and the control measures are to be maintained until vegetation is established; and

- all erosion and sediment control structures are to be routinely inspected and any necessary maintenance or repair is to be completed within 15 days of identification of the deficiency.

Licence condition 39 with respect to on-site earthen construction works, requires construction and maintenance of silt fences in the drainage routes transporting surface runoff off the property of the Development until vegetation has been re-established on the disturbed areas, and Licence conditions 83 and 84 require cover material stockpile areas to be operated to minimize erosion and sedimentation into any surface water features of the Development.

An excellent reference regarding the types and placement of silt fences from the USEPA is attached in Appendix J.

In spite of the best efforts at minimizing sedimentation, this may still occur within ditches and at culverts. Where the sedimentation interferes with flows it must be removed. Similarly, where vegetative growth or litter impedes flows in a drainage feature, it must be cleared.

If erosion is experienced within ditches or swales, ditch checks or check dams, that are small barriers, can be utilized to reduce the effective slope of the channel, thereby reducing the velocity of flowing water, allowing sediment to settle and reducing erosion. A ditch check can be constructed of rock, clean concrete rubble, gravel bags, sandbags, fibre rolls or products specifically manufactured for such use. However, for application here, such measures should be considered temporary since the objective is not to pond water within ditches. Should erosion persist in any reach of a ditch, suitability sized rock or clean concrete rubble riprap, underlain by geotextile fabric should be applied to maintain the original ditch geometry.

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The site currently contains numerous culvert installations that require inspection and maintenance. As the various site operations become organized and traffic flow patterns are optimized, the number of access roads should be reduced, allowing for deletion of some of the culvert installations.

15.2.4 Ponds Operation

The surface water management system employs three types of ponds, retention ponds such as the Active Area Pond and Leaf and Yard Waste and Biosolids Composting Storm Water Ponds, dry ponds such as the CRRC Pond and Dry Ponds 1, 2 and 3 and Clean Water Ponds.

Retention Ponds

Retention ponds are lined ponds that are used to collect runoff from the active landfill or compost operations that have a high likelihood of becoming contaminated. The collected runoff is to be tested and treated if necessary prior to release into an adjacent ditch.

Dry Ponds

Dry ponds under normal operations are intended to be flow-through facilities, with the gated outflow culverts in the open position. Under a contingency event, where an uncontrolled spill or leachate breakout occurs, the gates are closed and the collected runoff is tested and treated if necessary prior to release.

Clean Ponds

The clean ponds are part of clean water drainage system and retain some of the runoff for use in watering the leaf and yard waste composting piles and other site uses such as for fire fighting and dust suppression.

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Operations

Licence condition 28 c) requires normal operating levels for any leachate storage component to be one meter below the top of the liner. This would apply to the Active Area Pond and Compost Storm Water Ponds. The levels in these ponds are maintained by pumping. It will be important to have sufficient pumps available to maintain levels in these ponds.

The ponds will collect sediments with time which will require testing to determine whether they are suitable for cover material or whether they must be disposed of within the landfill.

The retention and dry ponds have overflows, in the event of storms greater than the 25 year design storm. Should such an overflow occur, testing is required to determine the impact on flows leaving the development. The Contingency and Emergency Plans must address the actions required for this scenario. As indicated in Section 9.2.1, a method for stopping off-site flow at the weir is needed as one of the contingency methods.

Treatment Options

Runoff collected in the retention ponds or in the dry ponds in a contingency event, may require treatment prior to release depending on the testing results.

The type of treatment required will depend on the constituents found and their concentration.

In the worst case scenario, the pond contents would be pumped into tankers and hauled to a sewage treatment plant for treatment. The volumes to be treated could be costly, and the capability of the treatment plants to handle large quantities could be an issue. Therefore, as indicated earlier in this report, the emphasis must be to control runoff from being contaminated at the source to the maximum extent possible so as to minimize contaminated runoff.

Some of the possible options for treatment that can be readily employed are as follows. These options need to be examined in greater detail and may require prior approval by the Regulator according to Licence condition 95.

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Disinfection/Shock treatment to treat pathogens

This is one method identified in the leaf and yard waste and biosolids composting report for stored compost operations runoff.

Aeration

Aeration can be effective in stripping methane, ammonia and other volatile contaminants. It can also lead to some precipitation of heavy metals if the pH can be elevated through sufficient aeration. However, odours can be an issue and must be controlled.

Chemical Oxidation

Chemicals can be used to oxidize organics, sulphide and certain other constituents, however special safety handing procedures would be required and it would be costly.

Chemical Precipitation of Metals

Adjustments to the pH using chemicals can be used to settle heavy metals.

Irrigation

This is not a treatment process per se, but more of a disposal process. Provided the characteristics of the contaminated water are acceptable and are not harmful to the vegetation, the water can be used to irrigate vegetated final cover on the landfill.

Freeze Desalination

This can be employed in winter months to concentrate contaminants in the lower horizon of the ponds and the clean ice can be harvested and placed in the clean water ponds. The concentrated liquid left behind would require treatment at a sewage treatment plant or possibly solidified with fly ash and disposed of in the landfill if acceptable to the Regulator.

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Recirculation

Licence condition 94 prohibits recirculation of leachate or contaminated water unless approved by the Director.

The compost operation has not been identified as a prohibited location for recirculating leachate. The water collected from at least the leaf and yard waste storm water pond should be considered for recirculating onto leaf and yard waste stockpiles prior to composting. Recirculation onto the compost windrows is not recommended, since it could negatively affect the compost quality. Recirculating the water from the biosolids composting storm water pond is not recommended, since the biosolids compost piles will not require moisture addition and reinfection of this piles with pathogens would be an issue.

Future Possibilities

A storage cell/lagoon could be considered for runoff needing other treatment requirements.

Discharge to a nearby sewer through a forcemain for treatment at the South End Water Pollution Control Centre may be possible depending on whether the quality of the water is acceptable for discharge to this facility.

Discharge to a treatment plant dedicated specifically to comprehensive treatment of leachate is an option if such a plant is implemented.

15.2.5 Construction

The components of the surface water drainage system should be constructed in a sequence starting at the most downstream component and working upstream and in accordance with Licence conditions 115, 116, and 117.

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16.0 SUMMARY CONCLUSIONS

- There will be no increase from present conditions regarding drainage leaving the BRRMF site with the proposed surface water management plan.
- Impacted runoff can be minimized through a combination of reducing the number and size of waste disposal tipping faces, waste compaction and impervious soil cover.
- Clean water flows and impacted flows can be separated and managed separately.
- Lined ponds can be utilized to store impacted runoff for testing and treatment (if necessary) prior to release.
- The designs of the leaf and yard waste and biosolids composting facility storage water ponds need to be reviewed for compatibility with this surface water management plan.
- Unlined dry ponds can be utilized for runoff from completed landfill areas with final cover to equalize flows, remove sediment and provide storage under a contingency scenario.
- The dry ponds for runoff from the landfill collector ditches can be converted into a wetlands operation with nominal alterations.
- Top to bottom control of runoff from active landfill areas can be achieved by using temporary dyke structures to direct runoff from the active landfill area into a lined ditch with erosion protection which empties into a lined pond.
- For steep ditch sections and where scour due to flow velocities and patterns is anticipated, riprap underlain by a filter layer is required. Flow velocities in most of the ditches for the two year storm event are not sufficient to warrant erosion protection.
- Materials available at the BRRMF that may be utilized for erosion protection include, clean recycled concrete or rock for riprap, compost and wood chips for sloped embankments and clean concrete rubble, rock, sand or gravel bags and fibre rolls for ditch checks.
- The seep control measures employed to date are adequate as short term measures. For long term control additional features and implementation protocols are required as discussed in section 8.5 of this report.
- Regular surveillance of the completed landfill areas and surface water management components is required to provide early identification of items requiring attention.
- Clean water can be used as a source of moisture addition for the leaf and yard waste composting operation, for dust suppression and for fire-fighting. Impacted water from the leaf and yard waste composting operation can be utilized for moisture addition in the leaf and yard waste stockpiles prior to composting.
- Detailed treatment protocols for stored impacted runoff require development.

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17.0 RECOMMENDATIONS

1. The following monitoring plans should be prepared and submitted to Manitoba Conservation and Water Stewardship by June 23, 2014:

   - Surface Water Sampling and Analysis Plan (Environment Act Licence condition 120)
   - Subsurface Landfill Gas Monitoring Program (Environment Act Licence condition 111)
   - Groundwater monitoring sampling and analysis Plan (Environment Act Licence condition 123, 127-129)
   - Contingency Action Plan (Environment Act Licence condition 125-126)

2. The following plan should be prepared and submitted to Manitoba Conservation and Water Stewardship by October 23, 2014 (initial target date).

   - Surface Water Management System Design Plan (Environment Act Licence condition 115)

3. The following should be prepared and submitted to Manitoba Conservation and Water Stewardship by April 23, 2015.

   - Leachate Sampling and Analysis Plan (Environment Act Licence condition 100)

   Sections of this report should be used to prepare these plans.

4. It is recommended that the City of Winnipeg undertake the following actions:

   - Submit this Surface Water Management Plan to Manitoba Conservation and Water Stewardship for a Water Rights Licence in accordance with Environment Act Licence condition 117.
   - Should incorporate the recommendations on sampling methodology given in Section 9 into their plans for the 2014 monitoring season.
   - Incorporate all relevant items in this report into the BRRMF Operating Plan.
   - Consult with Manitoba Conservation and Water Stewardship regarding monitoring program specifics and compliance considerations, including any pending or proposed legislation or best management practices.
   - Conduct weekly surveillance of the drainage system components to identify any needs for maintenance.
   - Conduct surveillance of completed landfill areas weekly and prior to storm events, to identify any leachate seeps requiring mitigation.
   - Reduce the number and size of disposal tipping areas as much as possible.
   - Ensure placement of final clay cover and cap on all completed landfill areas.
   - Not dispose of Special Waste near final landfill slopes.
   - Confirm safe application rates for composted biosolids application over final cover.
   - Retrofit the leaf and yard waste and biosolids composting facilities storm water ponds as required for compatibility with this surface water management plan.
   - Retrofit any leachate seep control measures required for long term service.

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- Maintain levels in impacted runoff holding ponds 1 meter below the top of the liner.
- Ensure adequate standby capacity for pumping out impacted runoff holding ponds.
- Evaluate conversion of the dry ponds into wetlands for runoff from the landfill collector ditches, once the hydraulic performance and water quality in this part of the drainage system has been determined and once the water quality objectives for the Development have been established.
- Construct the drainage system starting at the downstream end, working upstream.

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18.0 LIST OF TERMS

CCME	Canadian Council of Ministers of the Environment
QA/QC	Quality Assurance/Quality Control
ppm	parts per million
VOC	volatile organic compound
HC-CDWQ	Health Canada Canadian Drinking Water Quality Guidelines
MOE	Ontario Ministry of the Environment
AO	Aesthetic Objective
MAC	Maximum Allowable Concentrations
MWQSOG	Manitoba Water Quality Standards, Objectives and Guidelines
NEWPCC	North End Water Pollution Control Centre

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19.0 REFERENCES

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2. CH2MHill. 2012. Leaf and Yard Waste Composting Facility and Pilot Biosolids Composting Facility at Brady Road Resource Management Facility Final Conceptual Design and Operations Report December 2012. Final Report.
3. Health Canada. 2012. Guidelines for Canadian Drinking Water Quality Summary Table, August 2012
4. KGS Group. 1993. City of Winnipeg Landfill Site Disposition Study. October 1993.
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6. Ontario Ministry of the Environment (MOE). 2011. Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act Table 2 and Table 3. PIBS #7382e01. April 15, 2011.
7. Solid Waste Services, Planning and Environmental. 2012. Brady Road Landfill Environmental Sampling Standards of Operation. December 4, 2012.
8. Stantec. 2011. Environmental Impact Assessment of Brady Road Landfill and Future Resources Management. December 2011.
9. Stantec. 2011. Groundwater and Leachate Chemistry at the Brady Landfill. February 2011. Draft Report.
10. The City of Winnipeg Solid Waste Services Department. 2011. Brady Road Resources Management Facility Operating Plan Version 1.0. December 2011.
11. Winnipeg Water and Waste Department Solid Waste Services Division. 2011. Environment Act Proposal Brady Road Resources Recycling Facility. December 2011.

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20.0 STATEMENT OF LIMITATIONS AND CONDITIONS

Third Party Use of Report

This report has been prepared for The City of Winnipeg to whom this report has been addressed and any use a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

Statement of Limitations

KGS Group prepared the geo-environmental conclusions and recommendations for this report in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The information contained in this report is based on the information that was made available to KGS Group during the investigation and upon the services described, which were performed within the time and budgetary requirements of The City of Winnipeg. As the report is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

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TABLES

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TABLE 5
PROPOSED SURFACE WATER SAMPLING AND PARAMETERS

Sample ID	Locations	Parameter Sets											Frequency
Upstream (Off-site Monitoring)													
SWQ-25-1	Brady Road (drainage from west)	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
		A	B	C	D	E	F	G					Fall Runoff event
SWQ-25-12	Charette Road Ditch (drainage from north and west)	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
		A	B	C	D	E	F	G					Fall Runoff event
Downstream Compliance Point													
SWQ-25-2	Downstream Weir	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
		A	B	C	D	E	F	G					Fall Runoff event
								G					Flow Volume, pH and Conductivity (Weekly)
		A	B										Contigency Sampling for A & B if increase in Weekly Parameters seen.
Other Downstream													
SWQ-25-16	North Branch of Westendorf Coulee north of access Road	A	B			E	F	G					Spring Runoff
		A	B			E	F	G					Summer Runoff Event
Impacted Water Ponds													
SWQ-25-6	Active Area Collection Pond								H				Prior to Discharge
SWQ25-7	Biosolids Storm Water Pond									I			After treatment and prior to Discharge
SWQ25-8	Leaf and Yard Waste Storm Water Pond										J		Prior to Discharge
Clean Water Pond													
SWQ-9 a and b	Clean Water Pond 1 and 2	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
Dry Ponds													
SWQ-10	CRRC Pond											K	Prior to Discharge
SWQ-11 a, b, c	Southeast Dry Ponds 1, 2 and 3											K	Prior to Discharge
Intermediate Points on South Perimeter Ditch													
SWQ-25-13a	Upstream of CRCC pond	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
SWQ-25-13b	Downstream of CRCC Pond	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
SWQ-25-14a	Downstream of Clean Water Ponds 1 and 2	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
SWQ-25-14b	Downstream of Clean Water Ponds 1 and 2	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
SWQ-25-15a	Upstream of Dry Pond 3	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event
SWQ-25-15b	Downstream of Dry Pond 3	A	B	C	D	E	F	G					Spring Runoff
		A	B	C	D	E	F	G					Summer Runoff Event

Set A
Inorganic Parameters
Alkalinity- bicarbonate
Alkalinity-carbonate
Alkalinity-hydroxide
Alkalinity-total
Hardness as CaCO3
pH units
Specific Conductivity
Turbidity NTU
Residue-filterable (Total Dissolved Solids)
Residue- non-filterable (Total Suspended Solids)
Residue-total (Total Solids)
Chloride
Sulphate

Set B
Nutrients
Ammonia
Nitrate-Nitrite Nitrogen
Total Kjeldhal Nitrogen
Phosphorous

Set C
Other
Cyanide-total

Set D
Organic Indicators
COD
BOD

Set E
Metals
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Copper
Iron
Lead Magnesium
Manganese
Mercury
Nickel
Potassium
Selenium
Sodium
Zinc

Set F
Bacteria
Total Coliform
Fecal Coliform
E. Coli

Set G
Field Parameters
pH
Specific Conductance

Set H
Active Area Collection Pond
(To be determined)

Set I
Biosolids Pond
(To be determined)

Set J
Leaf and Yard Waste Storm Water Pond
(To be determined)

Set K
Dry Ponds
(to be determined)

TABLE 6
PROPOSED GROUNDWATER SAMPLING AND PARAMETERS

Sample ID	Unit Monitored	Parameter Sets												Frequency
		A	B	C	D	E	F	G	H	I	J	K		
Upgradient Background Brady Road														
GWQ 25-6N60DR	clay	A	B		D	E		G	H	I	J	K		May
GWQ 25-6N60E	Top of Till	A	B	C	D	E		G	H	I	J	K		May
		A	B		D	E		G						October
GWQ 25-W6	Bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
Downgradient Site Perimeter East														
GWQ 25-W8	bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
GWQ 25-5N62D	clay	A	B		D	E		G						May
GWQ 25-5N62E	till	A	B		D	E		G	H	I	J	K		May
		A	B	C	D	E		G						October
GWQ 25-W11	bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
Proposed New Wells														
GWQ-25-N-13A	Till	A	B	C	D	E		G	H	I	J	K		May
		A	B		D	E		G						October
GWQ-25-W-13	Bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
GWQ-25-W-14A	Till	A	B	C	D	E		G	H	I	J	K		May
		A	B		D	E		G						October
GWQ-25-W-14	Bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
GWQ-25N-15A	Till	A	B	C	D	E		G	H	I	J	K		May
		A	B		D	E		G						October
GWQ-25-W-15	Bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
GWQ-25N-16A	Till	A	B	C	D	E		G	H	I	J	K		May
		A	B		D	E		G						October
GWQ-25-W-16	Bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
Cross Gradient Site Perimeter North														
GWQ 25-6N63E	clay	A	B		D	E		G						May
GWQ 25-6N63F	till	A	B		D	E		G						May
GWQ 25-W9	bedrock	A	B	C	D	E	F	G	H	I	J	K		May
		A	B		D	E	F	G						October
GWQ 25-6N57DR	clay	A	B		D	E		G						May
GWQ 25-6N57F	till	A	B		D	E		G						May
GWQ 25-W10	bedrock	A	B	C	D	E	F	G	H	I	J	K		May
		A	B		D	E	F	G						October
Downgradient **Former Disposal Cells in west of site**														
GWQ25-W7	bedrock	A	B	C	D	E	F	G	H	I	J	K		May
		A	B		D	E	F	G						October
Former Disposal Cells 1974-1978 *(one cell further east)*														
Downgradient (east)														
GWQ 25-6N67E	clay	A	B		D	E		G						May
GWQ 25-6N67F	till	A	B		D	E		G						May
W12	bedrock	A	B	C	D	E	F	G	H	I	J	K		May
		A	B		D	E	F	G						October
Cross gradient (south)														
GWQ25-4N34B	clay	A	B		D	E		G						May
GWQ 25-6N34DR	till	A	B	C	D	E		G	H	I	J	K		May
GWQ 4N34 C	clay	A	B		D	E		G						May
Cross Gradient Site Perimeter South														
GWQ 25-6N58DR	top of Till	A	B		D	E		G						May every other year
GWQ 25-6N58F	till	A	B		D	E		G						May every other year
GWQ 25-W4	bedrock	A	B	C	D	E	F	G	H	I	J	K		May and October
GWQ 25-6N59DR	clay	A	B		D	E		G						May every other year
GWQ 25-6N59F	till	A	B		D	E		G						May every other year
GWQ 25-W5	bedrock	A	B	C	D	E	F	G	H	I	J	K		May
		A	B		D	E	F	G						October

Set A	Set E	Set I
Inorganic Parameters	**Metals**	**Petroleum Hydrocarbons**
Alkalinity- bicarbonate	Arsenic	CCME Petroleum Hydrocarbon Fraction 1
Alkalinity-carbonate	Barium	CCME Petroleum Hydrocarbon Fraction 2
Alkalinity-hydroxide	Beryllium	CCME Petroleum Hydrocarbon Fraction 3
Alkalinity-total	Cadmium	CCME Petroleum Hydrocarbon Fraction 4
Hardness as CaCO3	Calcium	Benzene
pH units	Chromium	Ethylbenzene
Specific Conductivity	Copper	Toluene
Turbidity NTU	Iron	Xylene
Residue-filterable (Total Dissolved Solids)	Lead	leachable lead is not applicable to water testing
Residue- non-filterable (Total Suspended Solids)	Magnesium	**Set J**
Residue-total (Total Solids)	Manganese	**VOCs**
Chloride	Mercury	Vinyl chloride
Sulphate	Nickel	Full screen monitored by COW
Set B	Potassium	**Set K**
Nutrients	Selenium	**Pesticides/Herbicides**
Ammonia	Sodium	Diazinon
Nitrate-Nitrite Nitrogen	Zinc	2,4-D
Total Kjeldhal Nitrogen	Full screen monitored by COW	(Full screen monitored by COW, will add these two parameters)
Phosphorous	**Set F**	
Set C	**Bacteria**	
Other	Total Coliform	
Cyanide-total	Fecal Coliform	
Set D	E. Coli	
Organic Indicators (No screen)	**Set G**	
COD	**Field Parameters**	
BOD	pH	
TOC	Specific Conductance	
	Set H (Full screen monitored by COW)	
	PAHs	
	naphthalene	
	benzo a pyrene	
	anthracene	

Notes:
1. The following parameters are proposed to be monitored by the COW but are not required in the licence:
   - TOC
   - Extra metals including total and hexavalent chromium
   - Full VOC screen
   - Full PAH screen
   - Pesticide screen
2. COD and BOD are required in surface water and are proposed for groundwater.
3. TOC has been sampled historically in groundwater and is proposed to be continued.
4. PCBs have been sampled historically in groundwater and are proposed to be discontinued.

FIGURES

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100 0 100 200 300 400m

SCALE: 1:10000 METRIC

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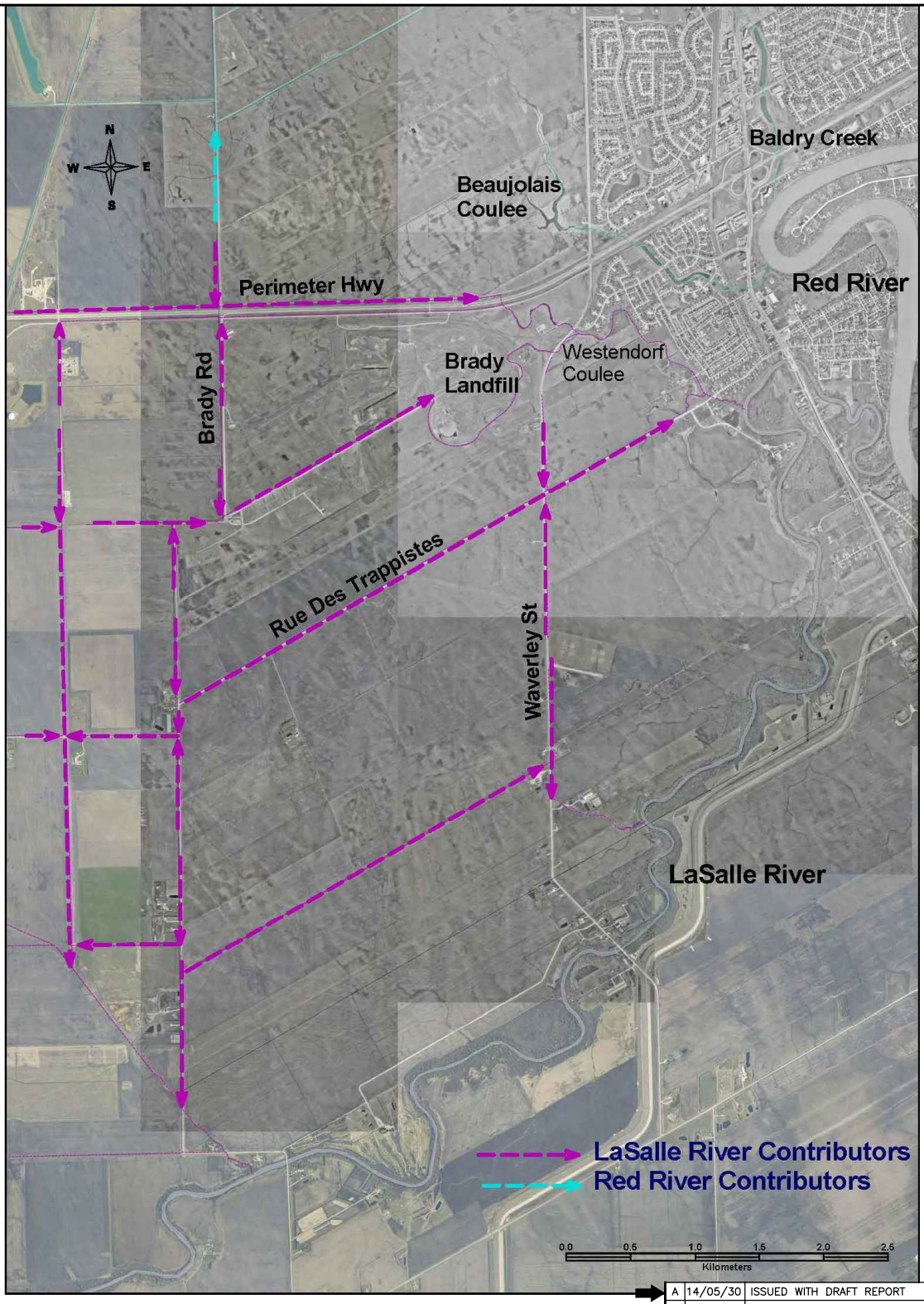
BRADY ROAD RESOURCE MANAGEMENT FACILITY SURFACE WATER MANAGEMENT PLAN

SITE PLAN

MAY 2014 | FIGURE 01 | REV: A

11x17

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SOURCE: ENVIRONMENTAL IMPACT ASSESSMENT OF BRADY ROAD LANDFILL AND FUTURE RESOURCE MANAGEMENT FACILITY, STANTEC, DECEMBER 2011.

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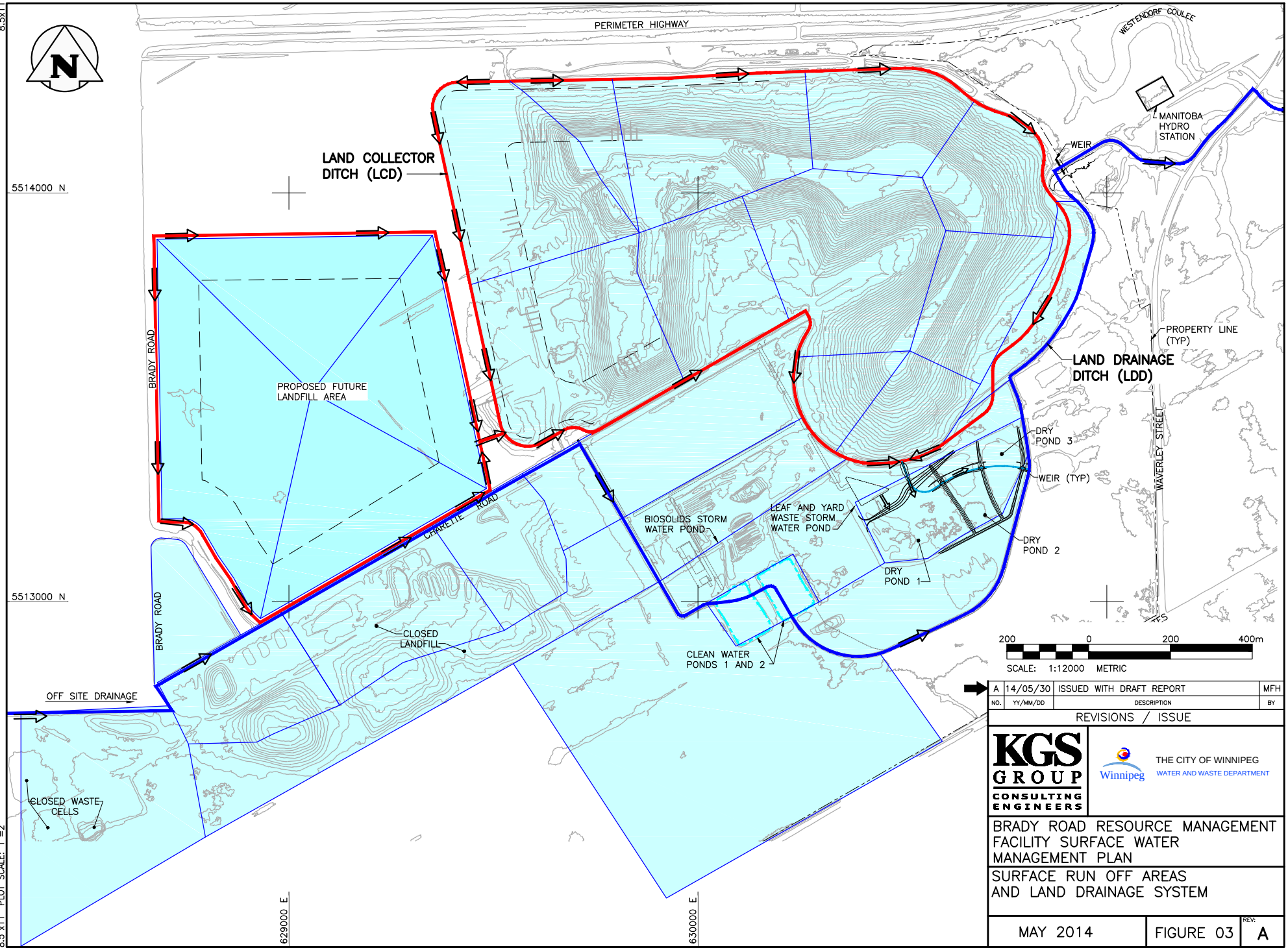
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BRADY ROAD RESOURCE MANAGEMENT FACILITY SURFACE WATER MANAGEMENT PLAN

REGIONAL DRAINAGE

MAY 2014 | FIGURE 02 | REV: A

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BRADY ROAD RESOURCE MANAGEMENT FACILITY SURFACE WATER MANAGEMENT PLAN

SURFACE RUN OFF AREAS AND LAND DRAINAGE SYSTEM

MAY 2014 | FIGURE 03 | REV: A

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8.5"x11" PLOT SCALE: 1"=2"

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N

5514000 N

5513000 N

629000 E

630000 E

631000 E

PERIMETER HIGHWAY

WEST ENDORF COULEE

SALLE RIVER

MANITOBA HYDRO STATION

WEIR

PROPERTY LINE (TYP)

WAVERLEY STREET

RUE DES TRAPPISTES

BRADY ROAD

CHARETTE ROAD

LAND COLLECTOR DITCH (LCD)

LAND DRAINAGE DITCH (LDD)

PROPOSED FUTURE LANDFILL AREA

CLOSED LANDFILL

CLOSED WASTE CELLS

OFF SITE DRAINAGE

BIOSOLIDS STORM WATER POND

LEAF AND YARD WASTE STORM WATER POND

CLEAN WATER PONDS 1 AND 2

POND 1

POND 2

POND 3

DRY POND 1

DRY POND 2

IA01 (N042)

IA02 (N156)

IA03 (N038)

IA04 (N037)

IA05 (N031)

IA06 (N057)

IA07 (N055)

IA08 (N049)

IA09 (N025)

IA10 (N015)

IA11 (N061)

IA12 (N109)

IA13 (N107)

IA14 (N112)

IA15 (N114)

IA16 (N062)

IA17 (N065)

IA18 (N068)

IA19 (N118)

IA20 (N117)

CA01 (N120)

CA02 (N120)

CA03 (N122)

CA04 (N123)

CA05 (N127)

CA06 (N130)

CA07 (N136)

CA08 (N132)

CA09 (N146)

CA10 (N140)

CA11 (N148)

CA12 (N075)

CA13 (N094)

LEGEND:

N100 NODE FROM MODEL

IA12 (N109) IMPACTED DRAINAGE AREA

100 0 100 200 300 400m

SCALE: 1:10000 METRIC

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BRADY ROAD RESOURCE MANAGEMENT FACILITY SURFACE WATER MANAGEMENT PLAN

SUBCATCHMENT DRAINAGE NETWORK

MAY 2014 | FIGURE 04 | REV: A

11x17

N

5514000 N

5513000 N

629000 E

630000 E

631000 E

PERIMETER HIGHWAY

WEST ENDORF COULEE

SALLE RIVER

MANITOBA HYDRO STATION

WEIR

20

LAND COLLECTOR DITCH (LCD)

PROPERTY LINE (TYP)

LAND DRAINAGE DITCH (LDD)

WAVERLEY STREET

BRADY ROAD

PROPOSED FUTURE LANDFILL AREA

CHARETTE ROAD

BRADY ROAD

CLOSED LANDFILL

BIOSOLIDS STORM WATER POND

LEAF AND YARD WASTE STORM WATER POND

DRY POND 2

DRY POND 2

DRY POND 1

CLEAN WATER PONDS 1 AND 2

RUE DES TRAPPISTES

OFF SITE DRAINAGE

CLOSED WASTE CELLS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

LEGEND:

⊗ 2 MODEL READOUT POINT (FLOW, m^3/Sec WATER ELEVATION, m)

100 0 100 200 300 400m

SCALE: 1:10000 METRIC

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BRADY ROAD RESOURCE MANAGEMENT FACILITY SURFACE WATER MANAGEMENT PLAN

DISCHARGE AND WATER LEVEL LOCATIONS

MAY 2014 | FIGURE 05 | REV: A

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N

5514000 N

5513000 N

629000 E

630000 E

631000 E

PERIMETER HIGHWAY

WESTENDORF COULEE

SWQ-25-16

TO LA SALLE RIVER

NEW LAND COLLECTION DITCH (LCD)

OFF-SITE COMPLIANCE POINT

WEIR

SWQ-25-2

MANITOBA HYDRO STATION

CLOSURE SLOPE

ACTIVE LANDFILL

CLOSED LANDFILL

ACTIVE AREA COLLECTION POND

SWQ-25-6

REGRADED LAND DRAINAGE DITCH (LDD)

PROPERTY LINE (TYP)

PROPOSED FUTURE LANDFILL AREA

BRADY ROAD

CHARETTE ROAD

DRY POND 3

SWQ-25-15b

WEIR (TYP)

SWQ-25-15a

SWQ-25-8

SWQ-25-11c

SWQ-25-11b

SWQ-25-11a

DRY POND 2

DRY POND 1

LEAF AND YARD WASTE STORM WATER POND

BIOSOLIDS STORM WATER POND

SWQ-25-7

SWQ-25-9

SWQ-25-14b

SWQ-25-14a

CLEAN WATER PONDS 1 AND 2

WAVERLEY STREET

RUE DES TRAPPISTES

SWQ-25-10

CRCC POND

SWQ-25-13b

SWQ-25-13a

CLOSED LANDFILL

SWQ-25-12

SWQ-25-1

OFF SITE DRAINAGE

CLOSED WASTE CELLS

LEGEND:

- IMPACTED WATER POND
- DRY POND
- CLEAN WATER POND
- SWQ-25-16 SURFACE WATER SAMPLING LOCATION
- SURFACE WATER FLOW DIRECTION
- CLOSED LANDFILL BOUNDARY
- LAND DRAINAGE DITCH

NOTES:

1. TOPOGRAPHY SOURCES ARE CITY OF WINNIPEG, KGS GROUP 2013 TOPOGRAPHY OF ACTIVE LANDFILL OPERATING AREA AND ADDITIONAL LANDFILL PERIMETER SURVEY BY KGS GROUP 2013.
2. EXACT SURFACE WATER SAMPLING LOCATION TO BE DETERMINDED IN FIELD.

100 0 100 200 300 400m

SCALE: 1:10000 METRIC

NO.	YY/MM/DD	DESCRIPTION	BY
A	14/05/30	ISSUED WITH DRAFT REPORT	MFH

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

BRADY ROAD RESOURCE MANAGEMENT FACILITY SURFACE WATER MANAGEMENT PLAN

PROPOSED SURFACE WATER MONITORING LOCATIONS

MAY 2014 | FIGURE 10 | REV: A

DRAWINGS

DRAFT





THE CITY OF WINNIPEG

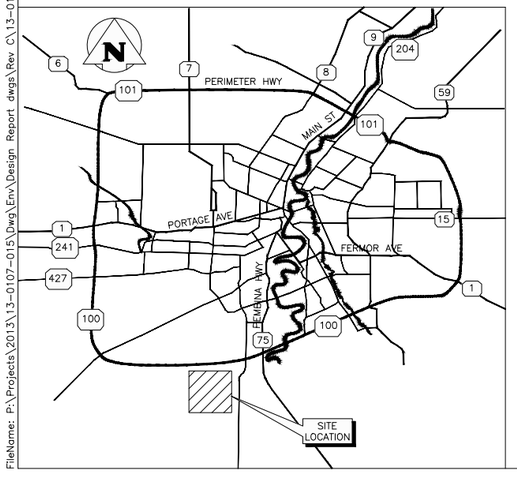
WATER AND WASTE DEPARTMENT

BRADY ROAD RESOURCE MANAGEMENT FACILITY

SURFACE WATER MANAGEMENT

LIST OF DRAWINGS:

DRAWING NO.	TITLE:
13-0107-015_CS	COVER SHEET AND DRAWING LIST
13-0107-015_G01	CULVERT LOCATIONS AND INVERTS
13-0107-015_G02	DETAILED DRAINAGE SYSTEM PLAN
13-0107-015_G03	PERIMETER LANDFILL COLLECTOR DITCH (LCD) ALIGNMENT CONTROL
13-0107-015_G04	LANDFILL COLLECTOR DITCH (LCD) PROFILES
13-0107-015_G05	LAND DRAINAGE DITCH (LDD) PROFILE
13-0107-015_G06	TYPICAL DITCH SECTIONS
13-0107-015_G07	DRY PONDS PLAN AND PROFILE
13-0107-015_G08	DRY PONDS WEIRS AND DRAIN PIPES SECTIONS AND DETAILS
13-0107-015_G09	DITCH DETAILS, PLANS AND SECTIONS
13-0107-015_G10	ACTIVE AREA COLLECTION POND PLAN, SECTION AND DETAILS
13-0107-015_G11	COMMUNITY RESOURCE RECOVERY CENTRE (CRRC). CAPTURE AND RELEASE POND. PLAN AND DETAILS



PRELIMINARY
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ENG. STAMP

APEGM
Certificate of Authorization
KGS Group
No. 245 Date:_____

NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
B	13/09/27	RE-ISSUED FOR REVIEW	RDS
A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
ISSUED FOR INFORMATION
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
COVER SHEET AND DRAWING LIST

KGS GROUP CONSULTING ENGINEERS

DESIGN BY:	TJK	DATE (YY/MM/DD):	13/08/12
DESIGN CHECK:	RDS	DATE:	
DRAWN BY:	Rar	DATE:	13/08/12
DWG CHECK:	jS	DATE:	

DWG. NO. 13-0107-015 CS
REV: C

FileName: P:\Projects\2013\13-0107-015\Dwg\Env\Design Report dwgs\Rev C\13-0107-015_CS.dwg - Tab: CS Plotted By: PDeffner 14/05/30 [Fri 10:36am]

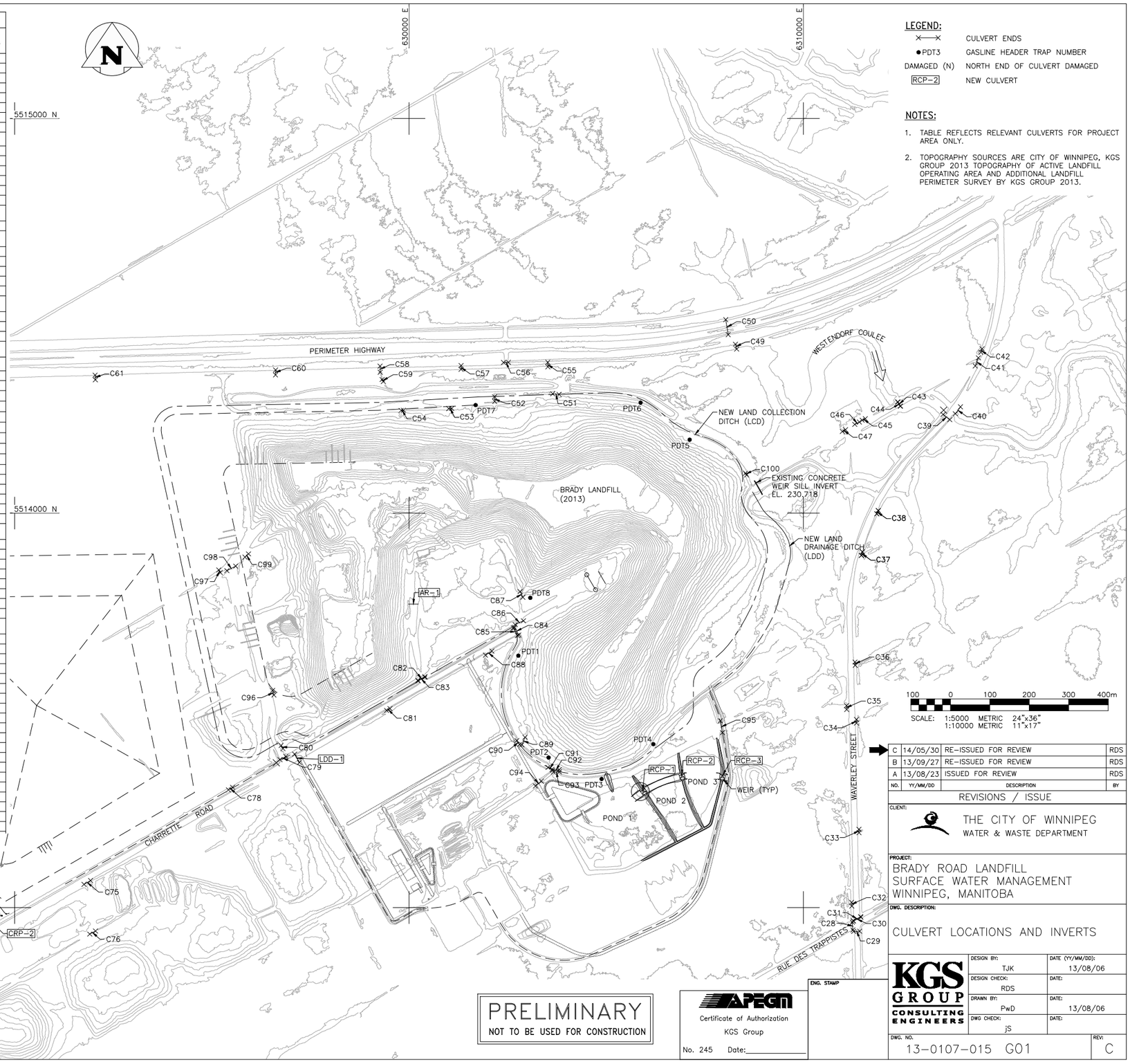
TABLE OF CULVERTS (AS SURVEYED BY KGS 2013)

CULVERT	INLET		OUTLET		INLET INVERT (m)	OUTLET INVERT (m)	CULVERT LENGTH (m)	DIAMETER (mm)	CROSSING TYPE	WORK REQUIRED
	NORTHING (m)	EASTING (m)	NORTHING (m)	EASTING (m)						
C01	5512798.893	628671.087	5512788.776	628650.786	232.364	232.362	22.7	1800mm	ROAD	NONE
C02	5512795.910	628673.578	5512784.053	628652.050	232.554	232.274	24.6	700mm	ROAD	NONE
C03	5512768.929	628677.940	5512794.226	628675.182	233.815	233.1450	25.5	500mm	ROAD	NONE
C05	5512808.347	628688.511	5512813.897	628699.272	232.246	232.207	12.1	1400mm	ACCESS	NONE
C06	5512811.295	628697.300	5512807.005	628689.239	232.326	232.152	9.1	1200mm	ACCESS	NONE
C28	5512962.899	631124.261	5512943.022	631125.628	232.211	231.957	19.9	800mm	ROAD	NONE
C29	5512940.097	631142.969	5512939.657	631127.578	232.278	232.039	15.4	500mm	ROAD	NONE
C30	5512965.698	631127.011	5512975.389	631146.120	231.690	231.638	21.4	1400mm	ROAD	NONE
C31	5512966.848	631126.358	5512976.973	631145.224	231.602	231.593	21.4	800mm UNDER WATER	ROAD	NONE
C32	5513013.177	631122.212	5513003.584	631122.802	232.460	232.368	9.6	400mm	APPROACH	NONE
C33	5513198.481	631141.048	5513189.816	631141.159	232.210	232.179	8.7	400mm	APPROACH	NONE
C34	5513467.671	631134.829	5513476.833	631134.663	232.252	232.201	9.2	400mm	APPROACH	NONE
C35	5513501.952	631109.867	5513511.901	631109.489	232.023	231.902	10.0	400mm	ACCESS	NONE
C36	5513622.450	631130.921	5513613.857	631131.319	232.142	232.015	8.6	400mm	APPROACH	NONE
C37	5513892.592	631147.057	5513901.691	631149.518	231.707	231.686	9.4	400mm	APPROACH	NONE
C38	5514006.506	631189.888	5513998.108	631186.240	232.250	231.277	9.2	400mm DAMAGED (N)	APPROACH	NONE
C39	5514236.675	631371.225	5514250.110	631354.530	229.840	229.720	21.4	1600mm	ROAD	NONE
C40	5514269.243	631398.559	5514251.767	631385.438	231.260	231.028	21.9	500mm DAMAGED (N)	ROAD	NONE
C41	5514372.878	631435.881	5514393.601	631443.924	231.740	231.613	22.2	500mm	ROAD	NONE
C42	5514416.575	631453.182	5514407.447	631450.242	232.056	231.736	9.6	400mm	APPROACH	NONE
C43	5514281.676	631239.755	5514271.267	631246.266	231.014	230.914	12.3	900mm	APPROACH	NONE
C44	5514281.246	631239.000	5514270.756	631245.622	230.871	230.860	12.4	600mm	APPROACH	NONE
C45	5514235.325	631149.214	5514239.252	631157.089	232.154	232.062	8.8	500mm	ROAD	NONE
C46	5514230.648	631142.000	5514244.768	631130.406	232.033	232.000	16.0	300mm BURIED (W)	ROAD	NONE
C47	5514211.183	631106.808	5514206.837	631098.740	232.323	232.199	9.2	300mm BURIED	ROAD	NONE
C49	5514428.038	630827.666	5514415.637	630830.949	232.000	231.097	14.0	1000mm	ROAD	NONE
C50	5514490.350	630803.122	5514452.230	630809.473	232.000	231.009	38.7	1000mm	ROAD	NONE
C51	5514300.852	630380.430	5514302.597	630364.261	233.000	232.485	16.3	600mm BURIED (E)	APPROACH	NONE
C52	5514283.134	630217.116	5514294.702	630216.819	232.920	232.771	11.6	500mm DAMAGED INLET	APPROACH	NONE
C53	5514264.755	630100.579	5514265.007	630108.198	233.092	233.040	7.6	900mm	APPROACH	NONE
C54	5514260.199	629979.949	5514260.692	629985.629	233.795	233.711	5.7	900mm	APPROACH	NONE
C55	5514370.698	630352.055	5514382.141	630351.751	232.416	232.214	11.5	500mm	SERVICE RD.	NONE
C56	5514381.839	630239.586	5514382.238	630251.997	231.753	231.728	12.4	700mm	SERVICE RD.	NONE
C57	5514364.325	630132.027	5514374.032	630131.894	232.413	232.335	9.7	500mm	SERVICE RD.	NONE
C58	5514356.989	629926.811	5514372.426	629926.462	232.575	232.106	15.4	500mm	SERVICE RD.	NONE
C59	5514338.693	629931.709	5514333.317	629934.843	232.687	232.675	6.2	700mm	SERVICE RD.	NONE
C60	5514350.135	629661.303	5514362.810	629661.609	232.896	232.639	12.7	400mm	SERVICE RD.	NONE
C61	5514337.644	629204.460	5514349.640	629203.831	232.628	232.438	12.0	500mm	SERVICE RD.	NONE
C62	5514369.410	628961.770	5514407.810	628962.888	232.530	233.250	38.4	900mm	ROAD	NONE
C71	5512826.303	628766.781	5512842.304	628761.127	233.768	233.262	17.0	500mm	ROAD	NONE
C72	5512825.481	628768.511	5512833.741	628787.545	233.815	233.747	20.7	300mm	ROAD	NONE
C73	5512914.176	628873.66	5512939.425	628914.786	232.465	232.357	48.3	1400mm	ROAD	NONE
C74	5512912.398	628874.741	5512937.703	628915.837	232.443	232.319	48.3	1400mm	ROAD	NONE
C75	5513058.821	629175.550	5513068.438	629192.271	233.958	233.717	19.3	600mm	APPROACH	NONE
C76	5512940.416	629204.859	5512932.713	629190.237	235.250	234.929	16.5	300mm BURIED (E)	ACCESS	NONE
C78	5513304.837	629552.490	5513298.362	629541.806	231.993	231.972	12.5	1000mm	APPROACH	NONE
C79	5513374.967	629672.625	5513383.088	629687.724	232.033	231.915	17.1	1000mm	ACCESS	NONE
C80	5513402.953	629680.403	5513410.829	629675.535	232.699	232.483	9.3	400mm	APPROACH	NONE
C81	5513499.601	629942.989	5513504.265	629951.577	232.509	232.444	9.8	400mm	APPROACH	NONE
C82	5513585.307	630040.162	5513575.825	630022.286	232.043	232.013	20.2	1200mm	ACCESS	NONE
C83	5513574.532	630022.966	5513583.812	630040.014	232.068	232.042	19.4	900mm	ACCESS	NONE
C84	5513690.857	630278.327	5513710.320	630267.136	231.507	231.463	22.5	1400mm	ACCESS	NONE
C85	5513689.370	630274.939	5513709.058	630264.361	231.680	231.626	22.4	1400mm	ACCESS	NONE
C86	5513726.925	630290.120	5513717.184	630269.216	233.500	231.474	23.1	500mm PLUGGED (E)	ACCESS	NONE
C87	5513801.070	630281.700	5513786.576	630288.666	233.296	233.062	16.1	500mm	ACCESS	NONE
C88	5513639.936	630193.672	5513650.076	630210.181	231.959	231.943	19.4	1000mm	APPROACH	NONE
C89	5513431.616	630294.048	5513412.736	630286.091	233.353	232.018	20.5	300mm	ACCESS	NONE
C90	5513423.153	630273.507	5513413.299	630280.452	231.528	231.494	12.1	1200mm	ACCESS	NONE
C91	5513350.224	630362.443	5513355.266	630352.470	231.436	231.363	11.2	900mm	ACCESS	NONE
C92	5513349.223	630381.080	5513348.097	630364.551	231.371	231.153	16.6	900mm	ACCESS	NONE
C93	5513343.467	630365.996	5513344.042	630381.291	231.824	231.517	15.3	600mm	ACCESS	NONE
C94	5513308.073	630320.451	5513320.392	630335.633	231.692	231.625	19.6	500mm	ACCESS	NONE
C95	5513443.435	630794.747	5513473.274	630789.539	230.756	230.593	30.3	1200mm	ACCESS	NONE
C96	5513538.650	629657.226	5513550.344	629653.964	233.182	233.176	12.1	400mm	APPROACH	NONE
C97	5513849.502	629521.251	5513855.756	629517.433	233.287	233.262	7.3	800mm	ACCESS	NONE
C98	5513865.534	629560.244	5513853.948	629538.030	233.331	233.021	25.1	400mm	ACCESS	NONE
C99	5513896.602	629592.884	5513888.301	629583.756	234.086	234.000	12.3	200mm	APPROACH	NONE
C100	5514101.026	630853.338	5514096.621	630855.869	231.918	231.869	5.1	600mm		NONE
LDD-1	5513388.872	629709.799	5513367.771	629721.944	233.000	232.5000	24.4	1200mm	ACCESS	NEW
RCP-1	5513293.861	630587.038	5513301.597	630598.102	231.250	231.250	13.5	600mm	DIKE	NEW
RCP-2	5513334.903	630685.002	5513338.032	630698.125	231.250	231.250	13.5	600mm	DIKE	NEW
RCP-3	5513337.036	630788.773	5513334.374	630802.113	231.250	231.250	13.5	600mm	DIKE	NEW
CRP-1	5512933.799	628860.188	5512956.080	628898.941	233.000	232.7500	44.7	600mm	ROAD	NEW
CRP-2	5512969.247	628939.690	5512958.454	628946.191	232.750	232.700	12.6	600mm	DIKE	NEW

TABLE OF EXISTING GASLINE TRAPS ALONG 450 DIA HEADER

Culvert	NORTHING (m)	EASTING (m)	ELEVATION (m)
PDT1	5513638.355	630277.205	231.446
PDT2	5513380.213	630353.896	229.403
PDT3	5513325.842	630488.426	230.189
PDT4	5513414.027	630619.667	228.699
PDT5	5514185.893	630711.750	231.061
PDT6	5514279.793	630587.327	230.083
PDT7	5514273.696	630168.904	231.000
PDT8	5513785.176	630307.444	231.399

AS PROVIDED BY "COMCOR"



LEGEND:

- ×——× CULVERT ENDS
- ●PDT3 GASLINE HEADER TRAP NUMBER
- DAMAGED (N) NORTH END OF CULVERT DAMAGED
- RCP-2 NEW CULVERT

NOTES:

1. TABLE REFLECTS RELEVANT CULVERTS FOR PROJECT AREA ONLY.
2. TOPOGRAPHY SOURCES ARE CITY OF WINNIPEG, KGS GROUP 2013 TOPOGRAPHY OF ACTIVE LANDFILL OPERATING AREA AND ADDITIONAL LANDFILL PERIMETER SURVEY BY KGS GROUP 2013.

NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
B	13/09/27	RE-ISSUED FOR REVIEW	RDS
A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT: THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
CULVERT LOCATIONS AND INVERTS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

APEGM Certificate of Authorization
KGS Group
No. 245 Date:_____

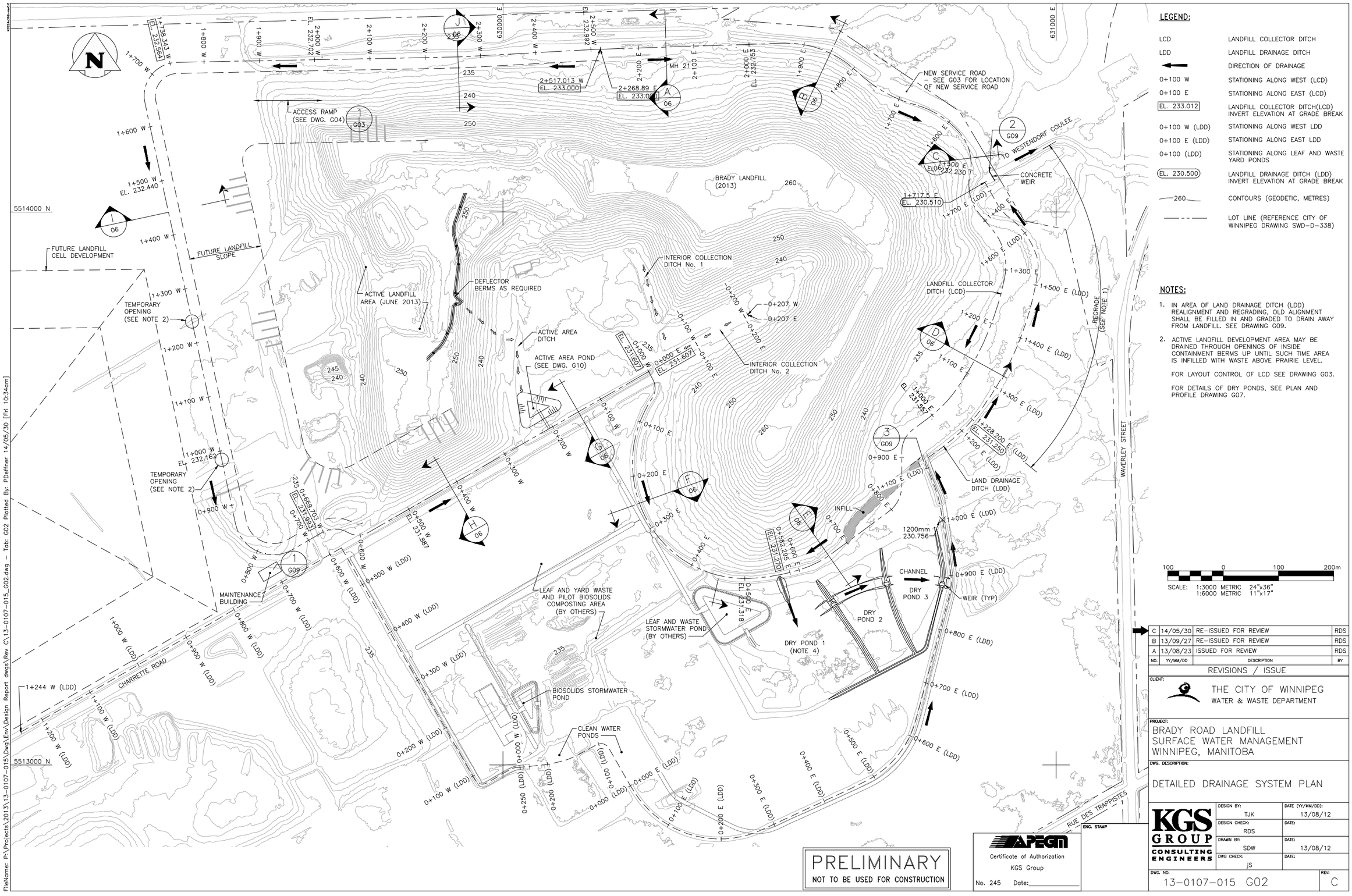
ENG. STAMP

KGS GROUP CONSULTING ENGINEERS

DESIGN BY:	TJK	DATE (YY/MM/DD):	13/08/06
DESIGN CHECK:	RDS	DATE:	
DRAWN BY:	PwD	DATE:	13/08/06
DWG CHECK:	jS	DATE:	

DWG. NO. 13-0107-015 G01 REV: C

FileName: P:\Projects\2013\13-0107-015\Dwg\Env\Design Report dwgs\Rev C\13-0107-015_G01.dwg – Tab: G01 Plotted By: PDeffner 14/05/30 [Fri 10:35am]



NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
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A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT: THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
DETAILED DRAINAGE SYSTEM PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

APEGM Certificate of Authorization
KGS Group
No. 245 Date:

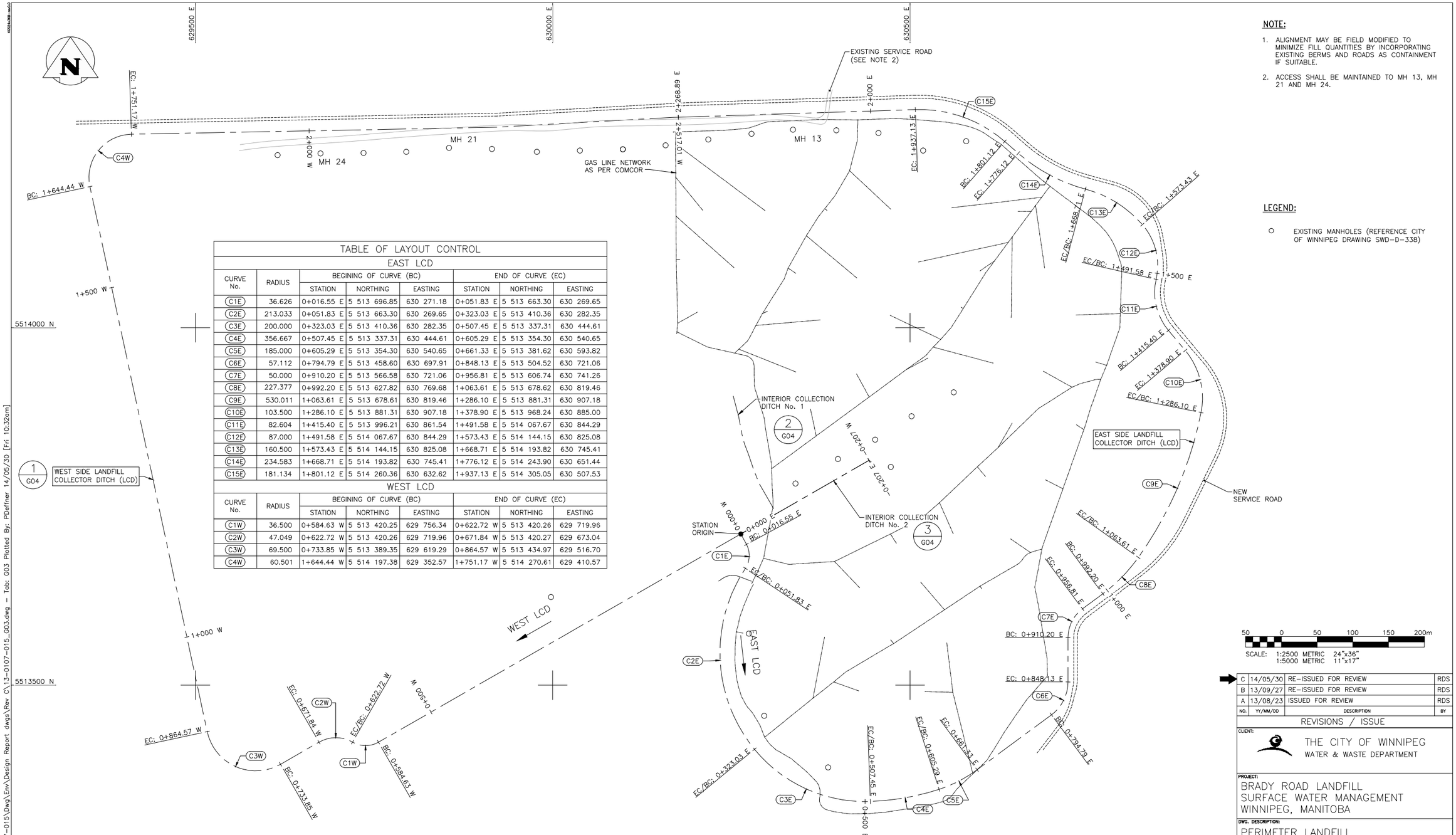
ENG. STAMP

KGS GROUP CONSULTING ENGINEERS

DESIGN BY:	TJK	DATE (YY/MM/DD): 13/08/12
DESIGN CHECK:	RDS	DATE:
DRAWN BY:	SDW	DATE: 13/08/12
DWG CHECK:	JS	DATE:

DWG. NO. 13-0107-015 G02 REV: C

FileName: P:\Projects\2013\13-0107-015\Dwg\Env\Design Report dwgs\Rev C\13-0107-015_G02.dwg - Tab: G02 Plotted By: PDeffner 14/05/30 [Fri 10.34am]



NOTE:

1. ALIGNMENT MAY BE FIELD MODIFIED TO MINIMIZE FILL QUANTITIES BY INCORPORATING EXISTING BERMS AND ROADS AS CONTAINMENT IF SUITABLE.
2. ACCESS SHALL BE MAINTAINED TO MH 13, MH 21 AND MH 24.

LEGEND:

○ EXISTING MANHOLES (REFERENCE CITY OF WINNIPEG DRAWING SWD-D-338)

TABLE OF LAYOUT CONTROL

EAST LCD

CURVE No.	RADIUS	BEGINING OF CURVE (BC)			END OF CURVE (EC)		
		STATION	NORTHING	EASTING	STATION	NORTHING	EASTING
C1E	36.626	0+016.55 E	5 513 696.85	630 271.18	0+051.83 E	5 513 663.30	630 269.65
C2E	213.033	0+051.83 E	5 513 663.30	630 269.65	0+323.03 E	5 513 410.36	630 282.35
C3E	200.000	0+323.03 E	5 513 410.36	630 282.35	0+507.45 E	5 513 337.31	630 444.61
C4E	356.667	0+507.45 E	5 513 337.31	630 444.61	0+605.29 E	5 513 354.30	630 540.65
C5E	185.000	0+605.29 E	5 513 354.30	630 540.65	0+661.33 E	5 513 381.62	630 593.82
C6E	57.112	0+794.79 E	5 513 458.60	630 697.91	0+848.13 E	5 513 504.52	630 721.06
C7E	50.000	0+910.20 E	5 513 566.58	630 721.06	0+956.81 E	5 513 606.74	630 741.26
C8E	227.377	0+992.20 E	5 513 627.82	630 769.68	1+063.61 E	5 513 678.62	630 819.46
C9E	530.011	1+063.61 E	5 513 678.61	630 819.46	1+286.10 E	5 513 881.31	630 907.18
C10E	103.500	1+286.10 E	5 513 881.31	630 907.18	1+378.90 E	5 513 968.24	630 885.00
C11E	82.604	1+415.40 E	5 513 996.21	630 861.54	1+491.58 E	5 514 067.67	630 844.29
C12E	87.000	1+491.58 E	5 514 067.67	630 844.29	1+573.43 E	5 514 144.15	630 825.08
C13E	160.500	1+573.43 E	5 514 144.15	630 825.08	1+668.71 E	5 514 193.82	630 745.41
C14E	234.583	1+668.71 E	5 514 193.82	630 745.41	1+776.12 E	5 514 243.90	630 651.44
C15E	181.134	1+801.12 E	5 514 260.36	630 632.62	1+937.13 E	5 514 305.05	630 507.53

WEST LCD

CURVE No.	RADIUS	BEGINING OF CURVE (BC)			END OF CURVE (EC)		
		STATION	NORTHING	EASTING	STATION	NORTHING	EASTING
C1W	36.500	0+584.63 W	5 513 420.25	629 756.34	0+622.72 W	5 513 420.26	629 719.96
C2W	47.049	0+622.72 W	5 513 420.26	629 719.96	0+671.84 W	5 513 420.27	629 673.04
C3W	69.500	0+733.85 W	5 513 389.35	629 619.29	0+864.57 W	5 513 434.97	629 516.70
C4W	60.501	1+644.44 W	5 514 197.38	629 352.57	1+751.17 W	5 514 270.61	629 410.57

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

APEGM
Certificate of Authorization
KGS Group
No. 245 Date:

ENG. STAMP

NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
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A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

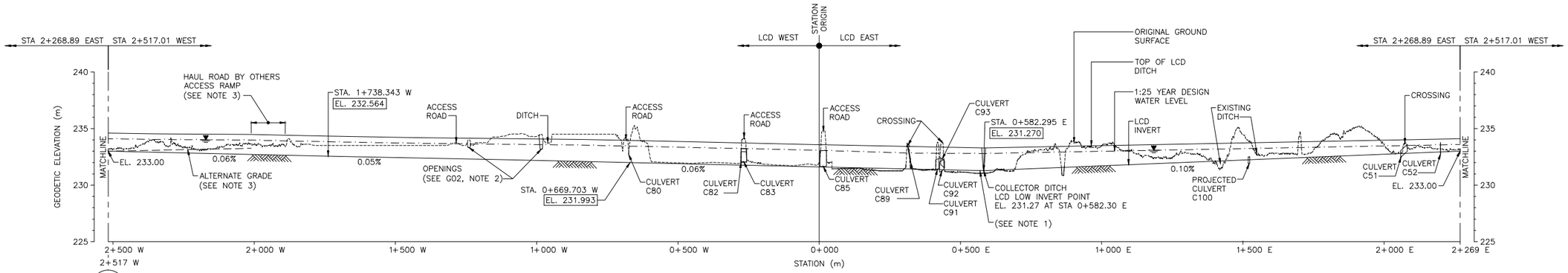
DWG. DESCRIPTION:
PERIMETER LANDFILL
COLLECTOR DITCH (LCD)
ALIGNMENT CONTROL

KGS GROUP CONSULTING ENGINEERS

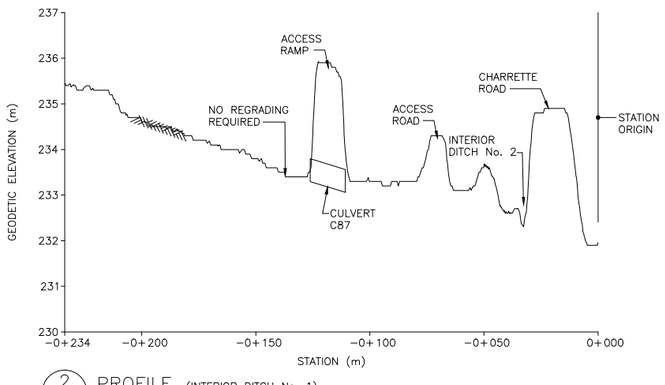
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DESIGN CHECK:	RDS	DATE:	
DRAWN BY:	Rar	DATE:	13/08/12
DWG CHECK:	jS	DATE:	

DWG. NO. 13-0107-015 G03
REV: C

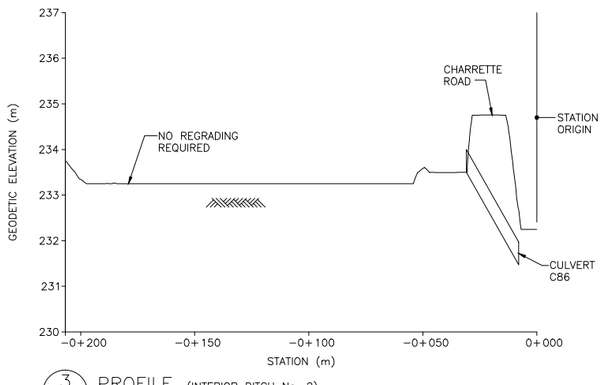
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1 / G03 **PROFILE** (COLLECTOR DITCH) (LCD)
SCALE: 1:7500 METRIC 24"x36"
SCALE: 1:15000 METRIC 11"x17"
VERTICAL SCALE: 40 TIMES EXAGGERATION



2 / G03 **PROFILE** (INTERIOR DITCH No. 1)
SCALE: 1:1250 METRIC 24"x36"
SCALE: 1:2500 METRIC 11"x17"
VERTICAL SCALE: 20 TIMES EXAGGERATION



3 / G03 **PROFILE** (INTERIOR DITCH No. 2)
SCALE: 1:1250 METRIC 24"x36"
SCALE: 1:2500 METRIC 11"x17"
VERTICAL SCALE: 20 TIMES EXAGGERATION

NOTES:

1. 450mm ø GAS HEADER PROTECTION AND COVER REQUIREMENTS UNDER DITCH (LCD) INVERTS SHALL BE FIELD TREATED BY COMCOR.
2. INTERIOR DITCH No. 1 AND No. 2 ARE PART OF THE LANDFILL COLLECTOR DITCH (LDD) SYSTEM. SEE G03 FOR LOCATIONS.
3. HAUL ROAD ACCESS RAMP BY OTHERS (LOCATION TO BE DETERMINED) MAY BE ACCOMMODATED BY GRADING DITCH FROM STATION 2+517.01 WESTERLY AT 0.05% AS REQUIRED.

100 0 100 200m
SCALE: 1:3000 METRIC 24"x36"
1:6000 METRIC 11"x17"

250 0 250 500m
SCALE: 1:7500 METRIC 24"x36"
1:15000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
B	13/09/27	RE-ISSUED FOR REVIEW	RDS
A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
LANDFILL COLLECTOR DITCH (LCD)
PROFILES

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

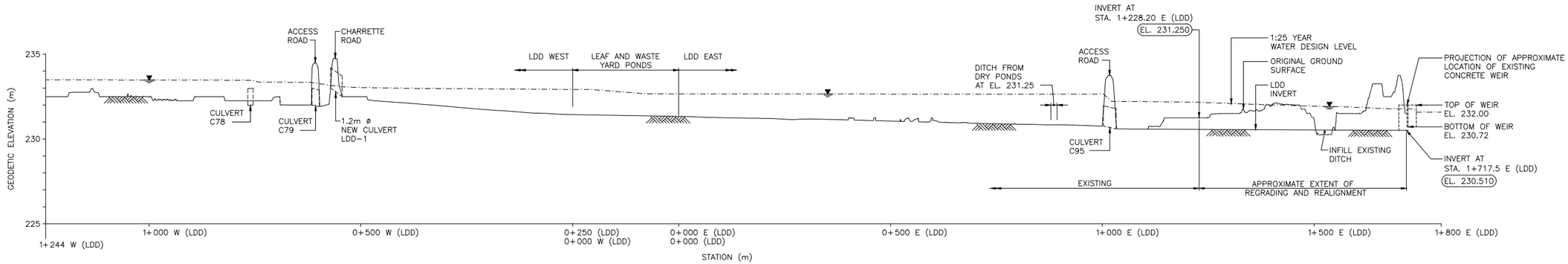
ENG. STAMP
APEGM
Certificate of Authorization
KGS Group
No. 245 Date:_____

KGS GROUP CONSULTING ENGINEERS

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DRAWN BY:	Rar	DATE:	13/08/12
DWG CHECK:	jS	DATE:	

DWG. NO. 13-0107-015 G04
REV: C

FileName: P:\Projects\2013\13-0107-015\Dwg\Env\Design Report dwgs\Rev C\13-0107-015_G04.dwg — Tab: G04 Plotted By: PDeffner 14/05/30 [Fri 10.31am]



PROFILE LAND DRAINAGE DITCH (LDD)
SCALE: 1:5000 METRIC 24x36
1:10000 METRIC 11x17
VERTICAL SCALE: 40 TIMES EXAGGERATION

100 0 100 200 300 400m
SCALE: 1:5000 METRIC 24"x36"
1:10000 METRIC 11"x17"

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A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
LAND DRAINAGE DITCH
(LDD)
PROFILE

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

APEGM
Certificate of Authorization
KGS Group
No. 245 Date:_____

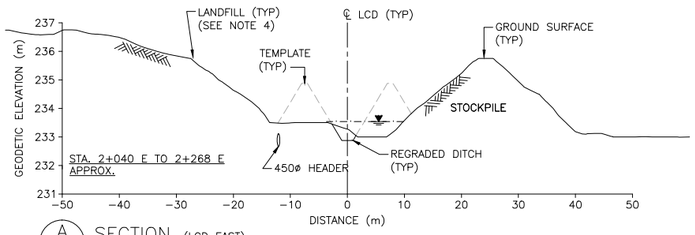
ENG. STAMP

KGS GROUP CONSULTING ENGINEERS

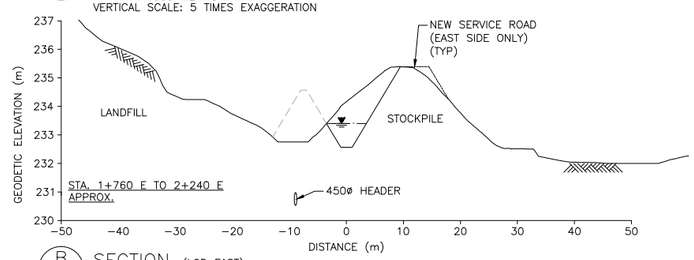
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DRAWN BY:	Rar	DATE:	13/08/12
DWG CHECK:	jS	DATE:	

DWG. NO. 13-0107-015 G05
REV: C

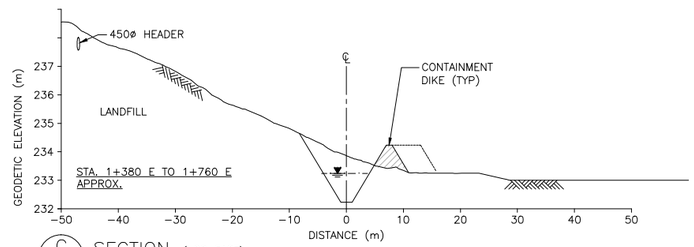
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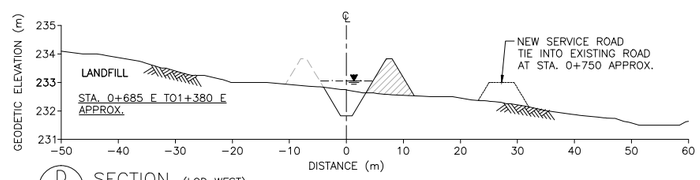
A G02 SECTION (LCD EAST)
SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



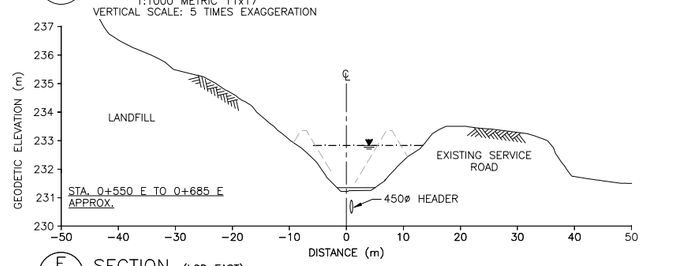
B G02 SECTION (LCD EAST)
SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



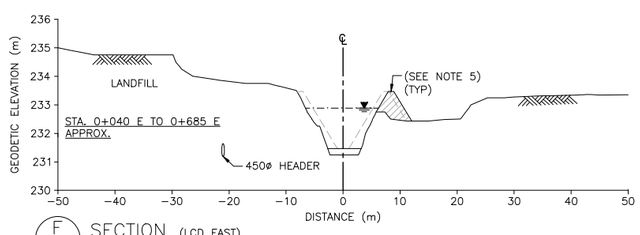
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SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



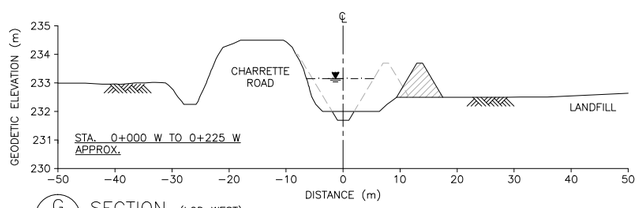
D G02 SECTION (LCD WEST)
SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



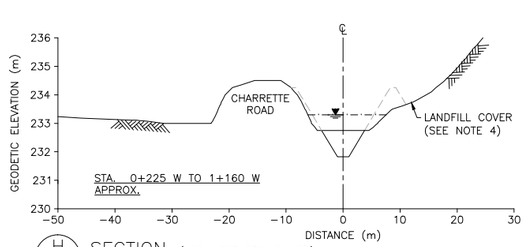
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VERTICAL SCALE: 5 TIMES EXAGGERATION



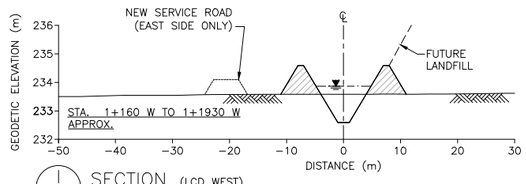
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SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



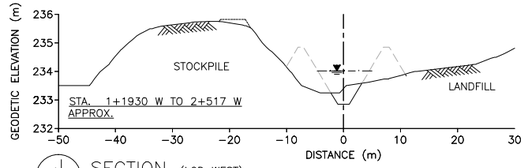
G G02 SECTION (LCD WEST)
SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



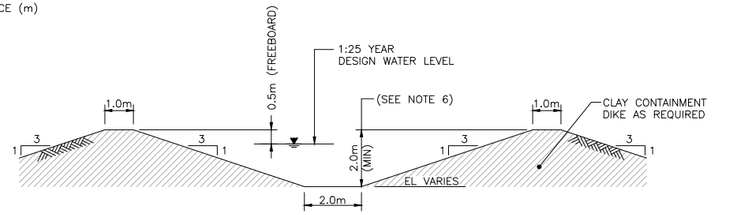
H G02 SECTION (LCD WEST STA. 0+400)
SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



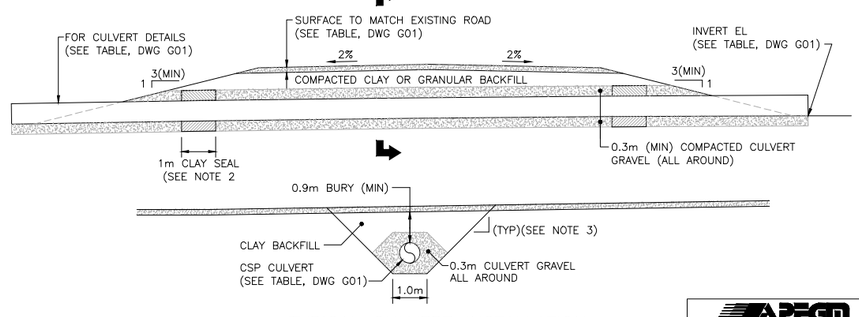
I G02 SECTION (LCD WEST)
SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



J G02 SECTION (LCD WEST)
SCALE: 1:500 METRIC 24x36
1:1000 METRIC 11x17
VERTICAL SCALE: 5 TIMES EXAGGERATION



TYPICAL DITCH CROSS SECTIONAL TEMPLATE (LCD AND LDD)
SCALE: 1:100 METRIC 24x36
1:200 METRIC 11x17



TYPICAL CULVERT INSTALLATION
SCALE: 1:100 METRIC 24x36
1:200 METRIC 11x17

LEGEND:

0+000 STATIONING ALONG DITCH INVERT (m)

1:25 YEAR DESIGN WATER LEVEL

NOTES:

1. CULVERTS SHALL BE INSTALLED WITH A 50mm POSITIVE CAMBER AT MID LENGTH.
2. A 1m LONG COMPACTED CLAY SEAL (CULVERT GRAVEL AND BENTONITE MIXTURE) SHALL BE PLACED NEAR BOTH ENDS, IN ACCORDANCE WITH THE SPECIFICATIONS.
3. TEMPORARY EXCAVATION SIDE SLOPES FOR CULVERT INSTALLATION SHALL BE A STABLE SLOPE TO SUIT SITE CONDITIONS.
4. THIS CONTRACT DOES NOT INCLUDE ANY LANDFILL SLOPE CAPPING AND IS ASSUMED TO BE DONE BY OTHERS.
5. CONTAINMENT DIKE MAY BE LOCATED ON HIGHER GROUND OUTSIDE THE DITCH TEMPLATE OR FINAL COVERED LANDFILL SLOPES MAY BE UTILIZED WHEN APPLICABLE TO MINIMIZE FILL QUANTITIES.
6. WHERE DEPTH OF WATER IN DITCH IS LESS THAN 1.5m THE DEPTH OF DITCH SHALL BE GOVERNED BY THE FREEBOARD REQUIREMENT. REFER TO HYDRAULIC PROFILE DWG G04.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

2 0 2 4 6 8m
SCALE: 1:100 METRIC 24"x36"
1:200 METRIC 11"x17"

10 0 10 20 30 40m
SCALE: 1:500 METRIC 24"x36"
1:1000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
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REVISIONS / ISSUE

CLIENT:
Winnipeg
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
TYPICAL DITCH SECTIONS

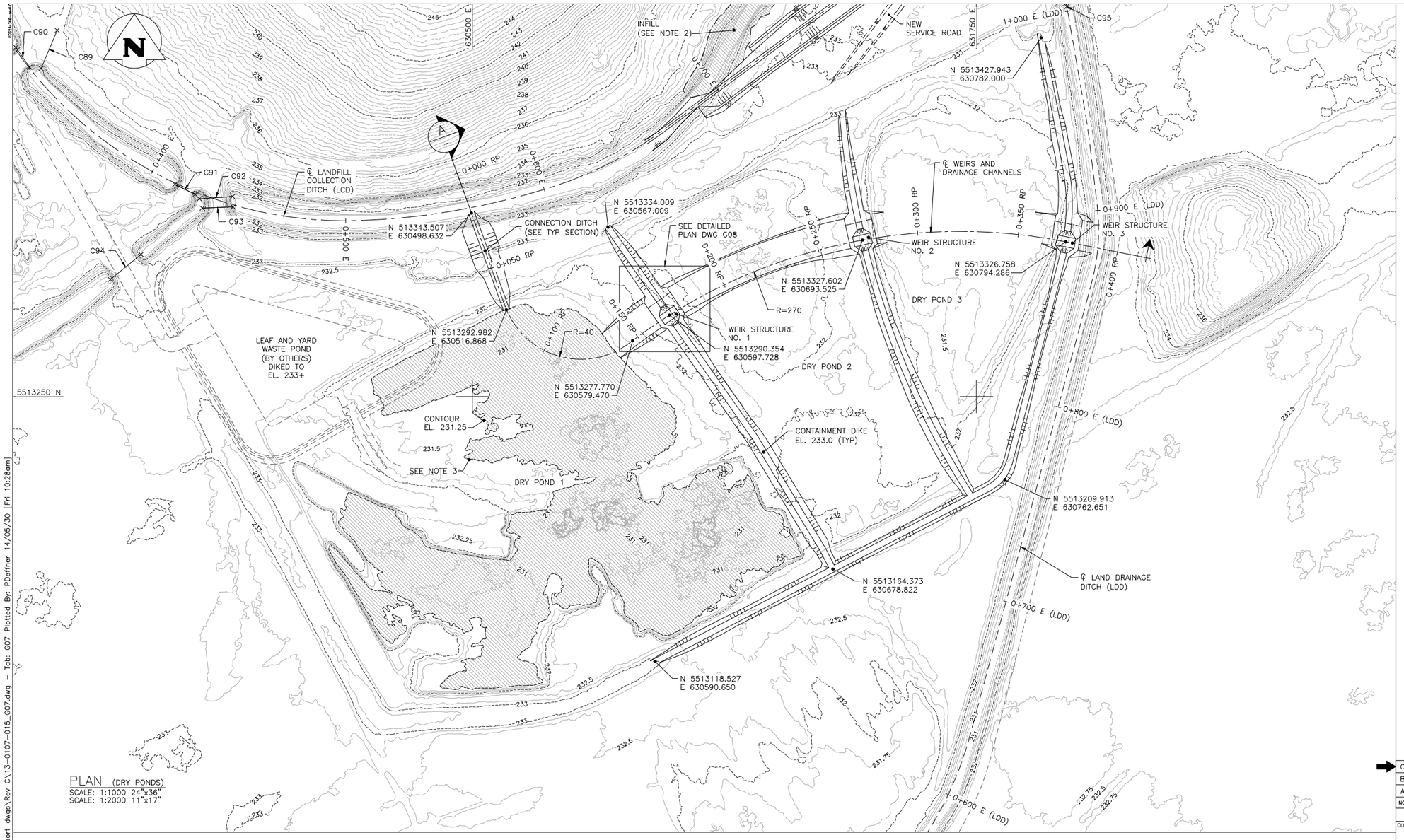
ENG. STAMP
APEGM
Certificate of Authorization
KGS Group
No. 245 Date:

KGS GROUP CONSULTING ENGINEERS

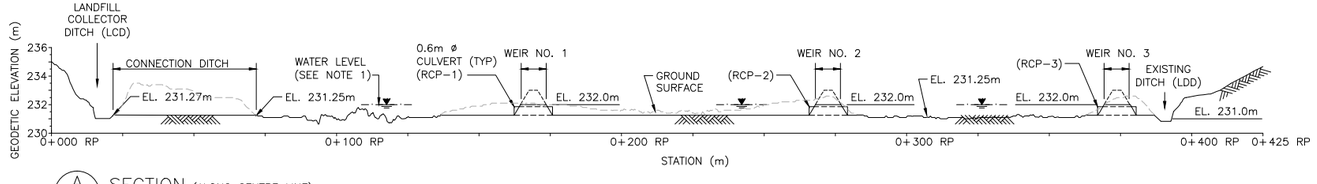
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PwD	13/08/12
DWG CHECK:	DATE:
jS	

DWG. NO. 13-0107-015 G06
REV: C

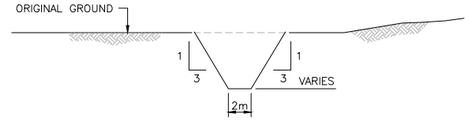
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PLAN (DRY PONDS)
SCALE: 1:1000 24"x36"
SCALE: 1:2000 11"x17"



A
SECTION (ALONG CENTRE LINE)
SCALE: 1:1000 24"x36"
SCALE: 1:2000 11"x17"
SCALE: 5 TIMES EXAGGERATION



TYPICAL SECTION (CONNECTION DITCH)
SCALE: 1:250 24"x36"
SCALE: 1:500 11"x17"
VERTICAL SCALE: 5 TIMES EXAGGERATION

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LEGEND:

WATER LEVEL (SEE NOTE 1)
232 GROUND SURFACE GEODETIC (m)

NOTES:

1. POND WATER LEVELS TO BE CONTROLLED BY OPERATION OF GATES AT EACH WEIR.
2. FILL IN ALL ABANDONED DITCHES WITH CLAY AND SLOPE TO DRAIN TOWARDS NEW LCD DITCH.
3. GRADE AND LEVEL AREA WITH COMPACTED CLAY AS REQUIRED WITHIN THIS AREA TO PROMOTE DRAINAGE AT ELEVATION 231.25.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

PLAN AND SECTION
20 0 20 40 60 80m
SCALE: 1:1000 METRIC 24"x36"
1:2000 METRIC 11"x17"

TYPICAL SECTION
5 0 5 10 15 20m
SCALE: 1:250 METRIC 24"x36"
1:500 METRIC 11"x17"

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THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

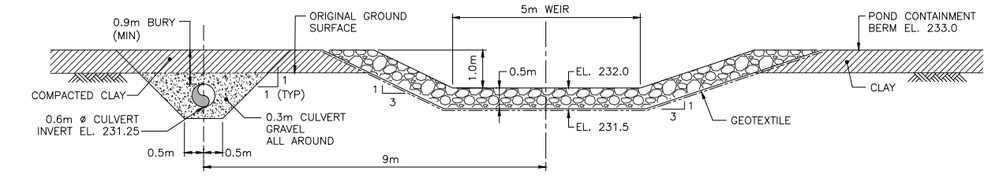
DWG. DESCRIPTION:
DRY PONDS
PLAN AND PROFILE

KGS GROUP CONSULTING ENGINEERS

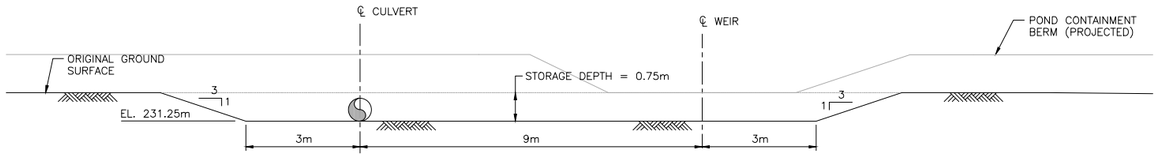
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DWG CHECK:	jS	DATE:

DWG. NO. 13-0107-015 G07
REV: C

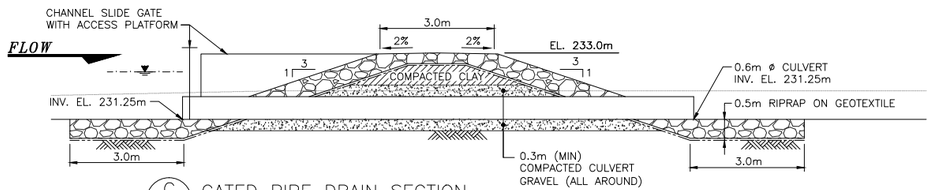
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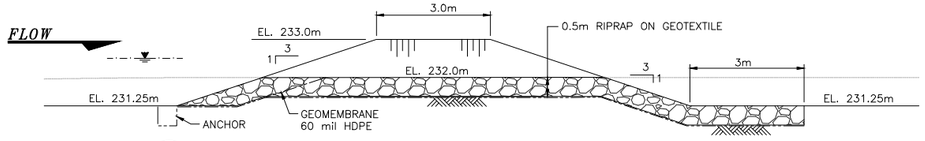
A WEIR SECTION
SCALE: 1: 75 24"x36"
SCALE: 1:125 11"x17"



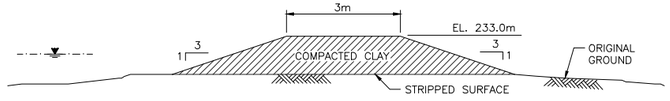
B APPROACH CHANNEL SECTION
SCALE: 1: 75 24"x36"
SCALE: 1:125 11"x17"



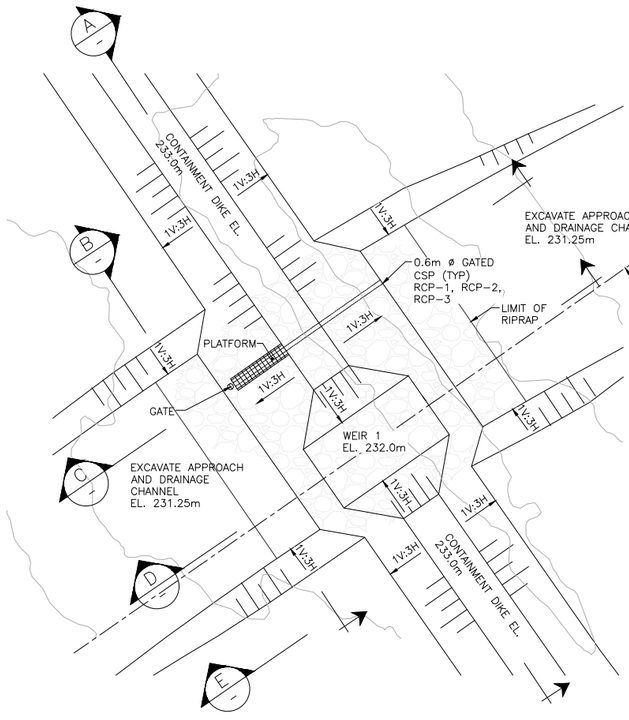
C GATED PIPE DRAIN SECTION
SCALE: 1: 75 24"x36"
SCALE: 1:125 11"x17"



D WEIR SECTION
SCALE: 1: 75 24"x36"
SCALE: 1:125 11"x17"



E CONTAINMENT DIKE SECTION
SCALE: 1: 75 24"x36"
SCALE: 1:125 11"x17"



TYPICAL WEIR PLAN
SCALE: 1:200 METRIC 24"x36"
SCALE: 1:400 METRIC 11"x17"

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

PLAN
5 0 5 10 15m
SCALE: 1:200 METRIC 24"x36"
1:400 METRIC 11"x17"

DETAILS
2.5 0 2.5 5m
SCALE: 1:75 METRIC 24"x36"
1:150 METRIC 11"x17"

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A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
DRY PONDS
WEIRS AND DRAIN PIPES
SECTIONS AND DETAILS

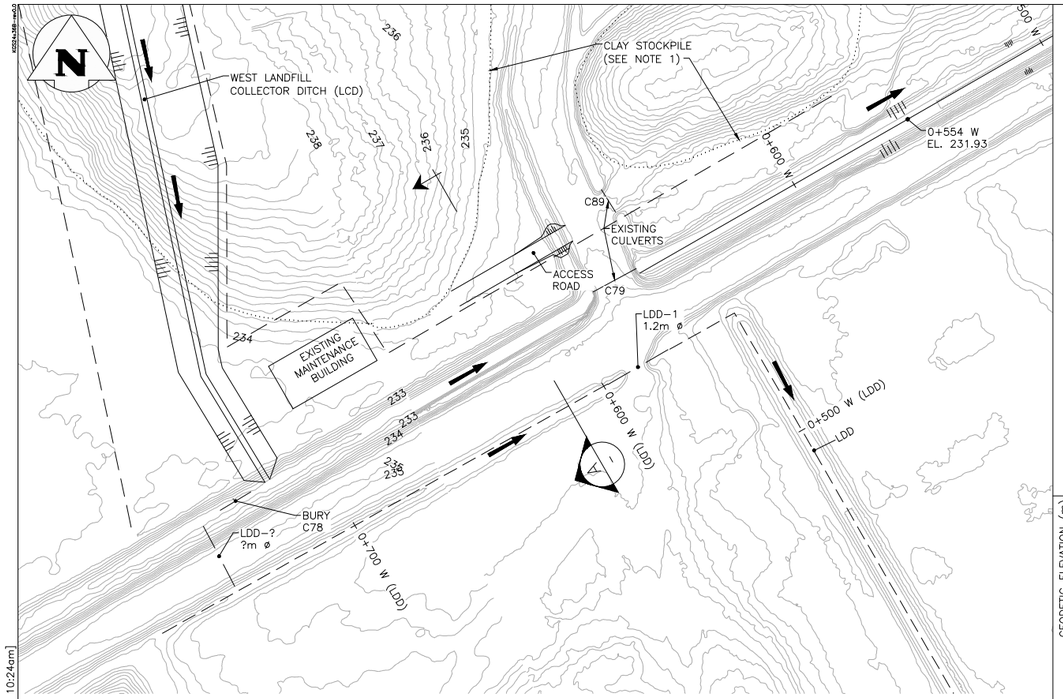
KGS GROUP CONSULTING ENGINEERS	DESIGN BY: TJK	DATE (YY/MM/DD): 13/08/12
	DESIGN CHECK: RDS	DATE:
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	DWG CHECK: jS	DATE:

DWG. NO. 13-0107-015 G08
REV: C

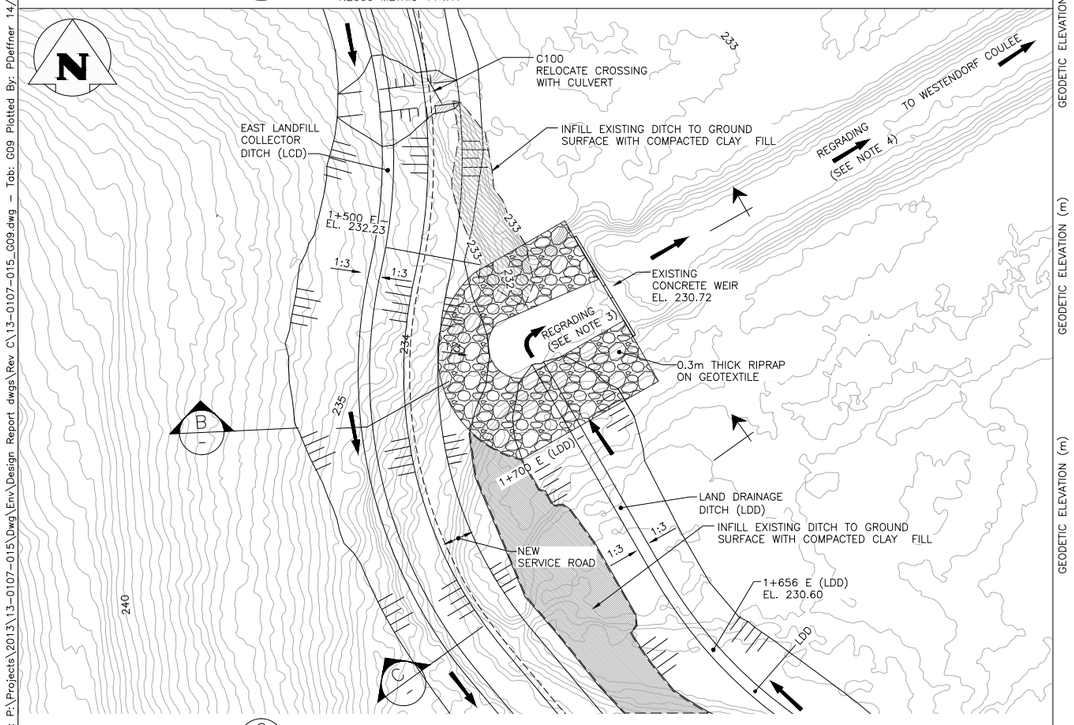
APEGM
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KGS Group
No. 245 Date:

ENG. STAMP

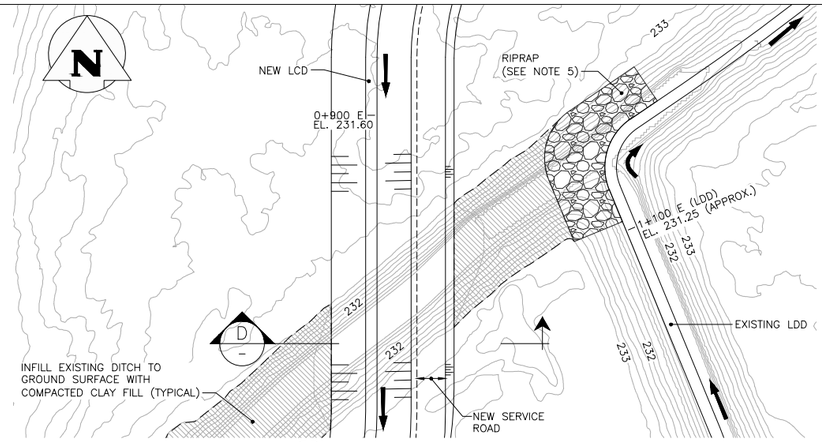
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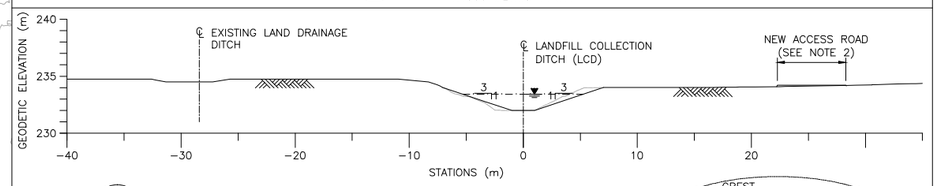
1 G02 MAINTENANCE BUILDING PLAN AREA
SCALE: 1:1000 METRIC 24"x36"
1:2000 METRIC 11"x17"



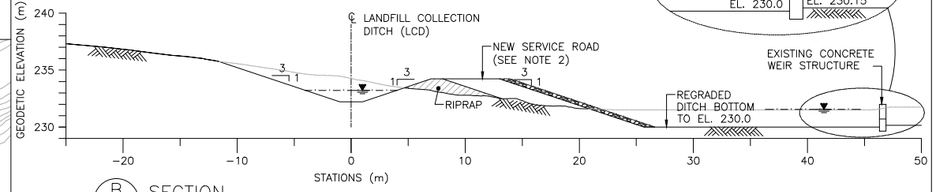
2 G02 CONCRETE WEIR PLAN AREA
SCALE: 1:500 METRIC 24"x36"
1:1000 METRIC 11"x17"



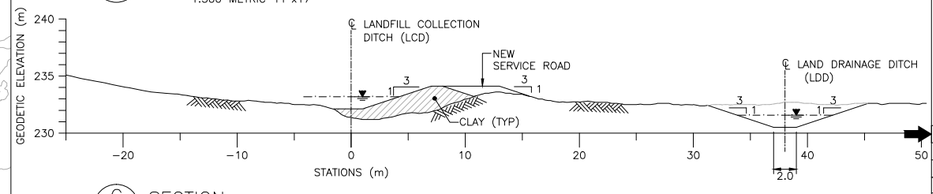
3 G02 NEW LCD CROSSING EXISTING DITCH
SCALE: 1:500 METRIC 24"x36"
1:1500 METRIC 11"x17"



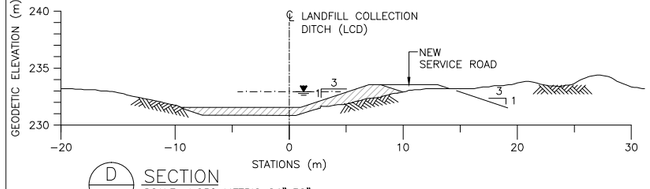
A — SECTION
SCALE: 1:250 METRIC 24"x36"
1:500 METRIC 11"x17"



B — SECTION
SCALE: 1:250 METRIC 24"x36"
1:500 METRIC 11"x17"



C — SECTION
SCALE: 1:250 METRIC 24"x36"
1:500 METRIC 11"x17"



D — SECTION
SCALE: 1:250 METRIC 24"x36"
1:500 METRIC 11"x17"

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

ENG. STAMP
APEGM
Certificate of Authorization
KGS Group
No. 245 Date:_____

LEGEND:

1:25 YEAR DESIGN WATER LEVEL

DIRECTION OF DRAINAGE

NOTES:

1. DEPENDING ON CONSTRUCTION TIMING CLAY STOCKPILES MAY STILL BE IN PLACE AT TIME OF LANDFILL COLLECTION DITCH EXCAVATION.
2. NEW SERVICE AND ACCESS ROAD WIDTH FILL TYPE AND ROAD TOPPING TO BE DETERMINED BY CITY OF WINNIPEG.
3. REGRADING UPSTREAM OF WEIR MAY BE REQUIRED.
4. REGRADING DOWNSTREAM OF WEIR TO WESTENDORF COULEE AND EROSION PROTECTION SHALL BE BY OTHERS AS REQUIRED AND DETERMINED ON SITE.
5. PLACE 0.3m THICK RIPRAP ON GEOTEXTILE FOR 20m FOR FULL SLOPE HEIGHT.

PLANS
10 0 10 20 30 40m
SCALE: 1:500 METRIC 24"x36"
1:1000 METRIC 11"x17"

20 0 20 40 60 80m
SCALE: 1:1000 METRIC 24"x36"
1:2000 METRIC 11"x17"

DETAILS
5 0 5 10 15 20m
SCALE: 1:250 METRIC 24"x36"
1:500 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
B	13/09/27	RE-ISSUED FOR REVIEW	RDS
A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

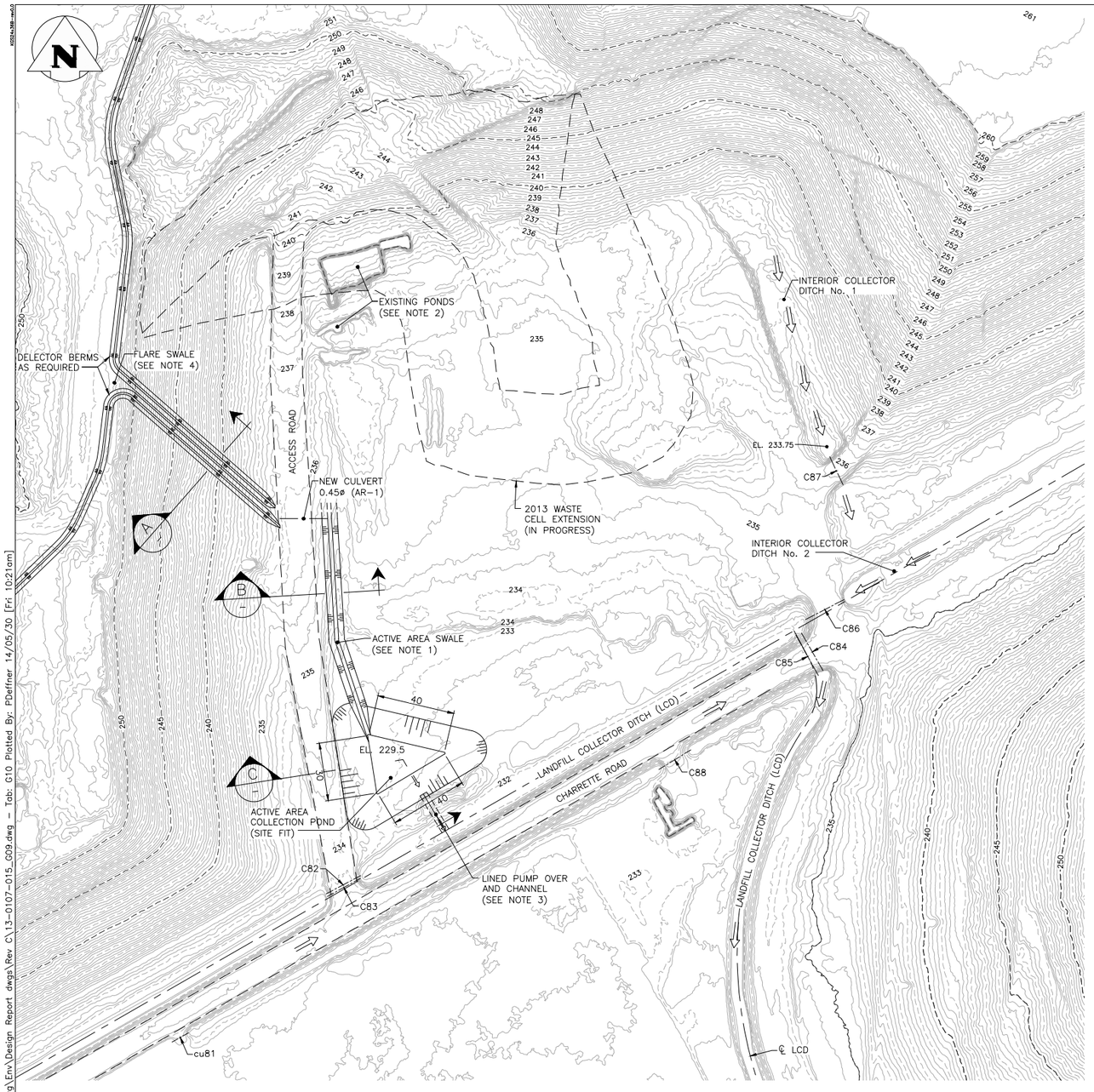
DWG. DESCRIPTION:
DITCH DETAIL,
PLANS AND SECTIONS

KGS GROUP CONSULTING ENGINEERS

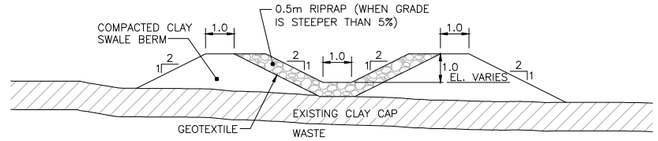
DESIGN BY:	DATE (YY/MM/DD):
TJK	13/08/12
DESIGN CHECK:	DATE:
RDS	
DRAWN BY:	DATE:
PwD	13/08/12
DWG CHECK:	DATE:
jS	

DWG. NO. 13-0107-015 G09 REV: C

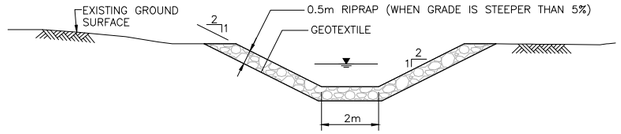
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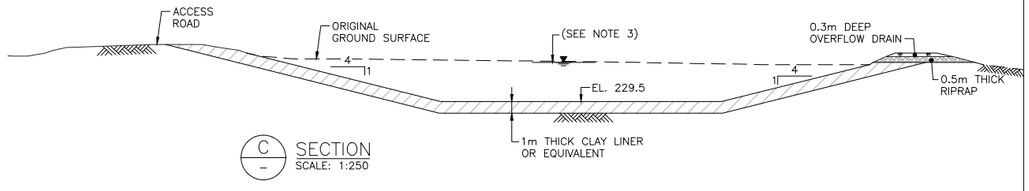
ACTIVE AREA PLAN
SCALE: 1:1250



A SECTION
SCALE: 1:100



B TYPICAL ACTIVE AREA DITCH
SCALE: 1:100



C SECTION
SCALE: 1:250

NOTES:

1. ACTIVE AREA SWALE SHALL BE LOCATED ON SITE TO MATCH EXISTING DITCH ALIGNMENT AND GRADES. DRAINAGE FROM WORKING ACTIVE AREA MAY BE DIRECTED TO ACTIVE AREA SWALE BY CROSSING ACCESS ROAD WITH CULVERT.
2. EXISTING PONDS AND WATER HOLDING AREAS SHALL BE DRAINED AND INFILLED PRIOR TO CONSTRUCTION OF ACTIVE AREA SWALE.
3. OPERATION OF WASTE WATER LEVELS TO BE CONTROLLED BY PUMPING DIRECTLY TO LCD.
4. SWALE SHALL BE TIED INTO ACTIVE AREA BY FLARING CLAY SWALE BERMS INTO EXISTING ACTIVE AREA BERMS AS DIRECTED.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

PLAN
25 0 25 50 75 100m
SCALE: 1:1250 METRIC 24"x36"
1:2500 METRIC 11"x17"

DETAILS
2.5 0 2.5 5.0 7.5m
SCALE: 1:100 METRIC 24"x36"
1:200 METRIC 11"x17"

5 0 5 10 15 20m
SCALE: 1:250 METRIC 24"x36"
1:500 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	BY
C	14/05/30	RE-ISSUED FOR REVIEW	RDS
B	13/09/27	RE-ISSUED FOR REVIEW	RDS
A	13/08/23	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG MANITOBA

DWG. DESCRIPTION:
ACTIVE AREA COLLECTION POND
PLAN, SECTION AND DETAILS

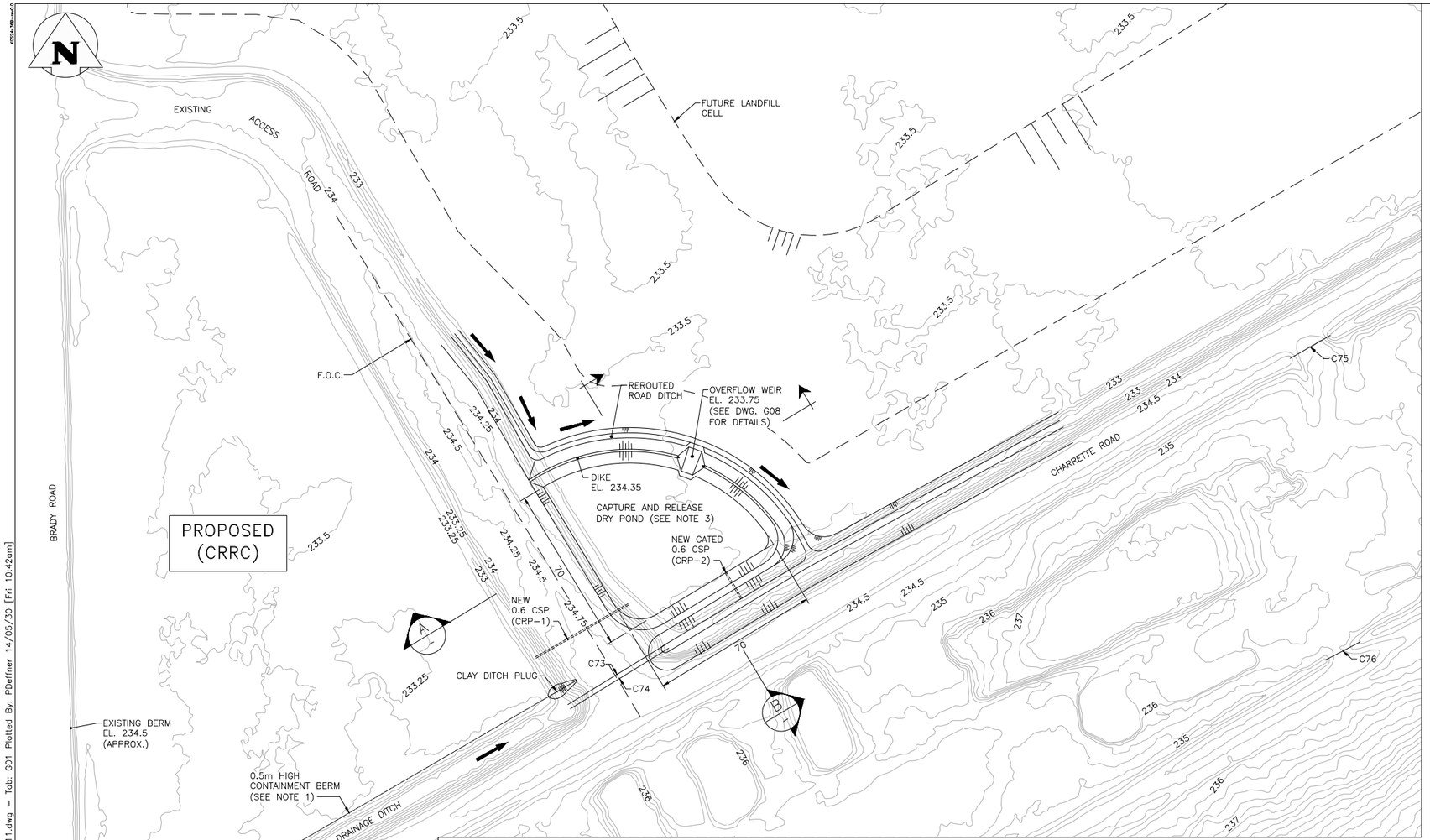
ENG. STAMP
APEGM
Certificate of Authorization
KGS Group
No. 245 Date:_____

KGS GROUP CONSULTING ENGINEERS

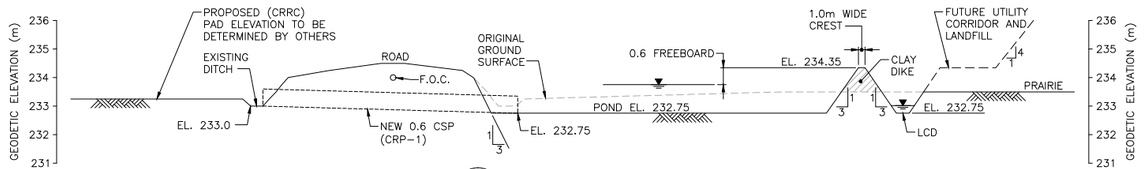
DESIGN BY:	DATE (YY/MM/DD):
TJK	13/08/12
DESIGN CHECK:	DATE:
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DRAWN BY:	DATE:
Rar	13/08/12
DWG CHECK:	DATE:
jS	

DWG. NO. 13-0107-015 G10
REV: C

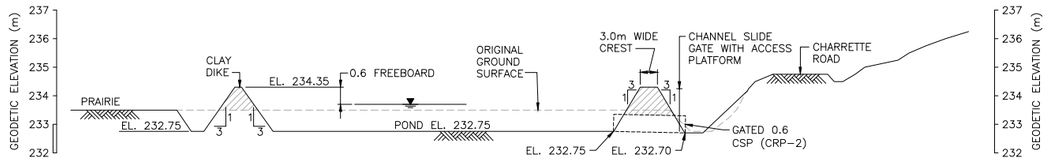
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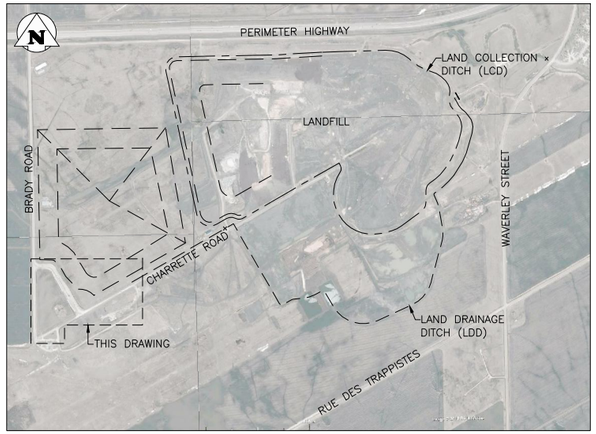
PLAN OF CRRC DRY POND AREA
SCALE: 1:1000



A – SECTION (CRRC POND)
HORIZONTAL SCALE: 1:500
VERTICAL SCALE: 5 TIMES EXAGGERATION



B – SECTION (CRRC POND)
HORIZONTAL SCALE: 1:500
VERTICAL SCALE: 5 TIMES EXAGGERATION



KEY MAP

LEGEND:

C75 – EXISTING CULVERT.
F.O.C. – EXISTING FIBRE OPTIC CABLE.
CRRC – COMMUNITY RESOURCE RECOVERY CENTRE
– DRAINAGE DIRECTION

NOTES:

1. PARKING LOT AREA SHALL BE GRADED TO POND AND RUNOFF CONTAINED WITH DEFLECTOR DIKE / CURB ALONG SOUTH SIDE.
2. SUITABLE EXCAVATED MATERIAL FROM POND MAY BE USED AS FILL IN CONSTRUCTION OF CRRC LOT. UNSUITABLE EXCAVATED MATERIAL MAY BE STOCKPILED FOR USE AS LANDFILL COVER.
3. CAPTURE AND RELEASE POND TO BE OPERATED ON A PUMP OUT BASIS.

PLAN
25 0 25 50 75m
SCALE: 1:1000 METRIC 24"x36"
1:2000 METRIC 11"x17"

SECTIONS
10 0 10 20 30 40m
SCALE: 1:500 METRIC 24"x36"
1:1000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	BY
B	14/05/30	RE-ISSUED FOR REVIEW	RDS
A	13/09/27	ISSUED FOR REVIEW	RDS

REVISIONS / ISSUE

CLIENT:
THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT

PROJECT:
BRADY ROAD LANDFILL
SURFACE WATER MANAGEMENT
WINNIPEG, MANITOBA

DWG. DESCRIPTION:
COMMUNITY RESOURCE RECOVERY CENTRE (CRRC). CAPTURE AND RELEASE POND. PLAN AND DETAILS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

APEGM
Certificate of Authorization
KGS Group
No. 245 Date:

ENG. STAMP

KGS GROUP CONSULTING ENGINEERS

DESIGN BY:	TJK	DATE (YY/MM/DD):	13/09/16
DESIGN CHECK:	RDS	DATE:	
DRAWN BY:	Rar	DATE:	13/09/16
DWG CHECK:	jS	DATE:	

DWG. NO. 13-0107-015 G11
REV: B

FileName: P:\Projects\2013\13-0107-015\Dwg\Env\Design Report dwgs\Rev B\13-0107-015_G11.dwg — Tab: G01 Plotted By: PDeffner 14/05/30 [Fri 10:42am]

APPENDICES

DRAFT

APPENDIX A

ENVIRONMENT ACT LICENCE NO. 3081R

DRAFT

Manitoba
Conservation and Water Stewardship

Environmental Stewardship Division
Environmental Approvals Branch
123 Main Street, Suite 160, Winnipeg, Manitoba R3C 1A5
T 204 945-8321 **F** 204 945-5229
www.gov.mb.ca/conservation/eal

CLIENT FILE NO.: 5556.00

April 23, 2014

Darryl Drohomerski, C.E.T., Manager of Solid Waste Services
City of Winnipeg, Water and Waste Department
1120 Waverley St.
Winnipeg MB R3T 0P4

Dear Mr. Drohomerski :

Enclosed is **revised Environment Act Licence No. 3081 R** dated April 23, 2014 issued to the **City of Winnipeg** for the construction and operation of the Development being a Class 1 Waste Disposal Ground and Resource Management Facility to be known as The Brady Road Resource Management Facility located at 1901 Brady Road in Winnipeg, Manitoba in accordance with the Proposal filed under *The Environment Act* on December 23, 2011.

In addition to the enclosed Licence requirements, please be informed that all other applicable federal, provincial and municipal regulations and by-laws must be complied with. A Notice of Alteration must be filed with the Director for approval prior to any alteration to the Development as licensed.

For further information on the administration and application of the Licence, please feel free to contact Cory Switzer, Environmental Engineer at 204-250-7645.

Pursuant to Section 27 of *The Environment Act*, this licensing decision may be appealed by any person who is affected by the issuance of this Licence to the Minister of Conservation and Water Stewardship within 30 days of the date of the Licence.

Yours truly,

"original signed by"

_____

Tracey Braun, M.Sc.
Director
Environment Act

c: Don Labossiere, Director, Environmental Compliance and Enforcement
Public Registries
Public distribution: Ladco Company Ltd. – **via email**

NOTE: Confirmation of Receipt of this Licence No. 3081 R *(by the Licencee only)* is required by the Director of Environmental Approvals. Please acknowledge receipt by signing in the space provided below and faxing a copy (letter only) to the Department by May 7, 2014.

On behalf of the City of Winnipeg **Date**

****A COPY OF THE LICENCE MUST BE KEPT ON SITE AT THE DEVELOPMENT AT ALL TIMES****

THE ENVIRONMENT ACT
LOI SUR L'ENVIRONNEMENT

LICENCE

Manitoba

Licence No. / Licence n° **3081 R**

Issue Date / Date de délivrance **December 23, 2013**

Revised : **April 23, 2014**

In accordance with *The Environment Act* (C.C.S.M. c. E125) /
Conformément à *la Loi sur l'environnement* (C.P.L.M. c. E125)

Pursuant to Section 11(1) / Conformément au Paragraphe 11(1)

THIS LICENCE IS ISSUED TO: / CETTE LICENCE EST DONNÉE À:

THE CITY OF WINNIPEG, WATER AND WASTE DEPARTMENT;
"the Licencee"

for the construction and operation of the Development being a Class 1 Waste Disposal Ground and Resource Management Facility to be known as The Brady Road Resource Management Facility located at 1901 Brady Road in Winnipeg, Manitoba in accordance with the Proposal filed under *The Environment Act* on December 23, 2011, and subject to the following specifications, limits, terms and conditions:

DEFINITIONS

In this Licence,

"access road" means a road that leads from a Provincial Trunk Highway, Provincial Road, or a municipal road;

"accredited laboratory" means an analytical facility accredited by the Standard Council of Canada (SCC), or accredited by another accrediting agency recognized by Manitoba Conservation and Water Stewardship to be equivalent to the SCC, or be able to demonstrate, upon request, that it has the quality assurance/quality control (QA/QC) procedures in place equivalent to accreditation based on the international standard ISO/IEC 17025, or otherwise approved by the Director;

"active area" means a designated trench, cell, or berm confined area of a waste disposal ground in which solid wastes are deposited, also known as waste disposal cell or landfill cell;

"affected area" means a geographical area, excluding the property of the Development;

"all weather road" means a graded and/or graveled road or road of equivalent materials that is passable by vehicles under both wet and dry weather conditions;

"alternative daily cover" means materials approved by the Director for use in temporarily covering waste in an active area;

"approved" means approved by the Director or assigned Environment Officer in writing;

"background water quality" means the quality of water in any geologic zone monitored with regards to the chemical and microbiological parameters specified in a Licence issued pursuant to *The Environment Act* by the Director;

"biosolids" means accumulated organic solids, resulting from wastewater treatment processes, that have received adequate treatment to permit the material to be recycled;

"body of water" means any body of flowing or standing water whether natural or artificially created;

"buffer" means a strip of land that is managed to reduce or eliminate the impacts of land use practices on sensitive areas or natural features;

"bulky metallic waste" means, but is not limited to, derelict vehicles, farm machinery, and large appliances which are capable of being salvaged for recycling or reuse;

"CCME" means Canadian Council of Ministers of the Environment;

"cell" means the location where waste is deposited;

"Class 1 Waste Disposal Ground" means a waste disposal ground serving a population in excess of 5,000 persons;

"Closed Landfill" means the area identified as 'Closed Landfill' shown on the City of Winnipeg Brady Road Resource Management Facility Master Plan Proposed Development Map in Appendix 'C' of this Licence or identified as 'closed' as the status on the Brady Road Resource Management Facility Landfill Cell Location Plan in Appendix 'D' of this Licence or identified on updated closure plans as new areas are closed;

"closure plan" means a plan indicating the actions to be taken for the closure of the Development, or a portion of the Development;

"Community Resource Recovery Centre" means an area within the Brady Road Resource Management Facility that the public will have access to in order to deposit

small loads for segregating materials for recycling, reuse or repurposing and aggregating waste materials to be transferred to a tipping face;

"compliance boundary" means the planar surface that circumscribes the Development, extends vertically downward from the land surface, and constitutes the place at which the parameters of the background water quality as specified in a Licence issued pursuant to *The Environment Act* are not to be exceeded;

"component" means a landfill cell, pad or structure that forms a part of a process or system within an activity area of the Development;

"compost" means solid mature product resulting from composting;

"composting" means a managed process of bio-oxidation of a solid heterogeneous organic substrate including a thermophilic phase;

"concentration value" means a restriction established by a Licence issued pursuant to *The Environment Act* by the Director on quantities, discharge rates and concentrations of pollutants;

"condensate" means liquid created by condensing and removing gases from landfill gas;

"contaminant" means a contaminant as defined in *The Dangerous Goods Handling and Transportation Act*;

"cover material" means material which is non-flammable, does not interfere with landfill gas collection or extraction systems, does not biodegrade to produce landfill gas, is a deterrent to vectors, is free of roots, vegetation and frozen material, or is a material approved by the Director, that is used to cover compacted solid waste;

"CRRC" means Community Resource Recovery Centre;

"daily" means any 24-hour period;

"dangerous goods" means any product, substance or organism designated in the regulations, or conforming with the criteria set out in the regulations, or in any regulation adopted in accordance with *The Dangerous Goods Handling and Transportation Act*, and includes hazardous wastes;

"Director" means an employee so designated pursuant to *The Environment Act*;

"engineer(s)" means an engineer or engineers registered with the Association of Professional Engineers and Geoscientists of the Province of Manitoba;

"engineered wetland" means a designed and man-made system for treatment of impacted water or leachate composed of a basin containing soil at the bottom with emergent and submergent vegetation, animal life, and water that simulates natural wetlands;

"Environment Officer" means an employee so designated pursuant to *The Environment Act*;

"final cover" means earth compacted to a thickness of at least 0.5 metre applied to the surface of the compacted waste cell that has achieved the final elevation for cell closure, and is graded to minimize ponding of water on the surface;

"green waste" means leaf, grass, garden waste, prunings, shrubs, small branches and other yard wastes from residential and commercial generators as identified in the Leaf and Yard Waste Composting Facility and Pilot Biosolids Composting Facility at Brady Road Resource Management Facility document;

"groundwater" means water below the ground surface and within a zone of saturation;

"groundwater monitoring program" means a plan developed for the monitoring and management of groundwater;

"hazardous waste" means any substance or group of substances so designated by the regulations or conforming to criteria set out in regulations, or any future amendments thereof;

"HDPE" means high density polyethylene;

"hydraulic conductivity" means the quantity of water that will flow through a unit cross-sectional area of a porous material per unit of time under a hydraulic gradient of 1.0;

"industrial waste" means waste product generated by industry other than hazardous waste and liquid industrial waste;

"infill waste disposal cell" means an active area that is developed on top of or adjacent to a closed waste disposal cell to maximize use of the space available;

"landfill" see waste disposal ground;

"landfill gas" means a mixture of gases generated by the microbial decomposition and chemical reactions between wastes in a landfill;

"leachate" means liquid that has percolated though solid waste, and that contains dissolved and suspended materials from the solid waste;

"leachate collection system" means a system that gathers leachate so that it may be removed from a landfill and which could include a permeable drainage layer, a network of perforated piping, and sumps or manholes from which leachate can be removed;

"Leachate Management System" means all of the components of a system to transport, collect, and extract leachate from the Development; to include the leachate collection system, and any other infrastructure installed for the purpose of handling leachate;

"liner" means a continuous layer of reworked soil, or manufactured materials, placed beneath and on the sides of a waste disposal ground active area, a compost facility, or a storage area intended to restrict the downward or lateral escape of solid waste, leachate, and or gases, or to restrict the upward movement of groundwater into an area;

"liquid industrial waste" means waste generated by industrial processes that has a slump of more than 150 mm using the slump test method (slump test, C.S.A. Standards Test Method A 23.2-5C), and does not include hazardous waste or industrial waste;

"liquid waste" means sewage, sewage effluent and sludge from septic tanks, holding tanks and municipal sewage treatment systems and that has a slump of more than 150 mm using the slump test method (slump test, C.S.A. Standard Test Method A23.2-5C);

"mil" means one-thousandth of an inch;

"monitoring well" means a well drilled to measure groundwater levels and collect groundwater samples for the purpose of physical, chemical or biological analysis to determine the concentration of groundwater constituents;

"noise nuisance" means an unwanted sound, in an affected area, which is annoying, troublesome, or disagreeable to a person:

a) residing in an affected area;
b) working in an affected area; or
c) present at a location in an affected area which is normally open to members of the public;

if the unwanted sound

d) is the subject of at least 5 written complaints, received by the Director in a form satisfactory to the Director and within a 90-day period, from 5 different persons falling within clauses a), b) or c), who do not live in the same household; or
e) is the subject of at least one written complaint, received by the Director in a form satisfactory to the Director, from a person falling within clauses a), b) or c) and the Director is of the opinion that if the unwanted sound had occurred in a more densely populated area there would have been at least 5 written

complaints received within a 90-day period, from 5 different persons who do not live in the same household;

"odour nuisance" means a continuous or repeated odour, smell or aroma, in an affected area, which is offensive, obnoxious, troublesome, annoying, unpleasant or disagreeable to a person:

a) residing in an affected area;
b) working in an affected area; or
c) present at a location in an affected area which is normally open to members of the public;

if the odour, smell or aroma

d) is the subject of at least 5 written complaints, received by the Director in a form satisfactory to the Director and within a 90-day period, from 5 different persons falling within clauses a), b) or c), who do not live in the same household; or
e) is the subject of at least one written complaint, received by the Director in a form satisfactory to the Director, from a person falling within clauses a), b), or c) and the Director is of the opinion that if the odour, smell or aroma had occurred in a more densely populated area there would have been at least 5 written complaints received within a 90-day period, from 5 different persons who do not live in the same household;

"opacity" means the degree to which emissions reduce the transmission of light and obscure the view of an object in the background;

"particulate matter" means any finely divided liquid or solid matter other than water droplets;

"particulate residue" means that part or portion of an atmospheric emission which is deposited onto a surface;

"point source" means any point of emission from a Development where pollutants are emitted to the atmosphere by means of a stack;

"pollutant" means a pollutant as defined in *The Environment Act*;

"post-closure plan" means a plan indicating the actions to be taken for the care, maintenance, and monitoring of the Development after closure, that will prevent, mitigate, or minimize the threat to public health and the environment;

"QA/QC" means quality assurance/quality control;

"qualified professional" means an individual properly trained and authorized to practice in a specific area or field which may include assessment, design, or providing consultation for an aspect of the Development; to include but not be limited to Professional Engineers, Geoscientists or Landscape Architects;

"representative sample" means a sample collected by a methodology acceptable to an Environment Officer;

"Segregated Material Storage Area" means an area for accumulation and temporary storage of materials which have been segregated by type, composition or potential end use, e.g. metal and white goods, tires, glass etc., prior to utilization on site or transfer off site;

"site" means the area both permanent and temporary which is required for the construction and operation of the Development;

"solid waste" means all discarded waste including dead animals and does not include liquid waste, hazardous waste or bulky metallic waste;

"special waste" means bagged asbestos containing materials, dead animals including specified risk materials (SRM), slaughterhouse waste and food products deemed to be unacceptable by the Canadian Food Inspection Agency (CFIA), biosolids, and any other waste identified by the Director;

"Standard Methods for the Examination of Water and Wastewater" means the most recent edition of Standard Methods for the Examination of Water and Wastewater published jointly by the American Public Health Association, the American Water Works Association and the Water Environment Federation;

"Surface Water Management System" means a system that manages surface water and storm water from all areas, within the Development;

"surface water management feature" means an engineer designed element (pond, engineered wetland, drainage channel, etc.) that is included in the Surface Water Management System;

"top soil" means soil that is free of roots, vegetation, weeds and stones larger than 50 mm, is capable of supporting good vegetative growth, and is suitable for use in top dressing, landscaping and seeding;

"Wood Chip Processing and Storage Area " means an area for the receipt, chipping, and storage of wood waste, including Dutch elm disease impacted wood, prior to utilization on site or for transport off site, including but not limited to use as a compost bulking agent or feedstock; and

"waste disposal ground" means a parcel of land that is used for the disposal of solid or industrial waste, also referred to as a landfill.

PROJECT SCOPE

The Development is located within the area bordered by Waverley Street, Provincial Trunk Highway 100, Brady Road and Rue des Trappistes, also to include Parcels A, B, D and E of Plan 20197; individual parcels shown and legal descriptions in Appendix 'A' and Appendix 'B', attached.

Supporting documents and additional information for the Development, filed in accordance with *The Environment Act* include:

a) Brady Road Resources Management Facility Operating Plan, dated December 2011, received February 3, 2012;
b) Brady Road Landfill Methane Gas Abatement / Biofuel Plant Project, dated March 16, 2009;
c) Landfill Gas Collection and Flaring System Design Brief, Brady Road Resource Management Facility, August 21, 2012;
d) Notice of Alteration – Biosolids Composting Pilot Study Environment Act Licence No. 1089 E RR, January 5, 2012;
e) City of Winnipeg Biosolids Composting Pilot Study, February 9, 2012;
f) Leaf and Yard Waste Composting Facility and Pilot Biosolids Composting Facility at Brady Road Resource Management Facility; Draft Conceptual Design and Operations Report, received September 18, 2012;
g) Winnipeg Water and Waste Department Pilot Biosolids Composting Facility Design Brief dated January 2013;
h) Brady Environment Act Proposal: Proposed Development Plan and Landfill Cell Location Plan, received November 27, 2012; and
i) Updated Brady Environment Act Proposal: Proposed Development Plan, received September 23, 2013.

GENERAL TERMS AND CONDITIONS

This Section of the Licence contains terms and conditions intended to provide guidance to the Licencee in implementing practices to ensure that the environment is maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for present and future Manitobans.

General Terms

1. The Licencee shall reduce the production and dissemination of wastes by initiating and maintaining waste reduction and waste recycling programs at the Development.

2. The Licencee shall organize, chair and participate on a Community Liaison Committee to be established according to the criteria identified in Appendix 'E' of this Licence.

Reporting Format

3. The Licencee shall provide to the Director, upon request, all information required under this Licence, in writing and in such form and content (including number of copies), as may be specified by the Director and each submission shall be clearly labelled with the Licence Number and File Number associated with this Licence.

4. The Licencee shall carry out any remedial measures, modifications, or alterations, as deemed necessary by the Director, in respect to matters authorized under this Licence.

Future Sampling

5. In addition to any of the limits, terms and conditions specified in this Licence, the Licencee shall, upon the request of the Director:
   a) sample, monitor, analyse or investigate specific areas of concern regarding any segment, component or aspect of pollutant storage, containment, treatment, handling, disposal or emission systems, for such pollutants or ambient quality, aquatic toxicity, leachate characteristics and discharge or emission rates, for such duration and at such frequencies as may be specified;
   b) determine the environmental impact associated with the release of any pollutants from the Development; or
   c) provide the Director, within such time as may be specified, with such reports, drawings, specifications, analytical data, descriptions of sampling and analytical procedures being used, bioassay data, flow rate measurements and such other information as may from time to time be requested.

Sampling Methods

6. The Licencee shall, unless otherwise specified in this Licence:
   a) carry out all preservations and analyses on liquid samples in accordance with the methods prescribed in the most current edition of Standard Methods for the Examination of Water and Wastewater or in accordance with equivalent preservation and analytical methodologies approved by the Director;
   b) carry out all sampling of, and preservation and analyses on, soil and air samples in accordance with methodologies approved by the Director;
   c) have all analytical determinations undertaken by an accredited laboratory; and
   d) report the results to the Director within sixty (60) days of the samples being taken, or within another timeframe as specified by the Director.

7. The Licencee shall, unless otherwise specified in this Licence carry out all sampling of groundwater, surface water, leachate, soil, air and landfill gas in accordance with methodologies specified in the Operating Plan submitted pursuant to Clause 41 of this Licence.

Equipment Breakdown

8. The Licencee shall, in the case of physical or mechanical equipment breakdown or process upset or in cases where waste management functions are disrupted; where such breakdown or process upset results or may result in the release of a pollutant in an amount or concentration, or at a level or rate of release, that causes or may cause a significant adverse effect, immediately report the event by calling 204-944-4888 (toll-free 1-855-944-4888). The report shall indicate the nature of the event, the time and estimated duration of the event and the reason for the event.

9. The Licencee shall, following the reporting of an event pursuant to Clause 8,
   a) identify the repairs required to the mechanical equipment;
   b) undertake all repairs to minimize unauthorized discharges of a pollutant;
   c) complete the repairs in accordance with any written instructions of the Director; and
   d) submit a report to the Director about the causes of breakdown and measures taken, within four (4) weeks of the repairs being completed.

10. The Licencee shall implement a high standard of equipment maintenance and good housekeeping and operational practices with respect to the Development, at all times.

Fire Reporting

11. The Licencee shall in the event of a fire which continues in excess of thirty (30) minutes, or requires implementation of the Emergency Response Plan in Clause 130, or requires fire suppression assistance from personnel outside of the Development (e.g. fire department) report the fire by calling (204) 944-4888 (toll free 1-855-944-4888), identifying the type of materials involved and the location of the fire.

Approvals and Permits

12. The Licencee shall locate fuel storage and equipment servicing areas established for the construction and operation of the Development in compliance with the requirements of *Manitoba Regulation 188/2001* respecting *Storage and Handling of Petroleum Products and Allied Products* or any future amendments thereof.

13. The Licencee shall obtain approval in writing from the Director for any proposed alteration to the Development before proceeding with the alteration.

SPECIFICATIONS, LIMITS, TERMS AND CONDITIONS

Odours and Air Emissions

14. The Licencee shall not burn waste or combustible materials, or allow the burning of waste or combustible materials at the Development unless approved by the Director.

15. The Licencee shall not cause or permit an odour nuisance to be created as a result of the construction, operation, or alteration of the Development, and shall take such steps as the Director may require to eliminate or mitigate an odour nuisance.

16. The Licencee, upon written request of and in a timeframe stipulated by the Director, shall comply with any air emission or ambient air quality criteria specified by the Director for any pollutant of concern to the Director which has been identified pursuant to Clauses 5 or 108 of this Licence.

17. The Licencee shall take action to minimize the entrainment of particulate matter into the air at the Development resulting from the operation of vehicles or the transportation, storage or handling of compost feedstock, wood wastes, construction and demolition waste or other materials.

Noise

18. The Licencee shall not cause or permit a noise nuisance to be created as a result of the construction, operation, or alteration of the Development, and shall take such steps as the Director may require to eliminate or mitigate a noise nuisance.

Responsible Party

19. The Licencee shall assign an engineer(s) or a qualified person(s) to be responsible for the construction of the Development and any required remediation action in accordance with the plans, specifications and design report(s) submitted in support of the proposal or this Licence.

20. The Licencee shall designate an employee, within sixty (60) days of the date of issuance of this Licence, as the Licencee's Environmental Coordinator, whose job description will include assisting the Licencee in complying with the limits, terms and conditions in this Licence and assisting Senior Management of the Licencee to manage environmental issues at the Development. The name of the Environmental Coordinator shall be submitted in writing to the Director within fourteen (14) days of appointment.

Landscaping Plan

21. The Licencee shall submit to the Director, within one (1) year of the date of this Licence, a Landscaping Plan that includes information respecting the establishment of physical and visual buffers from the operations at the Development to adjacent properties. This plan shall include but not be limited to: construction of berms, tree plantings, vegetation of exposed soils, landscaping and timeframes for completion of each component of the plan.

22. The Licencee shall implement the Landscaping Plan as submitted pursuant to Clause 21 of this Licence.

Construction

23. The Licencee shall, prior to initiating any construction at the Development, submit two paper copies and one electronic copy of final engineering design plans, sealed by an engineer(s), to the Director. The plans will show the engineering details of each new component and the location of each new component with respect to other components.

24. The Licencee shall construct the Development in accordance with the design plans submitted to the Director pursuant to Clause 23 of this Licence.

25. The Licencee shall, to facilitate inspection of the Development during construction and operation, provide such access as the Director deems necessary, to an Environment Officer throughout the duration of construction and operation of the Development.

Site Preparation

26. The Licencee shall, prior to any new construction of any component of the Development, remove all top soil to a minimum depth of 150 mm and store this top soil at a suitable location for future use.

Clay Components of the Development

27. The Licencee shall, where a component of the Development is to be constructed with a clay liner; construct the liner underlying the component as described in Clauses 28 to 31of this Licence. For any component of the Development that is to be constructed with scarified in situ clay, the component shall be subject to Clauses 28 b), and 29 to 31 of this Licence.

28. The Licencee shall construct and maintain all clay lined component(s) of the Development in accordance with the following specifications:
    a) the clay liner is recompacted to a minimum thickness of one (1) metre for the side slopes and for the base;

b) the hydraulic conductivity of the clay is $1x10^{-7}$ cm/second or less;
c) the liner extends a vertical distance of one (1) metre above normal operating level for any leachate storage component other than a landfill cell liner; and
d) the clay liner is installed under the entire base and side wall or berm of any waste containment cell(s).

29. The Licencee shall arrange with an Environment Officer a mutually acceptable time and date for any required soil sampling between the 15th day of May and the 15th day of October of any year, unless otherwise approved by an Environment Officer.

30. The Licencee shall take and test undisturbed soil samples, in accordance with Appendix 'H' attached to this Licence, from:
a) the clay of new waste disposal cell(s);
b) the clay of the compost pad(s) and compost leachate pond, if applicable;
c) leachate treatment wetlands; and
d) any clay component of the Development requiring testing by the Director**.**

The number and location of samples and test methods will be specified by an Environment Officer up to a maximum of twenty (20) samples per cell, pond, compost pad or clay component of the Development.

31. The Licencee shall, prior to operation of the area tested in accordance with Clause 30, receive the approval of the an Environment Officer for the results of the tests carried out pursuant to Clause 30 of this Licence.

Synthetic Lined Components of the Development

32. The Licencee shall, where a component of the Development is to be constructed with a synthetic HDPE liner; construct the liner underlying the component as described in Clauses 33 to 37 of this Licence and establish that the synthetic material is compatible with landfill leachate.

33. The Licencee shall construct and maintain a continuous liner underlying the component of the Development, such that:
a) the liner is constructed from HDPE geomembrane;
b) the liner has a minimum thickness of 60 mil;
c) all sections of the liner are joined by double channel fusion seaming;
d) the liner is installed under the entire base and side wall or berm of any waste containment cell(s);
e) in accordance with ASTM Standard D-4437, the integrity of all field seams are tested by non-destructive test methods, a testing report is prepared and submitted to an Environment Officer within 30 days of commencing the installation of the liner; and
f) the liner is secured to prevent lifting of the liner.

34. The Licencee shall complete the installation of the synthetic liner on any component at the Development in accordance with manufacturer recommendations regarding temperature and environmental conditions. Installation shall be completed between the 15th day of May and the 15th day of October of any year, unless otherwise approved by an Environment Officer.

35. The Licencee shall not cover the synthetic liner or use a synthetic lined component of the Development until receiving written approval of the report submitted pursuant to sub-Clause 33 e) of this Licence from an Environment Officer.

36. The Licencee shall notify an Environment Officer two (2) weeks prior to commencing the installation of the synthetic liner.

37. The Licencee shall cover all surfaces of the synthetic liner of a component of the Development with 0.3 metre of sand, other non-angular granular material, or material approved by an Environment Officer.

Alternative Liners for Components of the Development

38. The Licencee, upon written request and approval by the Director, may utilize an alternative geomembrane, synthetic or composite liner system that is at minimum equivalent to the hydraulic conductivity of one metre of $1x10^{-7}$ cm/s compacted clay or a 60 mil HDPE liner; is compatible with landfill leachate; and subject to terms and conditions set by the Director at the time of approval.

Mitigating Erosion and Runoff

39. The Licencee shall with respect to on-site earthen construction works, construct and maintain silt fences in the drainage routes transporting surface runoff off the property of the Development until vegetation has been re-established on the disturbed areas.

40. The Licencee shall construct and maintain the final side slopes of the above ground deposit of waste, including final cover, in the waste cell to not exceed one unit vertical to four units horizontal (1V:4H) and the final top slope to not less than one unit vertical to twenty units horizontal (1V:20H), unless otherwise specified in the Closure Plan by the qualified professional, or approved by the Director.

Operating Plan

41. The Licencee shall submit to the Director, within six (6) months of the date of issuance of this Licence, an Operating Plan that includes information regarding all aspects of the Development, to include but not be limited to:
    a) operational parameters and objectives, including method of tracking placement of special wastes and those wastes requiring unusual management considerations;

b) waste type acceptance parameters and limitations;
c) restrictions and procedures (if applicable) on volumes or ratios for organic based wastes;
d) incident tracking and reporting parameters;
e) all weather access roads;
f) composting and biosolids composting parameters, objectives, standards and ultimate use;
g) dust and litter control procedures;
h) vector control procedures;
i) leachate and landfill gas handling and management;
j) surface and ground water management;
k) monitoring and reporting parameters;
l) identification of operational records to be maintained; and
m) an overview of staffing qualifications and positions.

42. The Licencee shall implement the Operating Plan submitted pursuant to Clause 41 of this Licence.

Operation and Monitoring Records

43. The Licencee shall have available for inspection by an Environment Officer or the Director upon request, records of all operational activities, monitoring and analytical results, reports, certifications and documents identified in this Licence.

44. The Licencee shall keep for inspection, operating and monitoring records at the Development site office including:
a) as-built drawings showing the location and development of excavation, fill area, final grades and structural components;
b) records of annual waste tonnage received at the site;
c) records of handling of any wastes (including special wastes) accepted at the landfill including the amounts accepted and the disposal locations within the landfill;
d) all Certifications and permits for acceptance of regulated materials (SRM permits, weigh scale certification);
e) an initial topographic survey and plans showing the areas where waste has be disposed in the current and previous years;
f) an annual update survey of active areas, or areas receiving cover;
g) nuisance records;
h) monitoring results;
i) complaints received and actions taken; and
j) a statement of compliance with Licence conditions.

Signage and Site Security

45. The Licencee shall post adequate signage at the entrance to the Development indicating, but not limited to the following:

a) the types of wastes not accepted at the site;
b) the hours and days of operation; and
c) 24-hour telephone numbers to be called in the event of an emergency occurring at the site.

46. The Licencee shall staff and secure the Development so that:
a) an attendant is on duty at the scale at all times during hours of acceptance of materials to the Development;
b) gates are provided for all access locations to the site;
c) the gates are kept locked when the attendants are not on duty or the Development is closed; and
d) other attendants to direct traffic and operate heavy equipment are on duty as necessary.

Materials Handling

47. The Licencee shall deposit all waste, other than material intended for recycling, composting or processing, in an active area within the Development.

48. The Licencee shall position fencing, including adequate portable litter fences around the active area or other locations where unloading or handling of materials occur, to prevent litter or other material from collecting on or escaping from the boundaries of the Development.

49. The Licencee shall not accept the following wastes at the Development:
a) hazardous waste;
b) biomedical waste;
c) liquid industrial waste;
d) liquid waste;
e) radioactive waste or materials;
f) unbagged asbestos; or
g) soils or sediments containing contaminants at concentrations in excess of the criteria specified for industrial occupancy in the Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines (latest edition), and the CCME Canada Wide Standards.

50. The Licencee may receive wastes prohibited in Clause 49 of this Licence if appropriate provisions have been made in the Operating Plan for the Development submitted pursuant to Clause 41 of this Licence, or if a separate proposal has been submitted and approved by the Director.

Special Wastes

51. The Licencee shall not excavate in areas where special wastes have been previously buried without approval from an Environment Officer.

52. The Licencee shall keep record, by Global Positioning System (GPS), of the locations of buried special wastes.

WEIGH SCALES AND FACILITY BUILDINGS

Construction – Weigh Scales and Facility Buildings

53. The Licence shall install radiation detectors on all inbound traffic lanes.

Operation – Weigh Scales and Facility Buildings

54. The Licencee shall maintain federal certification of the weigh scales utilized at the entrance of the Development.

LANDFILL CELLS

Construction – Landfill Cells

55. The Licencee shall submit to the Director, at least sixty (60) days prior to construction of a new waste disposal cell or an infill waste disposal cell, the engineering design plans, sealed by an engineer(s) which address construction specifications of any new active area and include, but are not limited to the following:
    a) engineering design with respect to construction of the waste disposal cell base and sides;
    b) engineering design with respect to the construction of the leachate collection system in each new cell, and connections, if applicable, to the Leachate Management System;
    c) location of access road(s) to the waste disposal cell;
    d) details of the location of the waste disposal cell with respect to property lines; and
    e) details of a drainage system to prevent water from entering the waste disposal cell and to channel the surface run-off into the Surface Water Management System for the Development.

56. The Licencee shall construct new waste disposal cells in accordance with the design plans submitted pursuant to Clause 55 of this Licence.

Operation – Landfill Cells

57. The Licencee shall restrict the maximum elevation of the above ground deposit of waste, including the final cover, to not exceed thirty (30) metres above grade.

58. The Licencee shall minimize the working face of each cell to reduce the generation of litter and leachate from the Development.

59. The Licencee shall compact waste deposited in the active area and cover the waste daily with cover material or alternative daily cover.

60. The Licencee, upon a written request to an Environment Officer, may, during extreme weather conditions, utilize temporary covering of wastes deposited in an active area. Such temporary covering material shall be replaced with permanent cover material when the extreme weather conditions cease, unless otherwise specified by an Environment Officer.

CLOSED LANDFILL CELLS

61. Any new waste cell or active area developed over an area that is identified as "closed landfill" on the map in Appendix 'C' or the Table of Appendix 'D'; must be developed in accordance with a design plan for an infill cell, as submitted pursuant to Clause 55 of this Licence.

LEAF AND YARD WASTE COMPOSTING FACILITY

Construction – Leaf and Yard Waste Composting Facility

62. The Licencee shall submit to the Director, at least sixty (60) days prior to construction, engineering design plans, sealed by an engineer(s), which address construction specifications of the composting facility and includes, but are not limited to the following:
    a) engineering design with respect to construction of the composting facility components;
    b) specifications with respect to construction of a compost pad, designed with a minimum of 0.5-metre thick compacted clay liner with a hydraulic conductivity of not greater than $1x10^{-7}$ cm/sec or equivalent;
    c) the location of all weather road(s) to the composting area;
    d) details of the compost facility drainage system and integration into the Surface Water Management System for the Development; and
    e) specifications with respect to construction of the onsite compost leachate basin designed with a minimum one (1) metre thick compacted clay liner or equivalent as approved by the Director.

63. The Licencee shall construct the Leaf and Yard Waste Composting Facility in accordance with the design plans submitted pursuant to Clause 62 of this Licence.

Operation – Leaf and Yard Waste Composting Facility

64. The Licencee shall operate the ditches for the collection and conveyance of impacted water off the Leaf and Yard Waste composting pad in such a manner that no standing water is present in the ditches.

65. The Licencee shall only accept and use green waste as compost feedstock for the Leaf and Yard Waste Composting Facility. The Licencee shall obtain written approval from an Environment Officer prior to the use of any other feedstock materials.

66. The Licencee shall not sell or make available, to any third party, leaf and yard waste compost generated at the Facility that does not achieve the quality requirements and specifications as contained in the most recent edition of the CCME publication entitled "*Guidelines for Compost Quality – PN 1340*" or equivalent standard approved by the Director.

BIOSOLIDS COMPOSTING FACILITY

Study - Biosolids

67. The Licencee shall submit to the Director a study within thirty (30) months of the issuance of this Licence, to include but not be limited to;
    a) any operational recommendations for biosolids compost utilization;
    b) long term options for utilization of biosolids compost; and
    c) timelines for developing and implementing the recommendations and options of the study.

Construction – Biosolids Composting Facility

68. The Licencee shall construct the pilot Biosolids Composting Facility in accordance with the Draft Conceptual Design and Operations Report entitled Leaf and Yard Waste Composting Facility and Pilot Biosolids Composting Facility at Brady Road Resource Management Facility dated August 2012, and the Pilot Biosolids Composting Facility Design Brief dated January 2013.

Operation – Biosolids Composting Facility

69. The pilot study shall run for a duration of two (2) years from commissioning, as identified in the alteration request for Environment Act Licence No. 1089E RR dated January 5, 2012.

70. The Licencee shall, during the pilot study, restrict the annual flow of biosolids to the Biosolids Composting Facility to a maximum of twenty percent (20%) of the biosolids that are generated from the City of Winnipeg's three water pollution control centres.

71. The Licencee shall operate the Biosolids Composting Facility activities separate from the Leaf and Yard Waste Composting Facility activities.

72. The Licencee shall operate the pilot Biosolids Composting Facility in accordance with the operations manual acceptable to the Director pursuant to the City of Winnipeg Biosolids Composting Pilot Study, and the Letter of Authorization dated April 30, 2012.

73. The Licencee shall not stockpile biosolids at any location at the Facility unless approved pursuant to Clause 72 of this Licence.

74. The Licencee shall not remove biosolids or biosolids compost from the Facility in any form, unless approved by an Environment Officer.

75. The Licencee shall utilize all biosolids compost products as landfill cover or as approved by the Director within the Facility for the duration of the pilot study.

76. The Licencee shall assess the quality (chemical and microbiological properties) of the used biofilter material in order to determine a suitable disposal or end use for the material. Proposed use or disposal method must be approved by an Environment Officer.

77. The Licencee shall haul all leachate collected in the underground leachate storage tank at the Biosolids Composting Facility and treat at a Wastewater Treatment Facility Licenced in accordance with *The Environment Act*. The Licencee shall operate the ditches for the collection and conveyance of impacted water off the biosolids composting pad in such a manner that no standing water is present in the ditches.

Monitoring and Reporting – Biosolids Composting Facility

78. The Licencee shall submit to the Director for approval, a report with respect to the pilot project's activities and proposed plans for continuing with the pilot study implementation or site remediation within 30 months of commissioning.

WOOD CHIP PROCESSING AND STORAGE AREA

Operation – Wood Chip Processing and Storage Area

79. The Licencee shall submit to the Director, within six (6) months of the date of issuance of this Licence an Operating Plan, to address design, operation and maintenance specifications of the Wood Chip Processing and Storage Area and include, but not be limited to the following:
    a) design with respect to site layout of the Wood Chip Processing and Storage Area;
    b) location of all weather road(s) and method to maintain site access and security of the Wood Chip Processing and Storage Area;
    c) methods to effectively produce, use and store materials;
    d) methods to control or manage airborne particulates, noise, fire hazards, and management of Dutch Elm disease contaminated materials and other tree wastes and
    e) details of the Wood Chip Processing and Storage Area drainage system and methods by which the runoff, impacted and non-impacted, is managed.

80. The Licencee shall operate the Wood Chip Processing and Storage Area in accordance with the Operating Plan submitted pursuant to Clause 79 of this Licence.

81. The Licencee shall operate the Wood Chip Processing and Storage Area to minimize airborne particulate and shall restrict hours of operation to the hours the Development is open to the public or as approved by the Director to reduce the potential for noise.

CONSTRUCTION MATERIAL AREA

Study – Construction Material Area

82. The Licencee shall submit to the Director a study within one (1) year of the issuance of this Licence, to include but not be limited to; any operational recommendations and plans for utilization, recycling or limitations for acceptance, handling or disposal of construction materials at the Development.

COVER MATERIAL STOCKPILE AREA

Construction - Cover Material Stockpile Area

83. The Licencee shall construct and maintain the geometry of the Cover Material Stockpile Area to allow for maximum recovery of the material and minimize erosion.

Operation – Cover Material Stockpile Area

84. The Licencee shall operate the Cover Material Stockpile Area to minimize soil erosion and sedimentation into any surface water features of the Development, and minimize any particulate matter from becoming airborne.

SAND/STREET SWEEPING STOCK PILE AREA

Operation – Sand / Street Sweeping Stock Pile Area

85. Prior to processing or cleaning the sand or street sweeping material for reuse; the Licencee shall submit to the Director, a plan identifying and mitigating potential environmental effects.

86. The Licencee shall operate the Sand / Street Sweeping Stock Pile Area in accordance with the Operating Plan submitted pursuant to Clause 85 of this Licence.

COMMUNITY RESOURCE RECOVERY CENTRE

Operation – Community Resource Recovery Centre

87. The Licencee shall operate the Community Resource Recovery Centre in a manner to prevent windblown waste, litter, odour generation, fire and other hazards, as well as preventing spills from contaminating runoff.

SEGREGATED MATERIAL STORAGE AREA

Operation – Segregated Material Storage Area

88. The Licencee shall not accept any materials which are not listed in the Operating Plan, pursuant to Clause 41, into the Segregated Material Storage Area unless otherwise approved by an Environment Officer.

89. The Licencee shall operate the Segregated Material Storage Area in a manner to prevent windblown waste, litter, odour generation, fire and other hazards.

90. The Licencee shall remove ozone depleting substances from appliances using a certified contractor in accordance with ***Manitoba Regulation 103/94***, or any future amendment thereof, respecting ***Ozone Depleting Substances and Other Halocarbons.***

LEACHATE MANAGEMENT SYSTEM

Operation – Leachate Management System

91. Unless otherwise approved by the Director, the Licencee shall haul and treat leachate collected in the sump manholes or any other component of the Leachate Management System at the City of Winnipeg North End Water Pollution Control Centre.

92. The Licencee shall submit a Leachate Management Plan, to the Director, within one (1) year of issuance of this Licence, to include, but not be limited to:
    a) design, construction, operation and maintenance procedures complete with proposed frequencies;
    b) proposed performance criteria for maximum leachate head on the liner for all new cells;
    c) proposed methods for reducing leachate head in existing cells;
    d) pumping schedules;
    e) methods to reduce potential chemical precipitation and clogging of collection components;
    f) leachate line clean out methodologies;
    g) inspection methodologies and frequency; and
    h) processes to prevent landfill gas escape from leachate collection components.

93. The Licencee shall inspect the leachate collection and extraction system in the frequency and with the methodology as identified in the Leachate Management Plan, submitted pursuant to Clause 92 of this Licence.

94. The Licencee shall not recirculate leachate or contaminated water collected at the Development through the landfill cells unless approved by the Director.

95. The Licencee shall operate the Leachate Management System in accordance to the Plan submitted pursuant to Clause 92 of this Licence and shall not implement any alternative method of leachate treatment without receiving prior approval of the Director.

Monitoring and Reporting – Leachate Management System

96. The Licencee shall report an occurrence of leachate breakout which leaves the Development to an Environment Officer within 24 hours.

97. The leachate collection system shall be designed to monitor leachate head according to the Leachate Management Plan submitted pursuant to Clause 92.

98. The Licencee shall report if the maximum depth of leachate in any waste cell, developed after August 1, 2013, exceeds the maximum head, as indicated in the approved Leachate Management Plan, above the crown of the collection system cell bottom piping; for a period of seven (7) days to an Environment Officer within 24 hours.

99. The Licencee shall record all events that require reporting, as per Clause 96 and 98, the elevation of the leachate in all waste disposal cells twice per year, in spring and fall, and after each maintenance clean out of the leachate system. The leachate elevation, historical trends and an assessment of the effectiveness of the leachate collection system in maintaining less than the maximum specified head shall be included in the annual report.

100. The Licencee shall develop a Leachate Sampling and Analysis Plan and submit to the Director within one (1) year of the date of issuance of this Licence. The Plan shall include but not be limited to:
    a) the location, type and number of samples from the leachate collection sump manholes or other leachate collection components;
    b) the parameters to be analysed; and
    c) the frequency of analysis.

101. The Licencee shall implement the plan submitted in accordance with Clause 100 of this Licence.

LANDFILL GAS COLLECTION AND FLARING SYSTEM

Construction – Landfill Gas Collection and Flaring System

102. The Licencee shall submit to the Director a copy of authorization for construction, expansion or major modification of a component which is under pressure, of the Landfill Gas Collection and Flaring System, issued by the Office of the Fire Commissioner, prior to any construction, expansion or major modification of the landfill gas system at the Development.

103. The Licencee shall, at least sixty (60) days prior to any future construction, major modification or expansion, provide to the Director complete design and

construction details for the Landfill Gas Collection and Flaring System. The design and construction details shall include at a minimum:

a) number and location of landfill gas extraction wells;
b) configuration of landfill gas extraction wells;
c) design and construction details of landfill gas extraction wells;
d) location of condensate traps;
e) description of pipe network; and
f) location, design, and construction details of blower and flare station.

104. The Licencee shall construct or modify the Landfill Gas Collection and Flaring System in accordance with the design plans submitted pursuant to Clause 103 of this Licence.

Operation – Landfill Gas Collection and Flaring System

105. The Licencee shall, in the event of an environmental, mechanical, electrical or human condition which causes a shutdown or malfunction of a component of the Landfill Gas Collection and Flaring System, lasting greater than 72 hours, report the condition to an Environment Officer within the next 24 hours. The report shall include the nature of the shutdown or malfunction, the time and estimated duration of the event, the cause for the event and the proposed actions for return to operation.

106. The Licencee shall not combust landfill gas at any location other than the enclosed landfill gas flare or other combustion equipment as approved by the Director.

107. The Licencee shall combust only landfill gas or propane for startup in the enclosed landfill gas flare.

108. The Licencee shall not emit particulate matter from the Development such that:
    a) particulate matter:
        i) exceeds 0.23 grams per dry standard cubic metre calculated at 25 degrees Celsius and 760 millimetres of mercury, corrected to 12 percent carbon dioxide for processes involving combustion, from any point source of the Development;
        ii) exhibits a visible plume with an opacity of greater than 5 percent at any point beyond the property line of the Development; or
        iii) results in the deposition of visible particulate residue at any time beyond the property line of the Development; or
    b) opacity from any point source of the Development equals or exceeds:
        i) 20 percent as the average of any 24 consecutive opacity observations taken at 15 second intervals;
        ii) 20 percent for more than 16 individual opacity observations within any 1 hour period; or
        iii) 40 percent for any individual opacity observation.

109. The Licencee shall manage condensate from the landfill gas collection system in accordance with the Operating Plan submitted pursuant to Clause 41 of this Licence.

Monitoring and Reporting – Landfill Gas Collection and Flaring System

110. The Licencee shall submit to the Director for approval, within six (6) months of the date of issuance of this Licence, an operating plan which includes information respecting activities to be implemented in the event that the monitoring program identifies any pollutant in air emissions, as a result of the operation of the Development, in excess of the specifications of Clause 108 of this Licence.

Monitoring and Reporting – Subsurface Landfill Gas Monitoring Program

111. The Licencee shall submit to the Director, within six (6) months of the date of issuance of this Licence, a monitoring program which includes:
    a) methodology for detection of lateral landfill gas migration;
    b) proposed monitoring well locations;
    c) sampling frequency;
    d) development of a Subsurface Landfill Gas Contingency Plan for migration occurrence; and
    e) an annual report for subsurface gas migration including collected data and analysis.

SURFACE WATER MANAGEMENT SYSTEM

Surface Water Management

112. The Licencee shall manage surface water, both impacted and non-impacted, at the Development to prevent uncontrolled release from the Development.

113. The Licencee shall construct and maintain permanent and temporary dyke structures and surface drainage to divert non–impacted surface water runoff away from active areas and Development components under construction to the Surface Water Management System of the Development, in accordance with the Surface Water Management Plan.

114. The Licencee shall:
    a) not construct ditch or surface water management features during periods of heavy rain;
    b) place and/or isolate all construction material where it will not erode into any watercourse;
    c) implement effective long-term sediment and erosion control measures such as sedimentation ponds and short-term sediment and erosion control measures such as silt fencing to prevent soil-laden runoff, and /or silt from

entering any watercourse during construction and operation of a component of the development and maintain the control measure until vegetation is established; and

d) routinely inspect all erosion and sediment control structures and complete any necessary maintenance or repair within 15 days of identification of the deficiency.

Construction – Surface Water Management System

115. The Licencee shall submit to the Director, within six (6) months of the date of issuance of this Licence, a Surface Water Management System design plan including engineered wetlands for the Development on the basis of a 1 in 25 year rainfall event. The plan shall include three tiers of water management addressing clean, impacted and leachate water with water management from all surface elevations of the Development. The plan shall include the source, any conveyance methods, treatment, monitoring parameters and discharge routes. Sealed engineering design plans shall be provided to address construction specifications of all surface water management features and include, but not be limited to the following:
    a) engineering design with respect to the ponds, engineered wetlands, if included in the design, and conveyance routes;
    b) location of all weather road(s) to the surface water management features;
    c) details of the location of the surface water management features with respect to the property lines; and
    d) details of fencing, if required, around surface water management features.

116. The Licencee shall construct the Surface Water Management System in accordance with the design plan submitted pursuant to Clause 115 of this Licence.

117. The Licencee shall obtain a Water Rights Licence from the Water Resources Branch, Conservation and Water Stewardship, if required, for drainage works that cause water to leave the Development. The Licencee shall provide to the Director, a copy of the Water Rights Licence at minimum ten (10) days prior to any construction identified within that Licence.

Operation – Surface Water Management System

118. The Licencee shall operate and maintain the Surface Water Management System to minimize sedimentation within the waterways, odour and pest problems and to maximize nutrient reduction.

Monitoring and Reporting – Surface Water Management System

119. The Licencee shall, for the parameters listed in Appendix 'G', attached to this Licence, sample and evaluate for the 2014 and 2015 monitoring season; and submit a report, prior to February 2016, the water quality criteria objectives for the Development, to be approved by the Director.

120. The Licencee shall develop a surface water sampling and analysis plan and submit it for approval within six (6) months of the date of issuance of this Licence. The plan shall propose the location, type and number of locations to be sampled from the surface water management system, the parameters and frequency of sampling. The Licencee shall maintain records of the results of all such analyses.

121. The Licencee shall undertake, at a frequency deemed appropriate by the Director, the sampling and analysis of water flowing onto and off the Development from the Surface Water Management System, for the parameters and at a frequency identified in the plan submitted and approved pursuant to Clause 120 of this Licence.

GROUNDWATER

Monitoring and Reporting – Groundwater

122. As a result of the operation of the Development, the Licencee shall not cause the concentration values of the parameters listed in Appendix 'F', attached to this Licence, to exceed background levels in groundwater at the compliance boundary.

123. The Licencee shall develop a groundwater monitoring, sampling and analysis plan and submit it for approval within six (6) months of the date of issuance of this Licence. The plan shall propose the location, type and number of locations to be monitored and sampled, the parameters and the frequency of sampling. The Licencee shall maintain records of the results of all such analyses.

GROUNDWATER AND SURFACE WATER REPORT AND CONTINGENCY ACTION PLAN

Monitoring and Reporting

124. The Licencee shall prepare a report which compares the analytical results obtained for the sampling with the results from previous sampling events, and shall provide annually to the Director a report summarizing the results in the report pursuant to Clause 127 of this Licence.

125. The Licencee shall submit to the Director for approval, within six (6) months of the date of issuance of this Licence, a plan that includes a Contingency Action Plan to be implemented in the event that the monitoring program identifies any parameter in surface or groundwater at the property boundary, as a result of the operation of the Development, in excess of background levels. The Contingency Plan shall assess the significance of the exceedance in relation to applicable groundwater and surface water criteria, and action to be taken to mitigate the contamination, if required.

126. The Licencee shall notify an Environment Officer of all incidents requiring Contingency Action Plan implementation regarding groundwater or surface water pollution within seven (7) days of identification of an incident; notification shall include the nature of the incident, the area affected (when determined), immediate actions taken and follow up action proposed to be taken.

ANNUAL REPORT

127. The Licencee shall, unless otherwise approved by the Director, on or before the 15th day of April of each year and beginning in 2015, prepare an annual report with respect to all activities at the Development conducted pursuant to this Licence during the previous calendar year. The format of the report shall be approved by the Director and contain information as identified in the Operating Plan approved pursuant to Clause 41 to this Licence.

128. The Licencee shall compare the results included with the report pursuant to Clause 127 of this Licence with annual reports submitted in previous years to show trends and variances. The reports shall identify, at minimum, any significant variations, the cause of the variations and any actions taken.

129. The Licencee shall create an Executive summary from the previous year's annual report, pursuant to Clause 127 of this Licence; the Executive summary is to be submitted to the Director, and made available to the public:
    a) by posting on the City of Winnipeg's website;
    b) by deposit at the City of Winnipeg Millennium Library; and
    c) at the Development site office.

EMERGENCY RESPONSE PLAN

130. The Licencee shall maintain an Emergency Response Plan, in accordance with the Canadian Centre for Occupational Health and Safety emergency planning guidelines or other document acceptable to the Director, outlining procedures to be used in the event of leak, spill, fire, flood or other hazardous condition at the facility, or if waste management functions are disrupted.

131. The Licencee shall have available for inspection by an Environment Officer, upon request, records of the details of all incidents requiring the implementation of the Emergency Response Plan at the Development site office.

SITE SAFETY PLAN

132. The Licencee shall maintain a Site Safety Plan in the Operating Procedures in accordance with Provincial and City requirements.

CLOSURE AND POST CLOSURE

133. The Licencee shall submit to the Director, within one (1) year of the date of issuance of this Licence, a Preliminary Closure and Post Closure Plan for the Development. The plan shall address the closure of the existing and closed waste disposal cells and provide a preliminary plan for the closure of the new waste disposal cells.

134. The Licencee shall submit to the Director, not less than one (1) year prior to closure of an active waste disposal cell of the Development, an updated engineering design for Closure and Post Closure Plan for that component of the Development.

135. The Licencee shall, where an increase in the slope of the final cover due to settlement, or erosion of the final cover occurs during the post-closure period, take remedial action to correct the situation and maintain the design.

136. The Licencee shall implement and maintain the approved Closure and Post Closure Plan for the Development pursuant to Clause 133 or 134 of this Licence.

FINANCIAL ASSURANCE/INSURANCE

137. The Licencee shall provide to the Director confirmation of financial insurance coverage in the form of: Environmental Impairment Liability insurance providing coverage subject to a minimum limit of $1.0 million per occurrence or claim, including coverage for gradual, and sudden and accidental pollution. Coverage to include on-site and off-site clean up costs, and be placed with insurers satisfactory to the Province of Manitoba. The Province of Manitoba shall be added as an Additional Insured on the policy. The policy shall contain a clause stating that the Insurer will give Manitoba 60 days prior written notice in case of significant reduction in coverage or policy cancellation**.**

138. During the term of the Licence, the City of Winnipeg, as Licencee, may self insure for environmental impairment liability. Such self-insurance shall satisfy

Manitoba's requirement for Environmental Impairment Liability insurance as set out in Clause 137 of this Licence.

RECORD DRAWINGS

139. The Licencee shall:
    a) prepare "record drawings" for the Development and label the drawings "record drawings"; and
    b) provide to the Director, within six (6) months, or as otherwise approved by the Director, after completion of construction of each component of the Development, two paper copies and one electronic copy of the "record drawings" of the component of the Development.

REVIEW AND REVOCATION

A. This Licence replaces Licence No. 3081 and No. 2890 R issued to The City of Winnipeg – Water and Waste Department, which is hereby rescinded.

B. This Licence replaces Operating Permit No 1-015 issued to The City of Winnipeg, which is hereby rescinded.

C. If, in the opinion of the Director, the Licencee has exceeded or is exceeding or has or is failing to meet the specifications, limits, terms, or conditions set out in this Licence, the Director may, temporarily or permanently, revoke this Licence.

D. If, in the opinion of the Director, new evidence warrants a change in the specifications, limits, terms or conditions of this Licence, the Director may require the filing of a new proposal pursuant to Section 11 of *The Environment Act*.

"original signed by"

Tracey Braun, M.Sc.
Director
Environment Act

File No.: 5556.00

APPENDIX 'A'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

Misc. Plan No. 10998/1
Brady Land Fill Title Plot

APPENDIX 'B'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

Legal Description of Land Parcels for
Brady Road Resource Management Facility

Title No:	Legal Description
1050929	Parcels D and E Plan 20197 WLTO in OTM Lots 79-82 Parish of St. Norbert
1233636	Parcels A and B Plan 20197 WLTO in OTM Lots 79 to 82 Parish of St. Norbert
1387181	OTM Lots 83, 84 and 85 of the Parish of St. Norbert, exc out of said Lot 83, Firstly: All that portion taken for Public Road Plan 7169 WLTO and secondly: all that portion shown as the Right-of-way of a Power Transmission Line Plan 10328 WLTO and exc out of all of said lots, firstly: all those portions taken for the Right-of-way of Power Transmission Line Plan 9349 WLTO and secondly: all mines and minerals that may be found to exist within upon or under the above described land.
1233778	All that portion of the SLY 132 feet perp of OTM lot 86, of the Parish of St. Norbert which lies to the east of a line drawn parallel to the eastern limit of said lot and distant wly therefrom 1650 feet measure on the southern limit of said lot
1233776	All that portion of nly 132 feet perp of the sly 264 feet perp of OTM Lot 86 Parish of St. Norbert which lies to the east of a line drawn parallel to the eastern limit of said lot and distant wly therefrom 1650 feet measured on the course of the southern limit of said lot.
1233783	All that portion of OTM Lot 86 Parish of St. Norbert which lies to the east of a line drawn parallel to the eastern limit of said lot and distant wly therefrom 1650 feet on the course of the southern limit of said lot exc of the land above described firstly: the sly 264 feet perp and secondly: the nly 10 feet perp
1387227	OTM Lot 86 Parish of St. Norbert, exc firstly: all that portion thereof lying to the east of a line drawn nly parallel to the eastern limit of said lot from a point in the southern limit of said lot distant wly thereon 1650 feet from the said eastern limit, which lies to the south of a line drawn south of parallel with and perp distant 10 feet from the northern limit of said lot and secondly: all those portions thereof taken for the Right-of-way for Transmission Line Plans 9349 and 15762 WLTO.
1387230	OTM Lot 87 Parish of St. Norbert, exc Right-of-way for Power Transmission Line Plans 9349 and 15762 WTLO.
1387091	OTM Lots 88, 89 and 90 Parish of St. Norbert exc firstly: Power Transmission Line Right-of-way (Pink and Green) Plan 9349 WLTO and secondly: Road Plan 24391 WLTO

APPENDIX 'B' (cont'd.)
TO ENVIRONMENT ACT LICENCE NO. 3081 R

Legal Description of Land Parcels for
Brady Road Resource Management Facility

1387094	All that portion of OTM Lot 91 Parish of St. Norbert which lies to the west of the western limit of Road Plan 24391 WLTO exc parcel "B" Plan 13724 WLTO
1233799	Parcels "A" and "B" Plan 13724 WLTO exc Public Road Plan 24391 WLTO in OTM Lot 91 Parish of St. Norbert and in closed government road allowance between OTM Lot 91 and 92 of said Parish
1233807	All that portion of parcel "A" Plan 19793 WLTO which lies to the west of the western limit of Road Plan 24391 WLTO in OTM Lots 92 and 93 Parish of St. Norbert
1240481	All that portion of OTM Lot 94 Parish of St. Norbert taken for Public Work Plan 6493 (now closed) exc public road plans 6788 WLTO and 24391 WLTO
1240483	OTM Lot 94 Parish of St. Norbert exc firstly: Public Work Plan 6493 WLTO (Closed) and secondly: Public Road Plans 6788 WLTO and 24391 WLTO
1233797	All that portion of OTM Lot 95 Parish of St. Norbert which lies to the south west of the north eastern limit of Public Road Plan 6788 WLTO exc firstly: said Road Plan 6788 and secondly: Public Road Plan 24391 WLTO
1233785	All those portions of OTM Lot 101 and of the S ½ of OTM Lot 102 of the Parish of St. Norbert which lie to the south west of the south-western limit of Public Road Plan 6788 WLTO
1233784	All those portions of OTM Lot 103 and of the N 1/2 of OTM Lot 102 Parish of St. Norbert which lie to the south west of the south-western limit of Public Road Plan 6788 WLTO
1240478	All those portions of OTM Lots 104, 105 and 106 Parish of St. Norbert which lie to the SW of Public Highway Plan 6788 WLTO exc all mines and minerals as the same are more fully setforth in transfer No. A37539 WLTO and Exc out of said Lot 106, Plan 21972 WLTO

APPENDIX 'C'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

City of Winnipeg Brady Road Resource Management Facility Master Plan

****A COPY OF THE LICENCE MUST BE KEPT ON SITE AT THE DEVELOPMENT AT ALL TIMES****

APPENDIX 'D'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

City of Winnipeg Brady Road Resource Management Facility
Landfill Cell Location Plan

APPENDIX 'E'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

City of Winnipeg Brady Road Resource Management Facility
Community Liaison Committee

Responsibility

The City of Winnipeg will establish and chair the Community Liaison Committee for the Brady Road Resource Management Facility.

Representation

The Committee shall consist of the following representatives, at minimum:

City of Winnipeg Water and Waste Division, Chair
Rural Municipality of Macdonald
Rural Municipality of Ritchot
LADCO Representative
Citizen Representatives – 1 appointed by each Rural Municipality that participates and 3 appointed by the City of Winnipeg
Manitoba Conservation and Water Stewardship

A secretary will be assigned, by the Chair, to record discussion and decisions for each meeting when the meeting is called to order.

Terms of Reference

The Committee shall meet as required by planning, construction and operational activities, but not less frequently than twice a year for the first five years. The first meeting shall occur within six (6) months of the issuance of this Licence. Following construction; meeting frequency is to be determined by the Committee.

The Chair of the Committee shall notify Manitoba Conservation and Water Stewardship 14 days prior, of the time and location of the next meeting. Minutes from the meetings shall be documented and the Chair will be required to have meeting minutes submitted to an Environment Officer within sixty (60) days following a meeting called by the Chair.

The Committee shall provide advice to the Licencee and the Director respecting the following:

1. The development of the landscaping plan required in Licence Clause 21.
2. The extent and frequency of noise and odour monitoring required in Licence Clause 41.
3. Measures to mitigate the impact of construction activities on the local environment.
4. Measures to mitigate the impact of operational activities on the local environment.

APPENDIX 'F'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

COMPREHENSIVE WATER QUALITY CHEMICAL AND MICROBIOLOGICAL PARAMETERS

Parameter	Notes
Alkalinity-bicarbonate	Dissolved
Alkalinity-carbonate	Dissolved
Alkalinity-hydroxide	Dissolved
Alkalinity-total	Dissolved
Hardness- as $CaC0_3$	Dissolved
pH-units	Dissolved
Specific Conductivity	Dissolved
Turbidity-NTU	
Residue-filterable	
Residue-non filterable	
Residue-total	
Chloride	Dissolved
Sulphate	Dissolved
Cyanide-total	Dissolved
Ammonia	Dissolved
Nitrate-Nitrite-Nitrogen	Dissolved
Total Kjeldhal Nitrogen	
Phosphorus	Dissolved
Arsenic	Dissolved
Barium	Dissolved
Beryllium	Dissolved
Cadmium	Dissolved
Calcium	Dissolved
Chromium	Dissolved
Copper	Dissolved
Iron	Dissolved
Lead	Dissolved

APPENDIX 'F' (cont'd.)
TO ENVIRONMENT ACT LICENCE NO. 3081 R
COMPREHENSIVE WATER QUALITY CHEMICAL AND MICROBIOLOGICAL PARAMETERS

Parameter	Notes
Magnesium	Dissolved
Manganese	Dissolved
Mercury	Total
Nickel	Dissolved
Potassium	Dissolved
Selenium	Dissolved
Silver	Dissolved
Sodium	Dissolved
Zinc	Dissolved
Naphthalene	
Benzo a pyrene	
Anthracene	
CCME Petroleum Hydrocarbon Fraction 1	
CCME Petroleum Hydrocarbon Fraction 2	
CCME Petroleum Hydrocarbon Fraction 3	
CCME Petroleum Hydrocarbon Fraction 4	
Leachable Lead	
Benzene	
Ethylbenzene	
Toluene	
Xylene	
Vinyl Chloride	
Diazinon	
2, 4-D	
Coliforms	Fecal & Total
*E.*Coli	

APPENDIX 'G'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

SURFACE WATER QUALITY CHEMICAL AND MICROBIOLOGICAL PARAMETERS

Parameter	Notes
Alkalinity-bicarbonate	Dissolved
Alkalinity-carbonate	Dissolved
Alkalinity-hydroxide	Dissolved
Alkalinity-total	Dissolved
Hardness as $CaCo_3$	Dissolved
pH-units	Dissolved
Specific Conductivity	Dissolved
Turbidity-NTU	
Residue-filterable	
Residue-non filterable	
Residue-total	
Chloride	Dissolved
Sulphate	Dissolved
Cyanide-total	Dissolved
Ammonia	Dissolved
Nitrate-Nitrite-Nitrogen	Dissolved
Total Kjeldhal Nitrogen	
Phosphorus	Dissolved
Arsenic	Dissolved
Barium	Dissolved
Beryllium	Dissolved
Cadmium	Dissolved
Calcium	Dissolved
Chromium	Dissolved
Copper	Dissolved
Iron	Dissolved
Lead	Dissolved
Magnesium	Dissolved
Manganese	Dissolved
Mercury	Dissolved
Nickel	Dissolved
Potassium	Dissolved
Selenium	Extractable
Sodium	Dissolved
Zinc	Dissolved
Coliforms	Fecal & Total
COD & BOD	
*E.*Coli	

APPENDIX 'H'
TO ENVIRONMENT ACT LICENCE NO. 3081 R

SOIL SAMPLING

1. The Licencee shall provide a drilling rig, acceptable to the designated Environment Officer, to extract soil samples from the specified liner of the structure. This includes all liners constructed with clay. The drill rig shall have the capacity to drill to the maximum depth of the clay liner plus an additional 2 metres. The drill rig shall be equipped with both standard and hollow stem augers. The minimum hole diameter shall be 5 inches.
2. For liners placed or found at the surface of the structure, the Licencee shall provide a machine, acceptable to the designated Environment Officer, capable of pressing a sampling tube into the liner in a straight line motion along the centre axis line of the sample tube and without sideways movement.
3. Soil samples shall be collected and shipped in accordance with ASTM Standard D 1587 (Standard Practice for Thin-Walled Tube Sampling of Soils), D 4220 (Standard Practice for Preserving and Transporting Soil Samples) and D 3550 (Standard Practice for Ring-Lines Barrel Sampling of Soils). Thin-walled tubes shall meet the stated requirements including length, inside clearance ratio and corrosion protection. An adequate venting area shall be provided through the sampling head.
4. At the time of sample collection, the designated Environment Officer shall advise the Licencee as to the soil testing method that must be used on each sample. The oedometer method may be used for a sample were the Environment Officer determines that the soil sample is taken from an undisturbed clay soil which has not been remoulded and which is homogeneous and unweathered. The triaxial test shall be used for all samples taken from disturbed and remoulded soils or from non homogenous and weathered soils.
5. The Licencee shall provide a report on the collection of soil samples to the designated Environment Officer and to the laboratory technician which includes but is not limited to: a plot plan indicating sample location, depth or elevation of sample, length of advance of the sample tube length of soil sample contained in the tube after its advancement, the soil test method specified by the Environment Officer for each soil sample and all necessary instructions from the site engineer to the laboratory technician.
6. All drill and sample holes shall be sealed with bentonite pellets after the field drilling and sampling has been completed.

APPENDIX 'H' (cont'd.)
TO ENVIRONMENT ACT LICENCE NO. 3081 R

SOIL TESTING METHODS

1. Triaxial Test Method
   a) The soil samples shall be tested for hydraulic conductivity using ASTM D 5084 (Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter).
   b) Soil specimens shall have a minimum diameter of 70 mm (2.75 inches) and a minimum height of 70 mm (2.75 inches). The soil specimens shall be selected from a section of the soil sample which contains the most porous material based on a visual inspection. The hydraulic gradient shall not exceed 30 during sample preparation and testing. Swelling of the soil specimen should be controlled to adjust for: the amount of compaction measured during sample collection and extraction from the tube and the depth or elevation of the sample. The effective stress used during saturation or consolidation of the sample shall not exceed 40 kPa (5.7 psi) or the specific stress level, that is expected in the field location were the sample was taken, which ever is greater.
   c) The complete laboratory report, as outlined in ASTM D 5084, shall be supplied for each soil sample collected in the field.

2. Oedometer Test Method
   a) The soil samples shall be tested for hydraulic conductivity using ASTM D 2435 (Standard Test Method for One-Dimensional Consolidation Properties of Soils).
   b) Soil specimens shall have a minimum diameter of 50 mm (2 inches) and a minimum height of 20 mm (0.8 inches). The soil specimens shall be selected from a section of the soil sample which contains the most porous material based on a visual inspection. The soil specimen shall be taken from an undisturbed soil sample. The soil specimen shall be completely saturated.
   c) The complete laboratory report, as outlined in ASTM D 2435, shall be supplied for each soil sample collected in the field.

****A COPY OF THE LICENCE MUST BE KEPT ON SITE AT THE DEVELOPMENT AT ALL TIMES****

APPENDIX B

COMMUNICATIONS WITH MANITOBA CONSERVATION AND WATER STEWARDSHIP

DRAFT

Sims, Trevor

From: Switzer, Cory (CON) [Cory.Switzer@gov.mb.ca]
Sent: Tuesday, January 15, 2013 13:59
To: Kuluk, Tony; Sims, Trevor
Subject: Brady Road Resource Management Facility

Good Afternoon,

Due to the fact that the Engineered Wetlands are for the treatment (sedimentation, possible nutrient reduction, flow equalization) of surface water from the Development, no engineered liner is required underneath the wetlands or clean water drainage ditches identified in the Surface Water Management Plan – Scope dated 10-Jan-13 for the 'clean surface water'.

It is the understanding that impacted water from the composting area(s), active waste disposal cells and material storage areas will be separated from the 'clean' surface water, and a portion of it (that is not treated or removed from site by other means) will be routed through the system identified as the 'impacted system in the 10-Jan-13 document. For this water course and wetland, due to the impacted nature of the water, the requirements will be a minimum of 1 metre clay liner to $1x10^{-7}$ cm/s or equivalent.

Please contact me if you have any further questions,

Regards,

Cory Switzer, P.Eng.
Manitoba Conservation &
Water Stewardship
Environmental Approvals
160 -123 Main St.
Winnipeg MB R3C 1A5
Phone: (204) 250-7645
Fax: (204) 945-5229

In the event of an Environmental Emergency please call the 24hr Environmental Emergency Response Line at 204-944-4888

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Tony Kuluk

From: Switzer, Cory (CWS) [Cory.Switzer@gov.mb.ca]
Sent: Thursday, September 12, 2013 8:05 AM
To: Tony Kuluk
Cc: ddrohomerski@winnipeg.ca; tsims@winnipeg.ca; islike@winnipeg.ca; Boswick, Robert (CWS); Webb, Bruce (CWS)
Subject: RE: Need for Ditch Lining Requirements at Brady Road Resource Recovery Facility

Good Morning,

You are correct in your statement.
If the ditches are designed, operated and maintained to run dry and not act as a location for storage of runoff, the in-situ material will be sufficient without a constructed liner, including ditches for conveyance of runoff from all compost processing and curing areas (excluding the biosolids mixing and compost bunker which is to be directed to the underground tank).

Please let me know if you require further clarification.

Regards,
Cory Switzer, P.Eng.

Phone: (204) 250-7645
Fax: (204) 945-5229

In the event of an Environmental Emergency please call the 24hr Environmental Emergency Response Line at 204-944-4888

From: Tony Kuluk [mailto:TKuluk@kgsgroup.com]
Sent: September-11-13 3:29 PM
To: Switzer, Cory (CWS)
Cc: ddrohomerski@winnipeg.ca; tsims@winnipeg.ca; islike@winnipeg.ca
Subject: Need for Ditch Lining Requirements at Brady Road Resource Recovery Facility

Hi Cory

This is to request confirmation of the position you expressed at our meeting today regarding this subject, namely, that for ditches designed, operated and maintained to run dry, i.e. not to retain runoff, there are no liner requirements, regardless of the origin of the flow, e.g. compost areas.

Tony J. Kuluk, P. Eng.
Solid Waste Management/Environmental Specialist

KGS Group Consulting Engineers & Project Managers
3rd Flr – 865 Waverley Street
Winnipeg, Manitoba
R3T 5P4
Tel: (204) 896-1209 Ext. 228
Fax: (204) 896-0754
Email: tkuluk@kgsgroup.com

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KGS GROUP
CONSULTING ENGINEERS

REPORT OF MEETING

PROJECT DESCRIPTION: **SURFACE WATER MANAGEMENT PLAN**
BRADY ROAD RESOURCE MANAGEMENT FACILITY (BRRMF)

FILE NUMBER: **13-0107-015**

PREPARED BY: **Tony Kuluk, P.Eng.**
DATE: **July 9, 2013**

MINUTES OF MEETING

DATE: July 9, 2013

LOCATION: Manitoba Conservation and Water Stewardship (MCWS), 160 – 123 Main Street

PRESENT:	MCWS	Bruce Webb, P. Eng.
	City of Winnipeg, Solid Waste Services Division	Irv Slike Trevor Sims, P. Eng. Becky Raddatz, M.C.P., MCIP
	KGS Group	Rob Sinclair, P. Eng. Tony Kuluk, P. Eng.

ISSUED: July 18, 2013

PURPOSE: To solicit any comments on the BRRMF conceptual surface water management plan prior to commencing design.

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1. ***Concept Plan Review and Comments***

KGS Group tabled the attached plan and described the proposed criteria for designing the drainage components for the three flow systems depicted as follows:

The clean runoff flow system has two system components. One is distanced from the landfill area (depicted in blue) and one is around the periphery of the completed landfill area that is capped with one metre of clay (depicted in purple). For these systems and their associated surface water management features, there are no liner requirements.

The impacted runoff flow system (depicted in orange) will receive runoff from the active landfill operation and will be lined (likely with an approved artificial liner).

A regular ditch maintenance program is a key feature of the surface water management system.

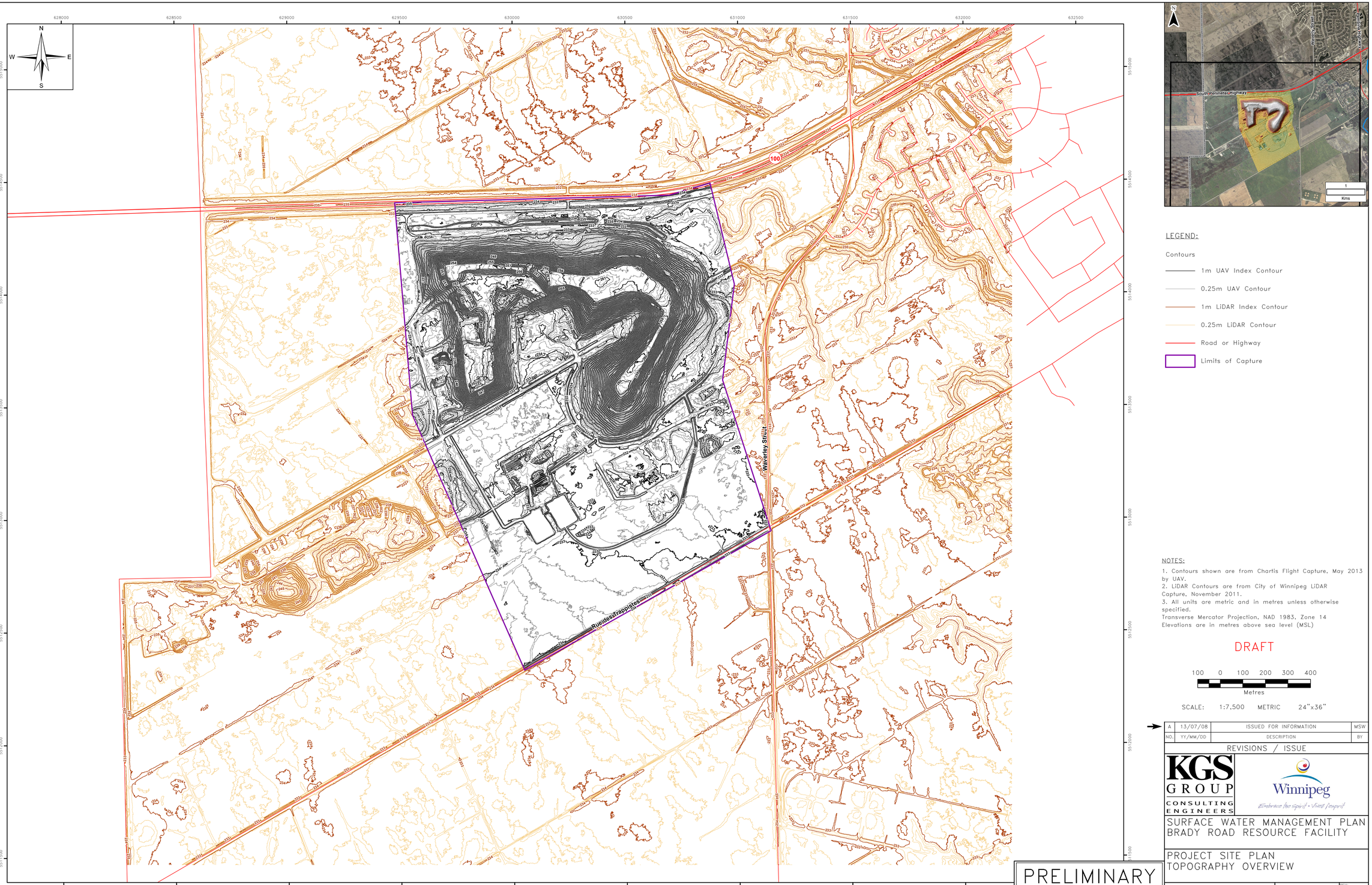
MCWS advised that the proposed criteria as described are acceptable.

2. Draft BRRMF Licence

Clarification was requested of MCWS regarding condition 103. of the Draft BRRMF Licence, regarding the process for determining if a Water Rights Licence will be required.

MCWS advised that the surface water management plan should be submitted to the Water Resources Branch of MCWS for this determination and that if required, the requirements are not onerous.

Portions of data presented are owned by the Province of Manitoba and are produced under the licence agreement with the Province of Manitoba 2013 Queen's Printer.



LEGEND:

Contours

- 1m UAV Index Contour
- 0.25m UAV Contour
- 1m LiDAR Index Contour
- 0.25m LiDAR Contour
- Road or Highway
- Limits of Capture

NOTES:

1. Contours shown are from Chartis Flight Capture, May 2013 by UAV.
2. LiDAR Contours are from City of Winnipeg LiDAR Capture, November 2011.
3. All units are metric and in metres unless otherwise specified.
   Transverse Mercator Projection, NAD 1983, Zone 14
   Elevations are in metres above sea level (MSL)

DRAFT

100 0 100 200 300 400
Metres

SCALE: 1:7,500 METRIC 24"x36"

NO.	YY/MM/DD	DESCRIPTION	BY
A	13/07/08	ISSUED FOR INFORMATION	MSW

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

Winnipeg
Embrace the Spirit · Vivez l'esprit

SURFACE WATER MANAGEMENT PLAN
BRADY ROAD RESOURCE FACILITY

PROJECT SITE PLAN
TOPOGRAPHY OVERVIEW

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

JULY 2013 | FIGURE 04 | REV: A

FileName: P:\Projects\2013\13-0107-015\Dwg\GIS\MXDs\RevA\13-0107-015-F04_RevA.mxd
24"x36" PLOT SCALE 1:1

APPENDIX C

RECOMMENDED SEEDING MIXES

DRAFT

SP208. SEEDING

SP208.1 Description

SP208.1.1 This Specification covers the placement of grass seed within the limits of the work, excluding the Base of the Floodway Channel. Areas to be seeded include but are not limited to: the Floodway Channel side slopes, disposal piles, site work roads, embankments (dykes) and new and regraded perimeter ditches. The Work includes, but is not limited to preparation of the seed bed, destruction of weed growth prior to seeding, supply and application of cover crop seed, the supply and application of fertilizer, sowing of seed, and harrowing after seeding.

SP208.1.2 Supply and placement of topsoil is not required as part of this Work.

SP208.1.3 Vegetation installation and related work for the Base of the Floodway Channel shall be in accordance with SP209.

SP208.2 Materials

SP208.2.1 Grass Seed will be supplied by MFA and will consist of pre-mixed grass or legume based mixes specifically designed for application on two different zones within the Contract Limits, described as follows:

(a) **Channel Slope Mix** – this mixture is to be applied on the main channel slopes as indicated in the Drawings (i.e. the outer edge of the newly constructed widened channel base to the top of the channel slope which is approximately located at original prairie level). This mixture will generally consist of the following species and approximate proportions:

(i) Creeping Red Fescue – 20%
(ii) Smooth Brome – 10%
(iii) Meadow Fescue – 10%
(iv) Slender Wheatgrass – 15%
(v) Tall Wheatgrass – 15%
(vi) Alfalfa (creeping variety) – 15%
(vii) Alsike Clover – 5%
(viii) Red Clover – 5%
(ix) Birdsfoot Trefoil – 5%

(b) **Forage Mix** – this mixture is to be applied on all disturbed portions of the work area outside the main channel slopes (i.e. from the top of the channel slope to the outer edge of the Floodway Right-of-Way, including new and reconstructed perimeter ditches). This mixture will generally consist of the following species and approximate proportions:

(i) Smooth Brome – 20%
(ii) Meadow Brome – 10%
(iii) Timothy – 10%
(iv) Orchard Grass – 10%
(v) Alfalfa (tap root variety) – 30%
(vi) Alfalfa (creeping variety) – 20%

(c) Oats (Certified Seed Variety) shall be utilized as a Nurse or Cover Crop for the period between May 1 and July 31 of any year. Winter wheat (Certified Seed Variety) shall be used between August 1 and September 30 of any year. The Contractor shall supply the seed, deliver to the site, and apply in accordance with this Specification.

The Contractor shall supply deliver tickets certifying the type and quantity of seed on a weekly basis, or as specified by the Contract Administrator.

(d) Fertilizer consisting of a 25-40-0 formulation is to be supplied, delivered to site, and applied by the Contractor. The Contractor shall provide fertilizer delivery tickets certifying the quantity and type of fertilizer delivered to site on a weekly basis or as specified by the Contract Administrator.

SP208.3 Construction Methods

SP208.3.1 The Contractor shall pick up materials supplied by MFA and deliver said materials to the Work site as required. All Channel Slope and Forage seed will be available for pick-up during normal working hours from the Manitoba Water Stewardship – Regional Operations, District Office / Floodway Yard, located adjacent to the east side of the Floodway Channel near the Trans Canada Highway Bridge crossing of the Floodway. The seed will be packaged in 25 kilogram labelled bags, and stored in marine shipping containers. The Contractor must supply all equipment and labour required to load the bagged seed into his transport vehicle. The Contractor must provide a minimum 1-day notice to Yard Staff at telephone number (204) 945-8953, prior to any anticipated seed pick-up.

SP208.3.2 Seeding shall commence immediately upon completion of excavation and trimming operations. The seeding operation shall consist of seedbed preparation (shallow discing and initial harrowing), application of the seed and fertilizer, and a second harrowing. Straw mulch application and crimping shall follow the second harrowing, in accordance with SP210.

SP208.3.3 No seeding shall be completed if the work area cannot be covered with straw mulch in accordance with SP210.

SP208.3.4 Seeding that is not completed in the fall or winter periods shall be completed the following spring as soon as atmospheric and site conditions allow for seeding operations to commence, as determined by the Contract Administrator.

SP208.3.5 All weed growth in areas to be seeded shall be destroyed as required so that proper seeding can be done. If herbicide applications are used to destroy weed growth then all work and materials shall be in accordance with GR130 Environmental Protection Specifications.

SP208.3.6 The seedbed shall be prepared by shallow discing (minimum 50 mm depth) and initial harrowing of the finished grade prior to seed application, as required and accepted by the Contract Administrator. This shallow discing for final seedbed preparation shall be additional to the deeper discing as specified in SP201.

SP208.3.7 The Channel Slope (or Forage) seed and Cover Crop seed shall be sown separately utilizing conventional seed drill equipment capable of uniformly applying all species contained within the specified mixtures. Only if the equipment is capable of sufficient adjustment as to ensure uniform application will the Cover Crop seed and the Channel Slope (or Forage) seed be permitted to be mixed and sown together, as accepted by the Contract Administrator. The drill shall accurately and uniformly place the seed (both grass/forage and cover crop) to a depth of 10 to 20 mm. The seed drill shall be fitted with on-row packers, in order to achieve adequate seed to soil contact. Seed shall not be applied by broadcasting methods unless directed by the Contract Administrator.

SP208.3.8 Channel Slope or Forage seed and Cover Crop seed shall be sown at the following rates:

(a) Channel Slope or Forage Seed 32 kg per hectare

(b) Cover Crop seed 38 kg per hectare

SP208.3.9 New seeding shall blend applications 300 mm into adjacent grassed areas and previous applications to form uniformly covered surfaces.

SP208.3.10 Harrowing after the seeding operation shall be undertaken, either as a separate operation or in conjunction with the seeding operation.

SP208.3.11 In order to discourage downslope erosion, on all sloped areas, the direction of equipment travel for seeding and final harrowing operations must be perpendicular to the slope.

SP208.3.12 No supplementary packing or rolling shall be done after seeding operations unless the Contractor is directed by the Contract Administrator to use broadcast seeding methods. Any areas seeded by broadcast seeding methods shall be considered extra work and will be addressed in accordance with GC7.00 Change in Work.

SP208.3.13 No seeding shall be done on frozen soils, or when any other conditions unfavourable to the successful planting of seed exist, as determined by the Contract Administrator.

SP208.3.14 Fertilizer shall not be mixed with seed but applied as a separate broadcast operation or by a fertilizer attachment on the seed drill.

SP208.3.15 The fertilizer application shall achieve a rate of 225 kg/ha (200 lbs/acre).

SP208.3.16 Rutting or damage caused during seeding and fertilizing operations shall be repaired to the satisfaction of the Contract Administrator.

SP208.3.17 The Contract Administrator will provide Final Acceptance of the seeded areas when:

(a) Verification has been made that the seed has been properly applied as per the above Specifications.

(b) Areas have been fertilized.

(c) Final harrowing has been completed on required areas.

SP208.4 Measurement and Payment

SP208.4.1 Supply of cover crop seed, placement all of seed, supply and placement of fertilizer, seed bed preparation and related Work specified herein will be measured on an area basis and paid for at the Contract Unit Price per hectare for "Seeding". The area to be paid for shall be the total number of hectares of ground cover by seed and fertilizer, and harrowed in accordance with this Specification, accepted and measured by the Contract Administrator.

SP208.4.2 Herbicide supply and application to destroy any weed growth prior to seeding as required, will be incidental to the seeding and no separate measurement or payment will be made.

SP208.4.3 Seeding required for restoration of any grassed areas disturbed by the Contractor during construction, which are not designated for construction of items to be permanently incorporated into the Work, including but not limited to access points, areas beyond excavation and disposal, site work roads outside the limits of excavation and disposal, laydown areas or any other areas requiring new seeding as a result of the Contractors activity are considered incidental to Mobilization and Demobilization and no separate measurement or payment will be made.

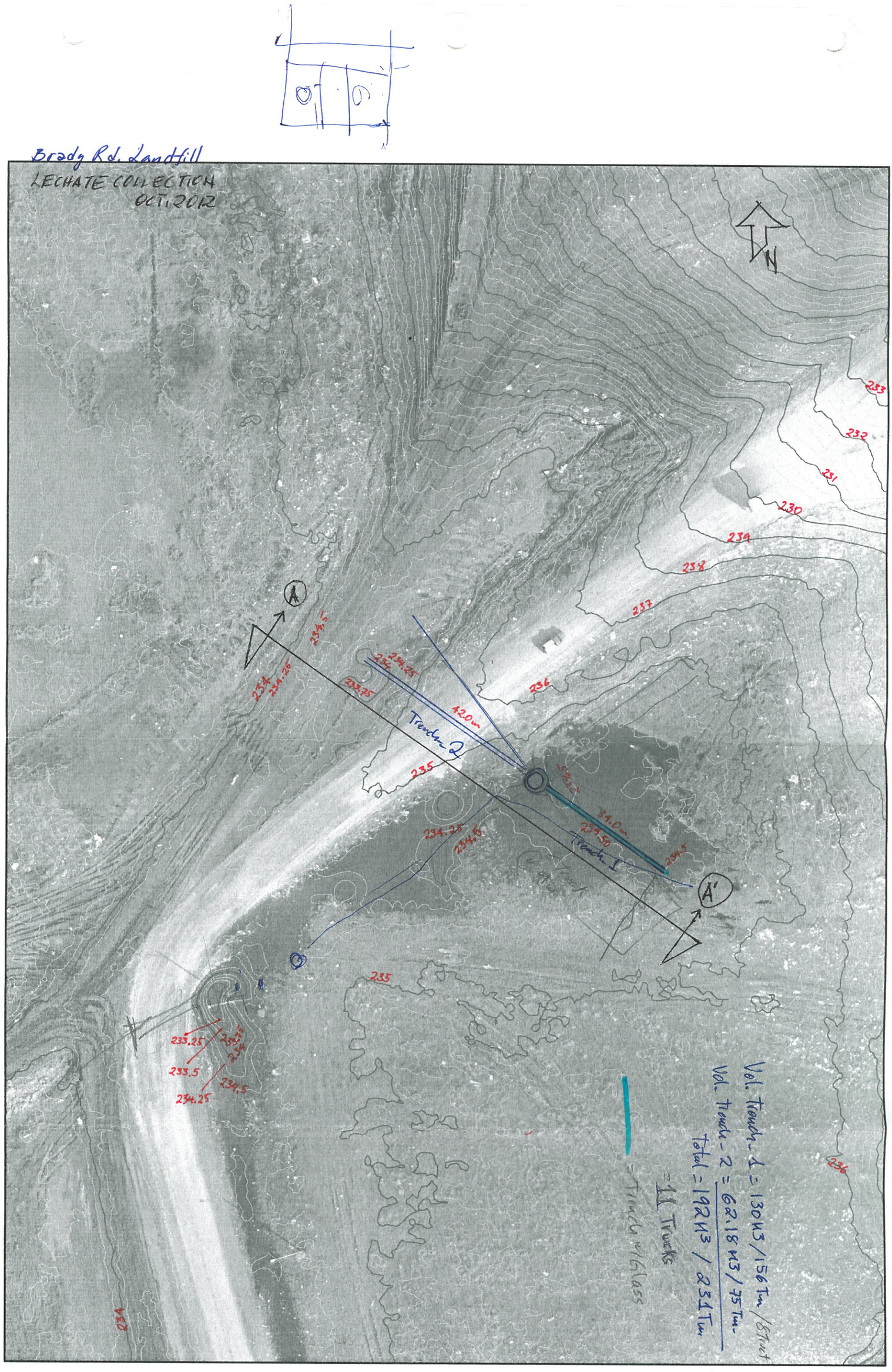
APPENDIX D

LEACHATE SEEP CONTROL DESIGNS

DRAFT

LEACHATE SEEP CONTROL DESIGNS

NEW MANHOLE 46


Brady Rd. Landfill
LECHATE COLLECTION
OCT. 2012
N
A
A'
Trench 2
Trench 1
42.0m
34.0m
233
232
231
230
234
238
237
236
235
234.5
234.25
234
233.75
234.25
234.5
234.25
234.5
234.7
233.25
233.5
234.25
234.5
Vol. Trench 1 = 130 M3 / 156 Tm / 87 Tm
Vol. Trench 2 = 62.18 M3 / 75 Tm
Total = 192 M3 / 231 Tm
= 11 Trucks
= Trench w/ Glass
SCALE 1:1000
Elev. @ 250mm. white lines.
Elev. @ 1.0 m. black lines.
IMG. GETEWING-X100 JUN-2012

BRADY RD. LANDFILL
LECHATE COLLECTION
OCT. 2012

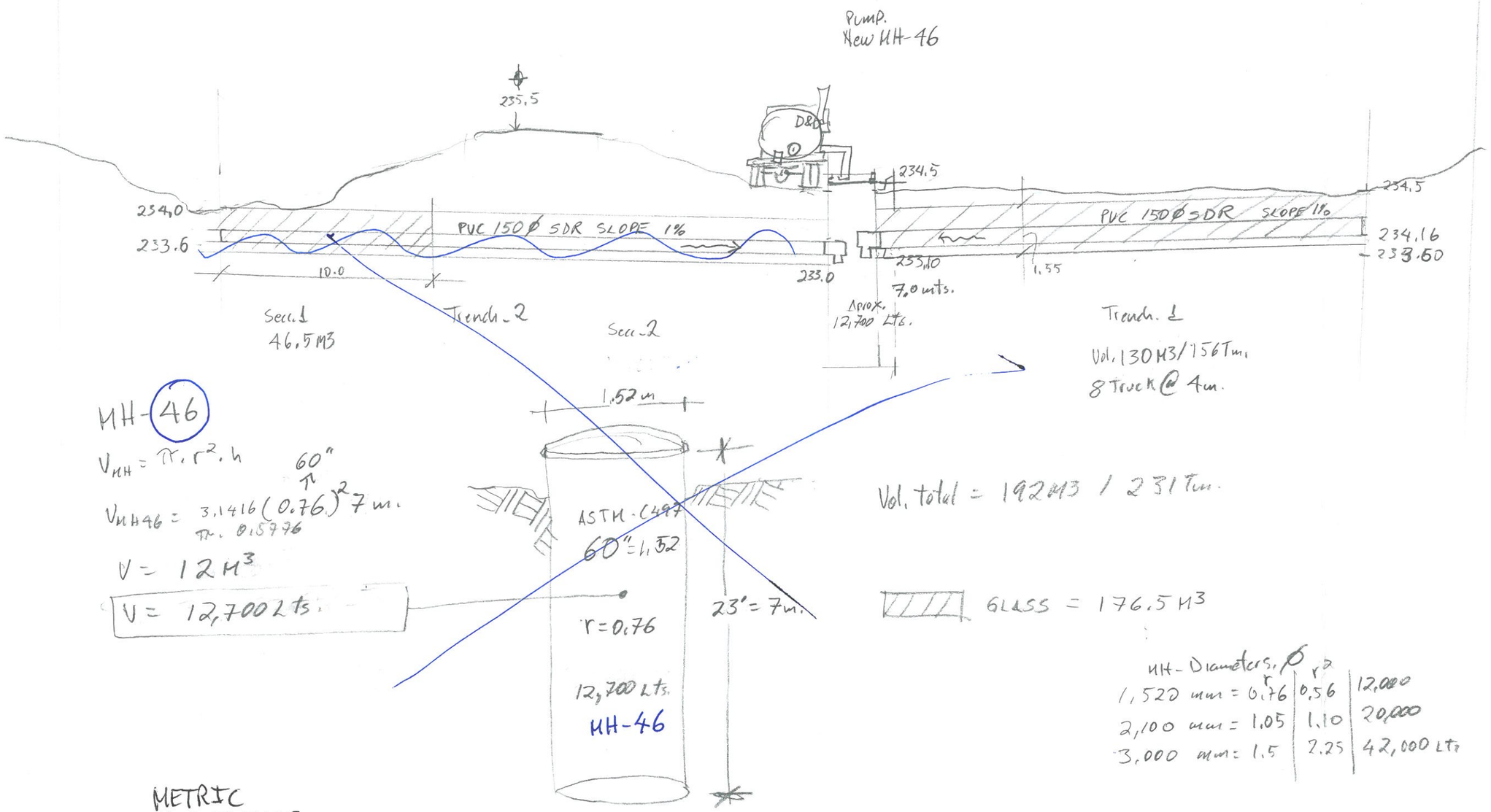
SECC. A-A'
NW-SE View

MH-46

MH ~~46~~ location change
See image from Apl. 18, 2013

MH-46 & trenchs change
See update.

A — 42.0m. — 34.0m. — A'



MH-46

$V_{MH} = \pi . r^2 . h$ 60"

$V_{MH46} = 3.1416 (0.76)^2 7m.$

$\pi . 0.5776$

$V = 12 M^3$

V = 12,700 Lts.

Vol. total = 192 M3 / 231 Tm.

GLASS = 176.5 M3

130
46.5
176.5

MH - Diameters, Ø	r	r^2	
1,520 mm =	0.76	0.56	12,000
2,100 mm =	1.05	1.10	20,000
3,000 mm =	1.5	2.25	42,000 Lts

METRIC
NON IN SCALE



Google earth

Image April. 18, 2013

feet 1000

meters 400

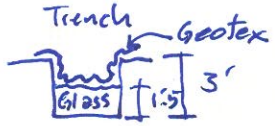
N.

New MH-46
Apl. 16, 2013

update Apl. 18, 2013

MH-46

MH-46 Date Install Apl. 16, 2013
Trench finish Apl. 18, 2013



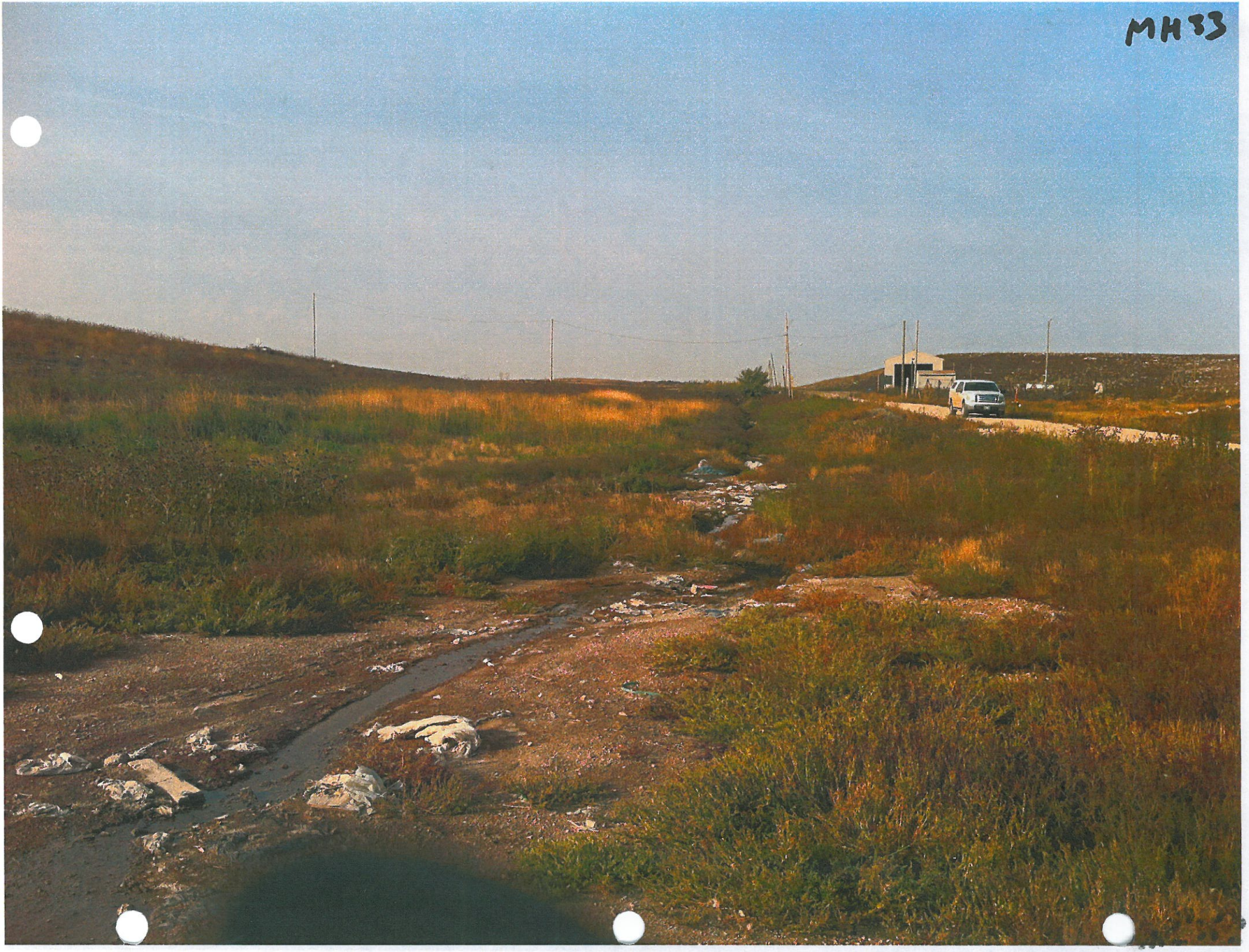
LEACHATE SEEP CONTROL DESIGNS

MANHOLES 3-2-1 AND MANHOLES 5-4-3


MH 5,4,3


MH5


115,43
Fall -2012


MH33


MW 5,43
Fall - 2012


MH 5,43


FALL-2012


Fall-2011
Residential Road
MH31
543
MH33

Brady Rd. Landfill

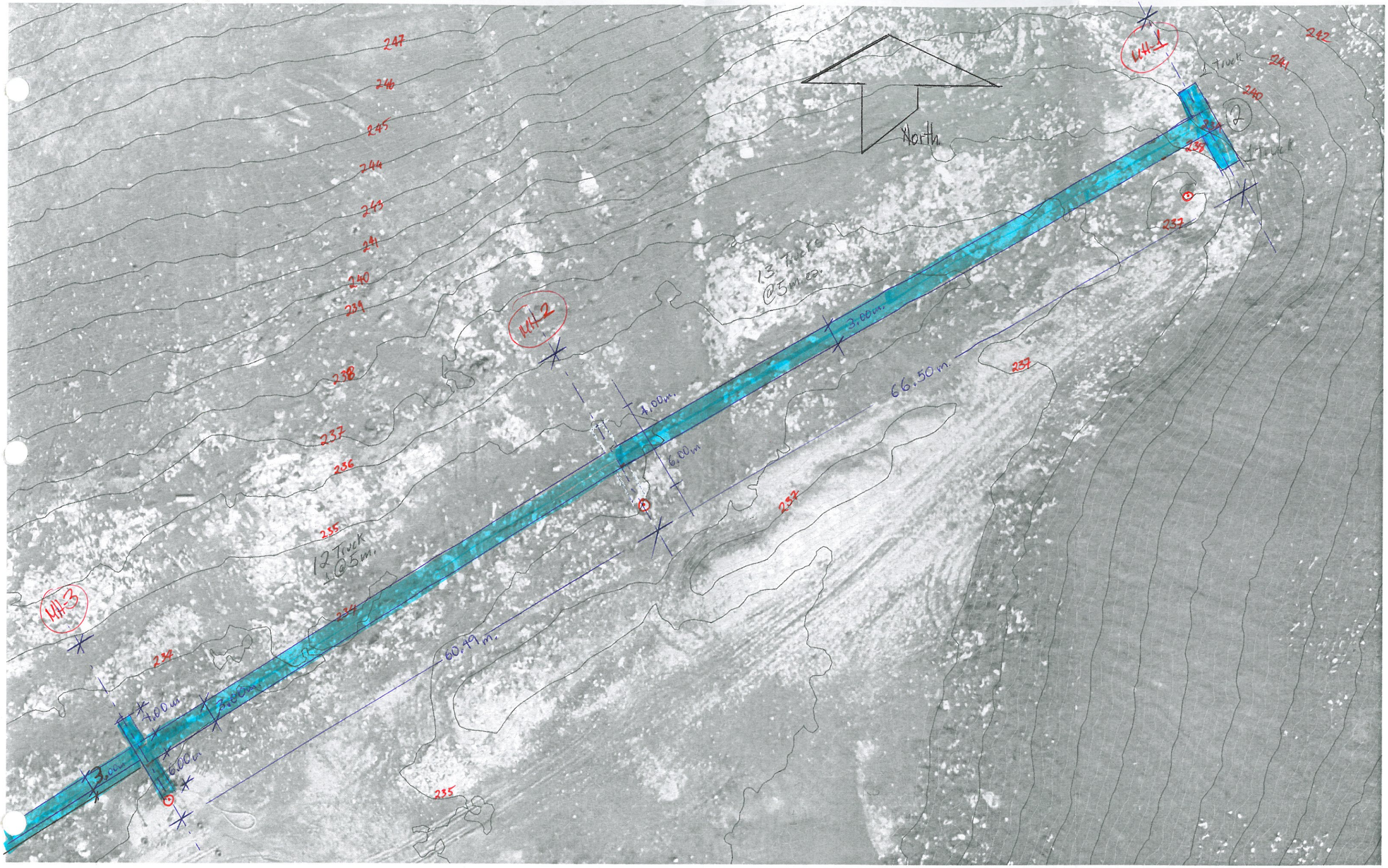


Google earth

feet 1000

meters 500

update
Apl. 18, 2013

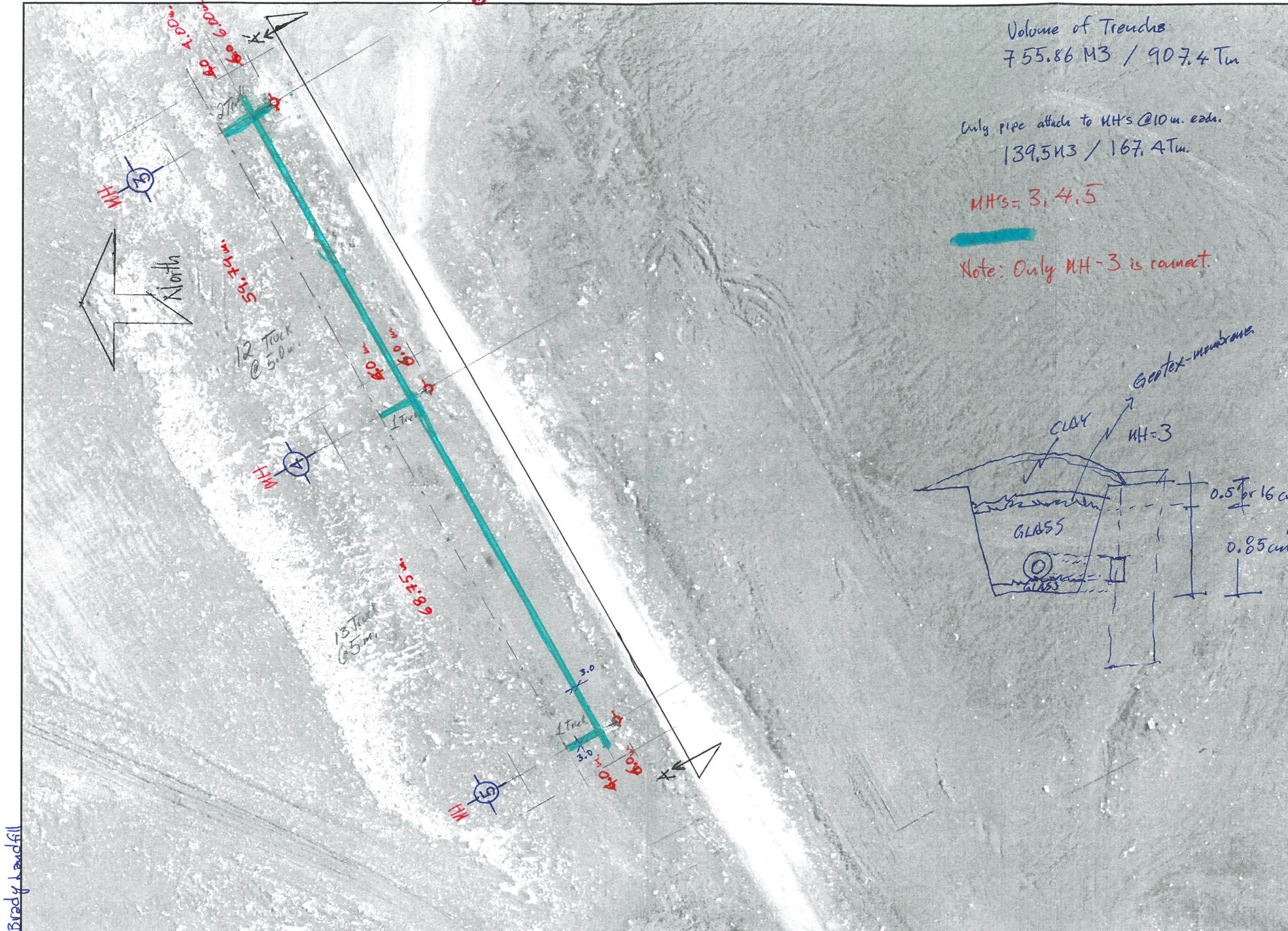


BRADY RD. LANDFILL.

— Trench W/Glass

SCALE
1:500

MH-3



Brady Landfill

Brady Landfill Expansion
Leachate collection Oct, 2012

Secc. N-S
Detail (East View)

City of Winnipeg
solid waste

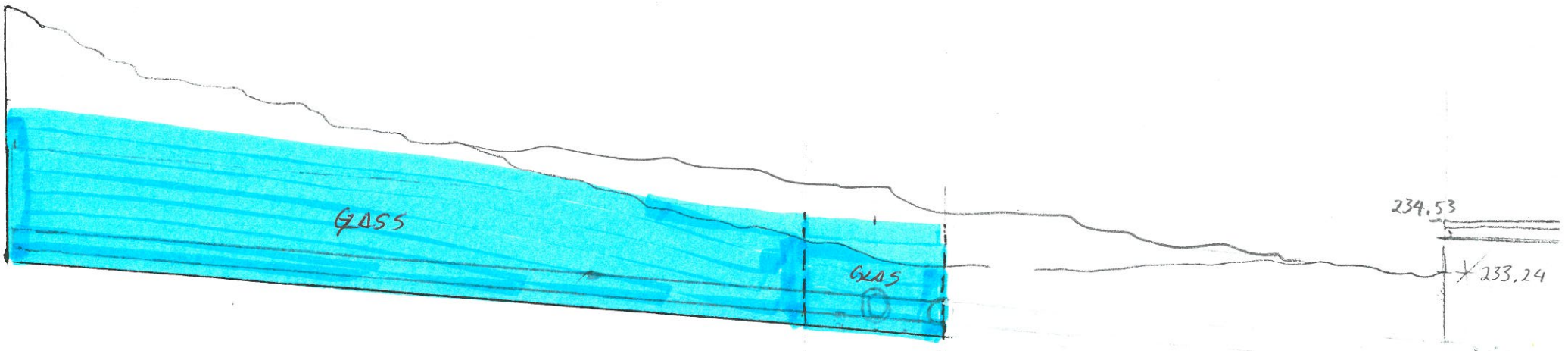
A

6.0

B

4.0

C



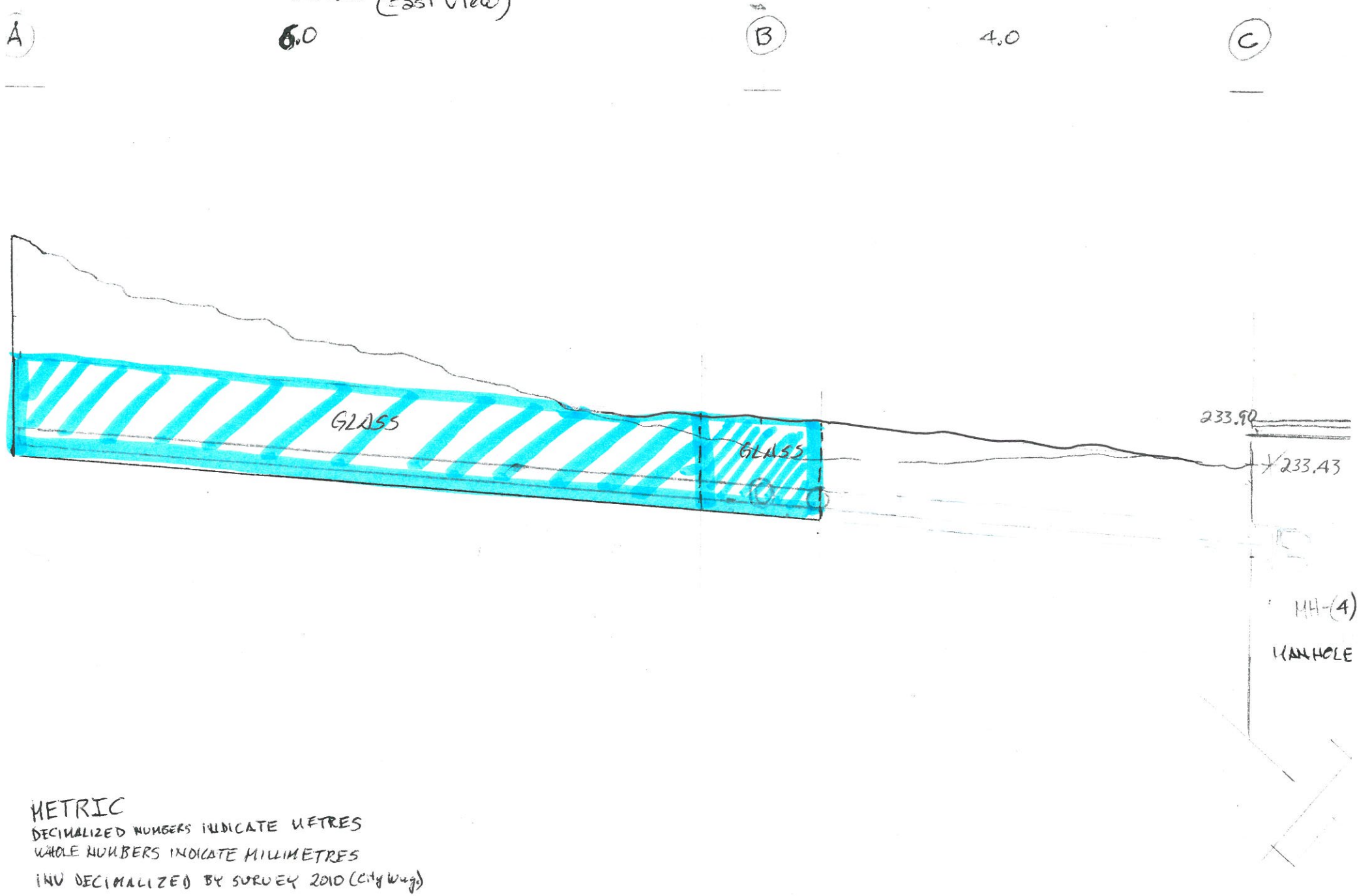
MH-(5)
MANHOLE

METRIC
DECIMALIZED NUMBERS INDICATE METRES
WHOLE NUMBERS INDICATE MILLIMETRES

Brady Landfill Expansion
Leachate collection Oct, 2012

City of Winnipeg
solid waste

Secc. N-S
Detail (East View)



METRIC
DECIMALIZED NUMBERS INDICATE METRES
WHOLE NUMBERS INDICATE MILLIMETRES
INV DECIMALIZED BY SURVEY 2010 (City Wpg)

Brady Landfill Expansion
Leachate collection Oct, 2012

Secc. N-S
Detail (East View)

City of Winnipeg
solid waste

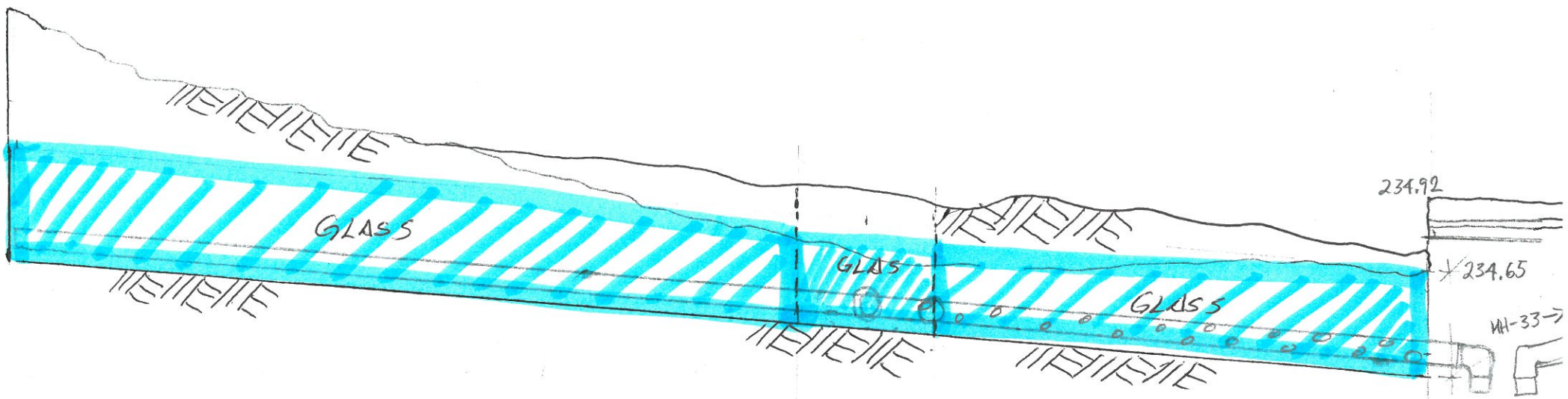
A

6.0

B

4.0

C

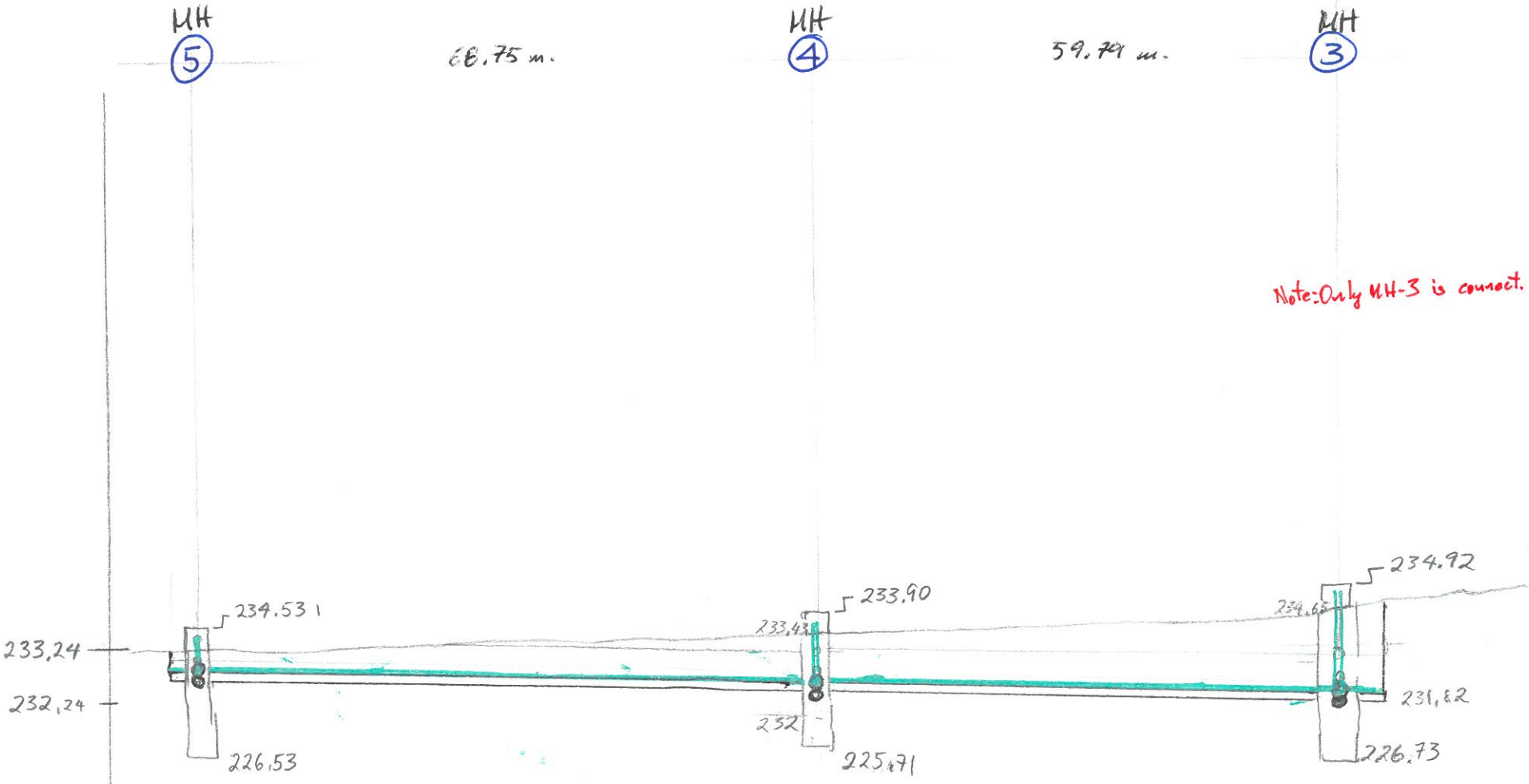


METRIC
DECIMALIZED NUMBERS INDICATE METRES
WHOLE NUMBERS INDICATE MILLIMETRES

Brady Rd. Landfill

N-W View
SECC. (A-A')

City of Winnipeg
Solid W[illegible]e Div.



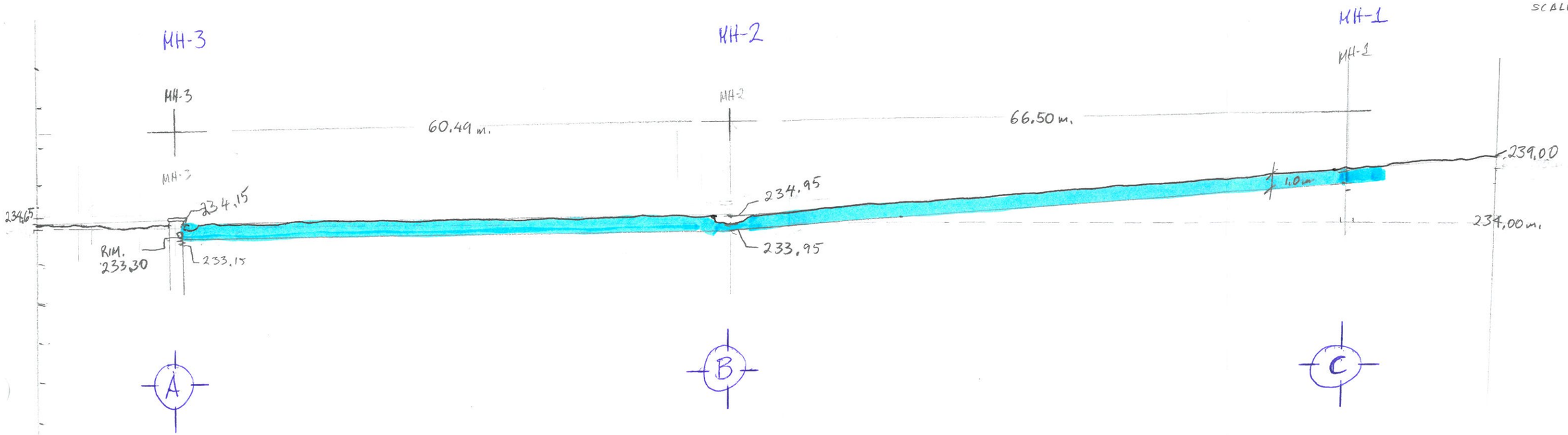
	Vol. m³	Trucks
Secc. MH-3 to MH-4	180	12
Secc. MH 4 to MH 5	206	13
Ext. MH-5=4 MH-3=10 MH-3=4	54	4
	440	29

METRIC
DECIMALIZED NUMBERS INDICATE METRES
WHOLE NUMBERS INDICATE MILLIMERES NON IN SCALE!

Brady Rd. Landfill

MH-1
MH-3
SECC-W-E

SCALE: H: 1:500
V: 1:300



	Vol. m^3	Tones
Secc. MH3 to M2 =	181.47	272
Secc. MH2 to M1 =	200	299
2 Secc. in MH-3 & MH1 =	60	60
G. Total :	441.47	570

Vol. to remove = 441.47 m^3

Vol. to re-fill w/Glass = 441.47 m^3

Vol(2) = Vol. to cover w/clay = 882.92 m^3

LEACHATE SEEP CONTROL DESIGNS

MANHOLES 31-32

1

Project: UTH.214
Coord: ~~UTM~~ Metres.
DATUM: WGS84

FIS
GPS Res. ± 2m.

Bearing in Degreed
Az = Degreed

Vol. of Trenches
~~449~~ M3 = ~~0000~~ n. (metres)
1,246.20 M3 / 1,601. Tm.
448 M³ x day
3 days 6r
= 60 trucks
1 @ 5m. Apx.

SCALE 1:300

MH-31
MH-32

N

A
N = 630,284.755
E = 5,513,646.776
2 Truck
26.0m.
Az: 108°
4 Truck
10m.
630,277
5513641
56m.

B
Az: 100°
24.0m.
4 Truck
MH-32
41 Truck
630,258
5,513,588
205.0m.
23m.
B'

C
Az: 97°
25.0m.
4 Truck
630,255
5,513,555
20m.
C'

D
Az: 82°
25.0m.
4 Truck
630,256
5,513,540
205
D'

E
E = 630,294.29
N = 5,513,457.47
Az = 88°
MH-31
25m
5 Truck
10@5m.
19 Trucks
10@5m.
96.0m.
E'

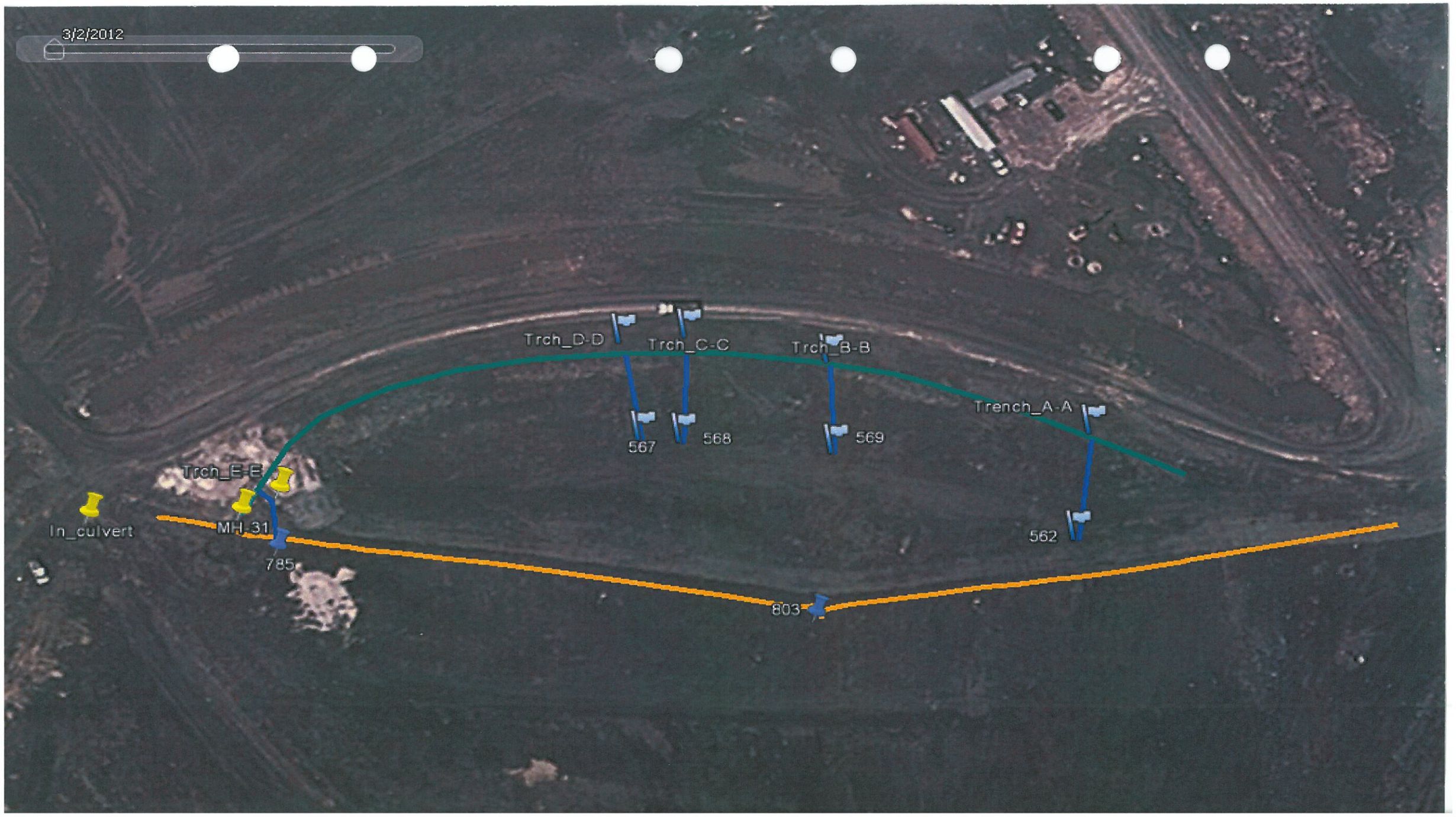
E'-E = 75 M3 / 5 Truck

BRADY

52

627 384

18
14
32
12


3/2/2012
Trch_D-D
Trch_C-C
Trch_B-B
Trench_A-A
567
568
569
562
Trch_E-E
In_culvert
MH_31
785
803

BRADY LANDFILL EXPANSION 1 BETWEEN MH-31 & 32 ~~SOUTH~~, 2
LEACHATE COLLECTION

SEC	LYS	DIST (M)	GPS-DIST	DIF	COORD. UTM-Z14 N (WGS84)	AZIMUTH (AZ)
A-A'	562 563	26.2	30.0	3.8	A' 630,307 - 5513635 A 630,277 - 5513641	~~284°~~ / 108°
B-B'	564 569	23.9	26.0	2.1	B' 630,258 - 5513588 B 630,284 - 5513584	~~280°~~ / 100°
C-C'	565 568	25.0	25.0	Ø	C' 630,255 - 5513555 C 630,281 - 5513552	~~277°~~ / 97°
D-D'	566 567	24.9	24.0	0.9	D' 630,256 - 5,513,540 D 630,280 - 5,513,544	~~263°~~ / 83°
E-E		25.0		+/- 1.7 RMS	E' 630,285.35 - 5,513,465.5 E 630,310.00 - 5,513,466.9	88°

- MH-31
MH-32

Brady Rd. Landfill — Jan 23-2013

	Vol. m3
Glass	2,247.20
Trench	2,318.32

MH-31 - MH-32 North bound → 205 m.

Secc N-S
1 - 96m x 4.0m x 1.0 = 384 m3
2 = 109m x 3.0m x 1.0 = 327 m3
} 711 m3

Secc W-E
A-A' = 26.0 x 3.0 x 1.0 = 78 m3
B-B' 24.0 x " x " = 72 m3
C-C' 25.0 x " x " = 75 m3
D-D' 25.0 x " x " = 75 m3
E-E' 25.0 x " x " = 75 m3
} 375 m3

1,086 m3

60


MH-31, 32
Apl. 16, 2013
Berma


MH31
Fall-2012
31


IN31
Fall-2012

AH31


MH31


MH31

MH31






MH31

MH31

MH31

MH31

M.31



BRADY LANDFILL EXPANSION

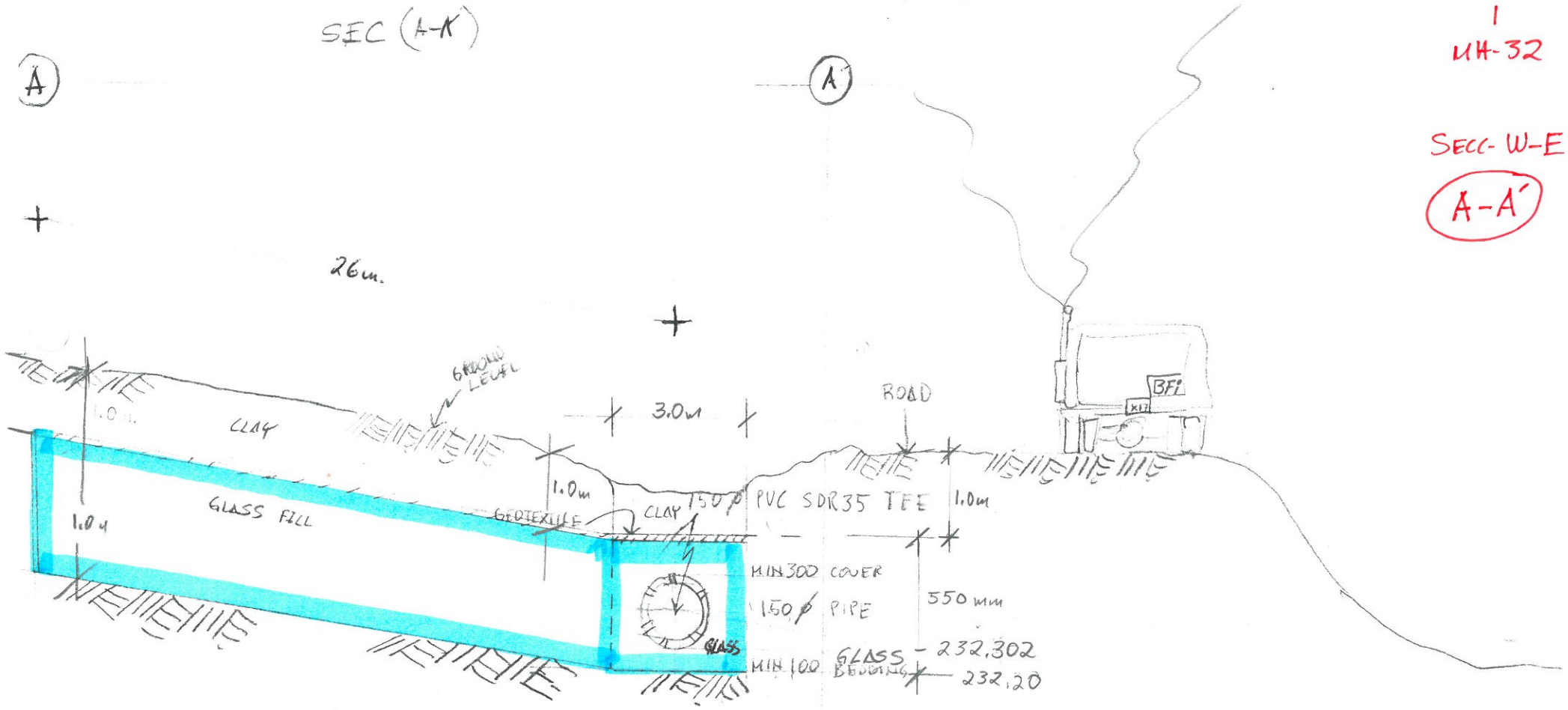
LEACHATE COLLECTION MARCH 14, 2012

MH-31
|
MH-32

SECC- W-E

A-A'

SEC (A-A')



South view ( )

DETAIL

METRIC

NON IN SCALE!

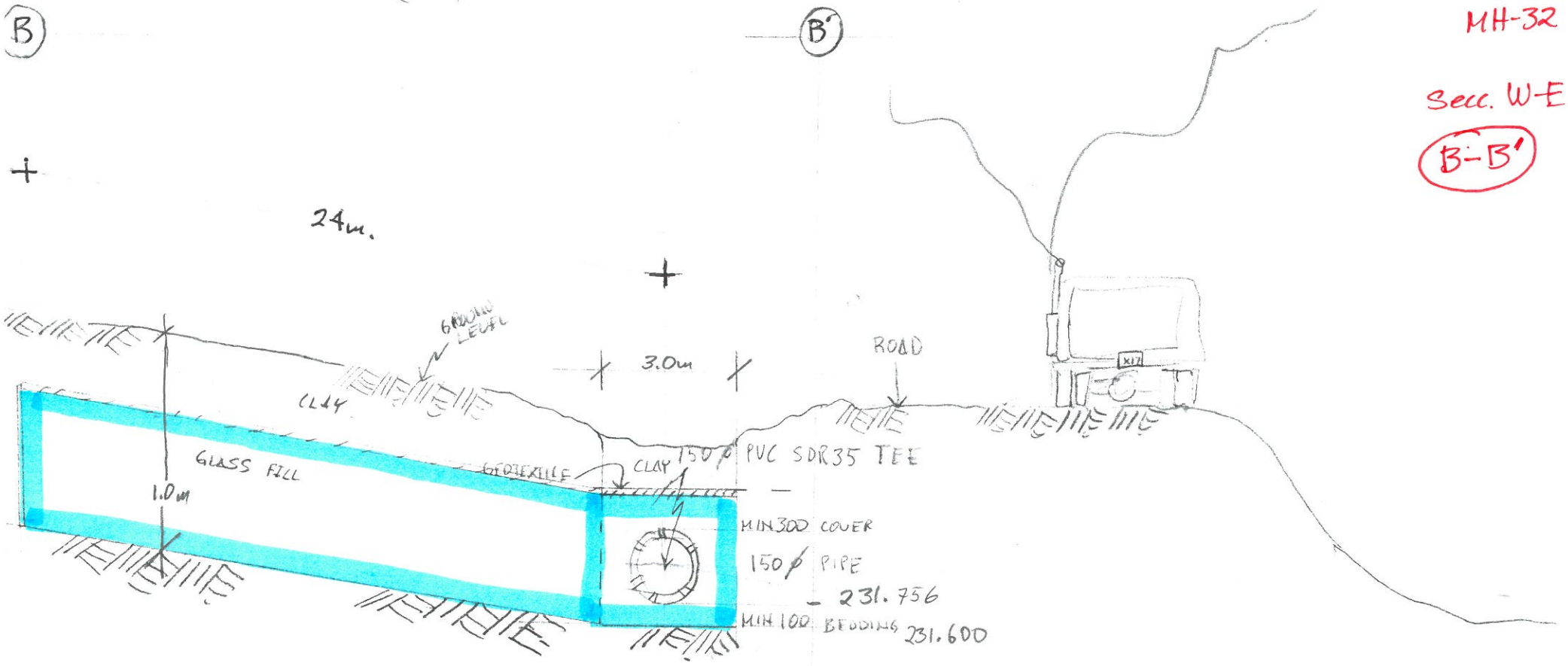
WHOLE NUMBERS INDICATE MILLIMETRES

BRADY LANDFILL EXPANSION
LEACHATE COLLECTION MARCH 14, 2012

SEC (B-B')

MH-31
1
MH-32

Secc. W-E
B-B'



South View ( )
DETAIL

METRIC
NON IN SCALE!
WHOLE NUMBERS INDICATE KILOMETRES

BRADY LANDFILL EXPANSION
LEACHATE COLLECTION MARCH 14, 2012

MH-31
|
MH-32

Sect-W-E

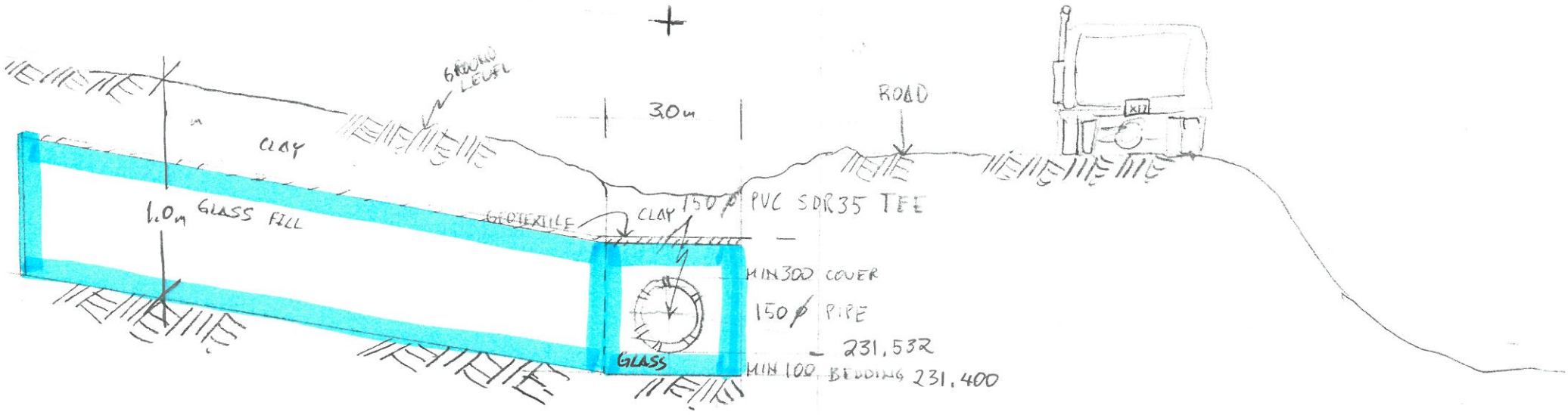
C-C'

SEC (C-C')

C

C'

25.0m.



South View ( )
DETAIL

METRIC
NON IN SCALE!
WHOLE NUMBERS INDICATE KILOMETRES

BRADY LANDFILL EXPANSION

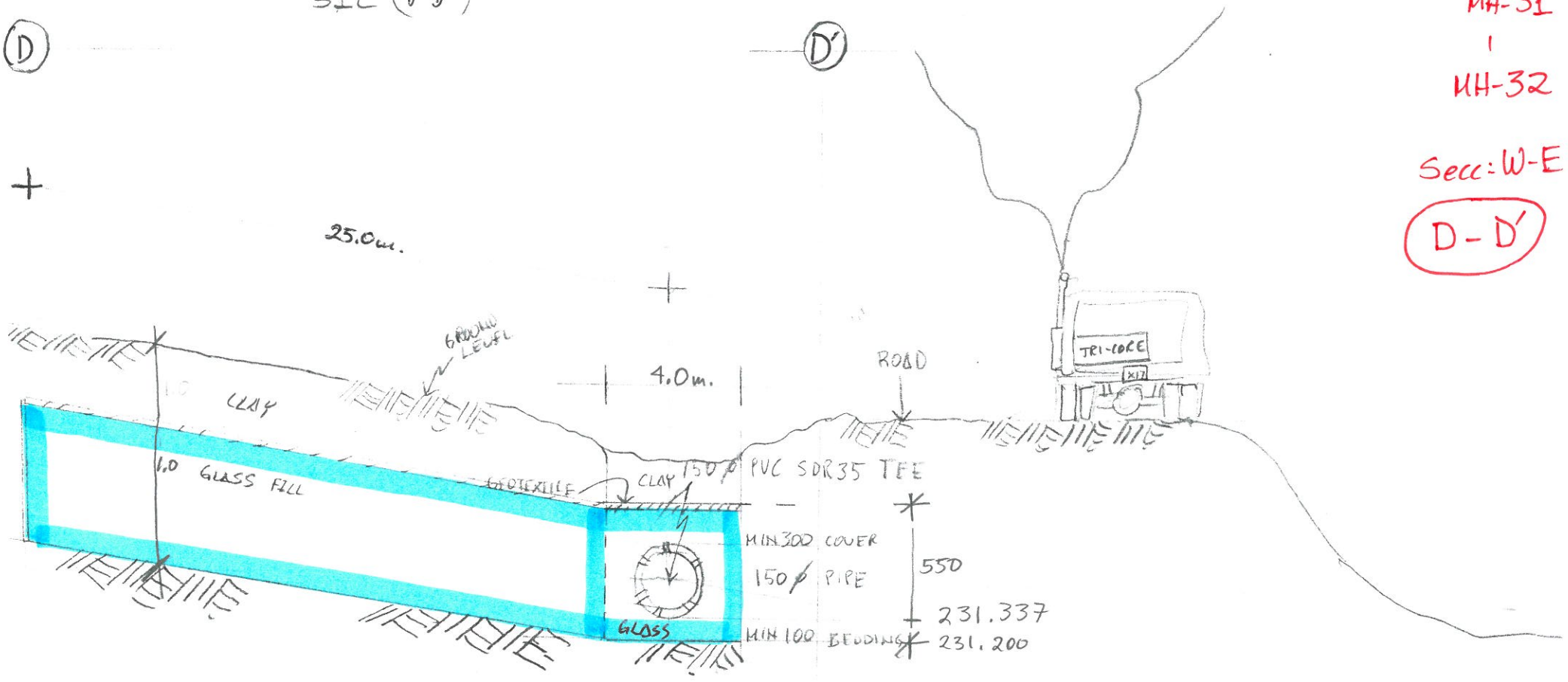
LEACHATE COLLECTION MARCH 14, 2012

SEC (D-D')

MH-31
|
MH-32

Secc: W-E

D-D'



South View ( )

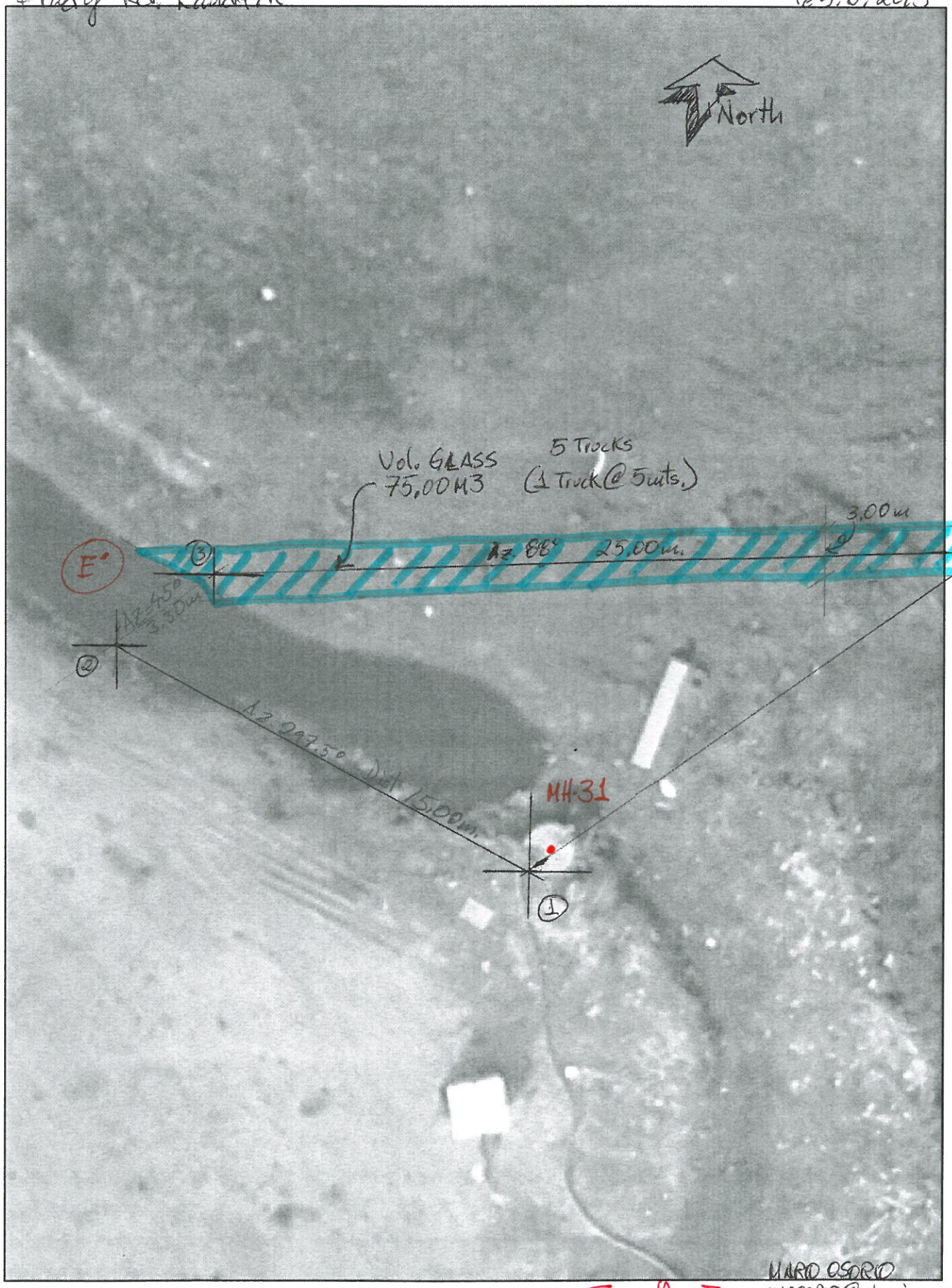
DETAIL

METRIC
NON IN SCALE!

WHOLE NUMBERS INDICATE MILLIMETRES

Brady Rd. Landfill

Feb. 6, 2013



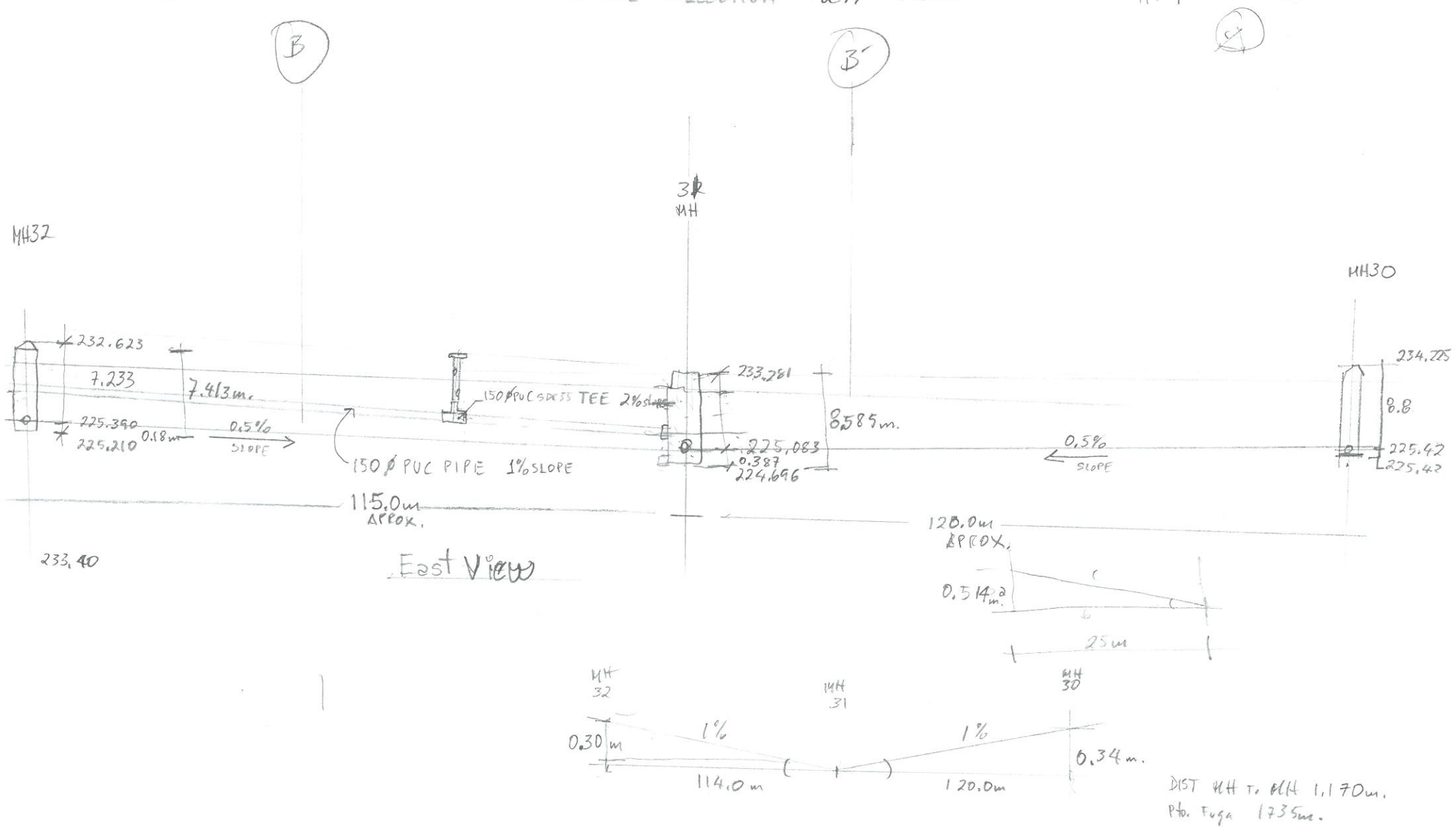
MARIO OSORIO
mosorio@umanitoba.ca

W-E

SECC-E-E

MH-31

BRADY LANDFILL EXPANSION
LEACHATE COLLECTION OCT. 14, 2012

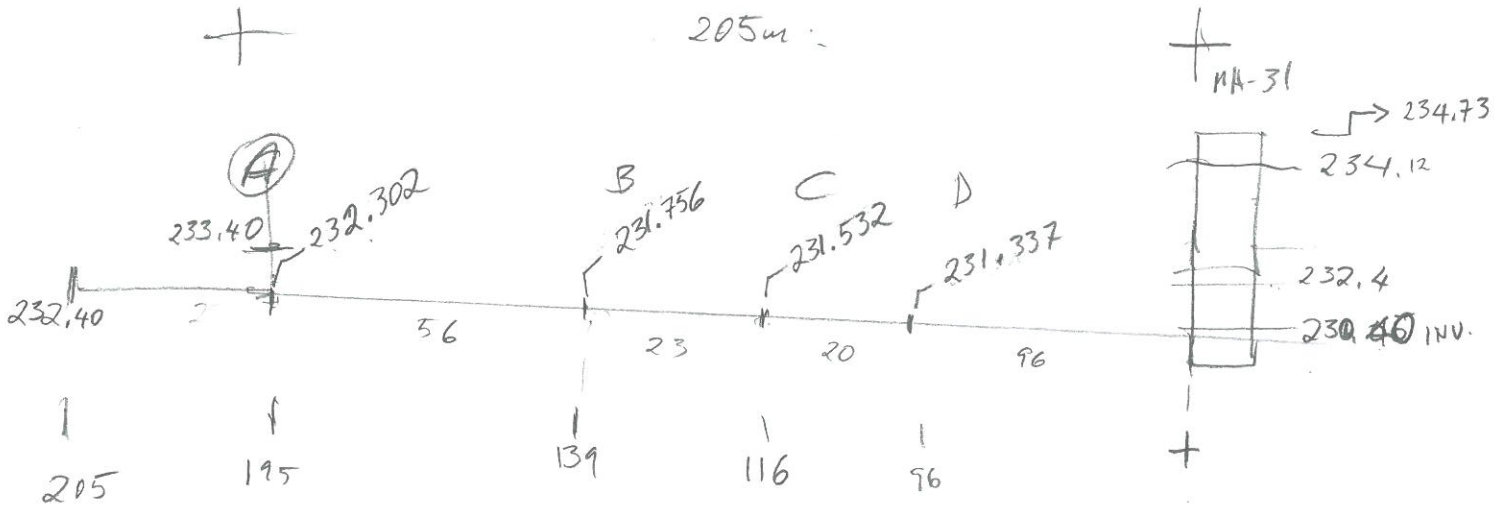


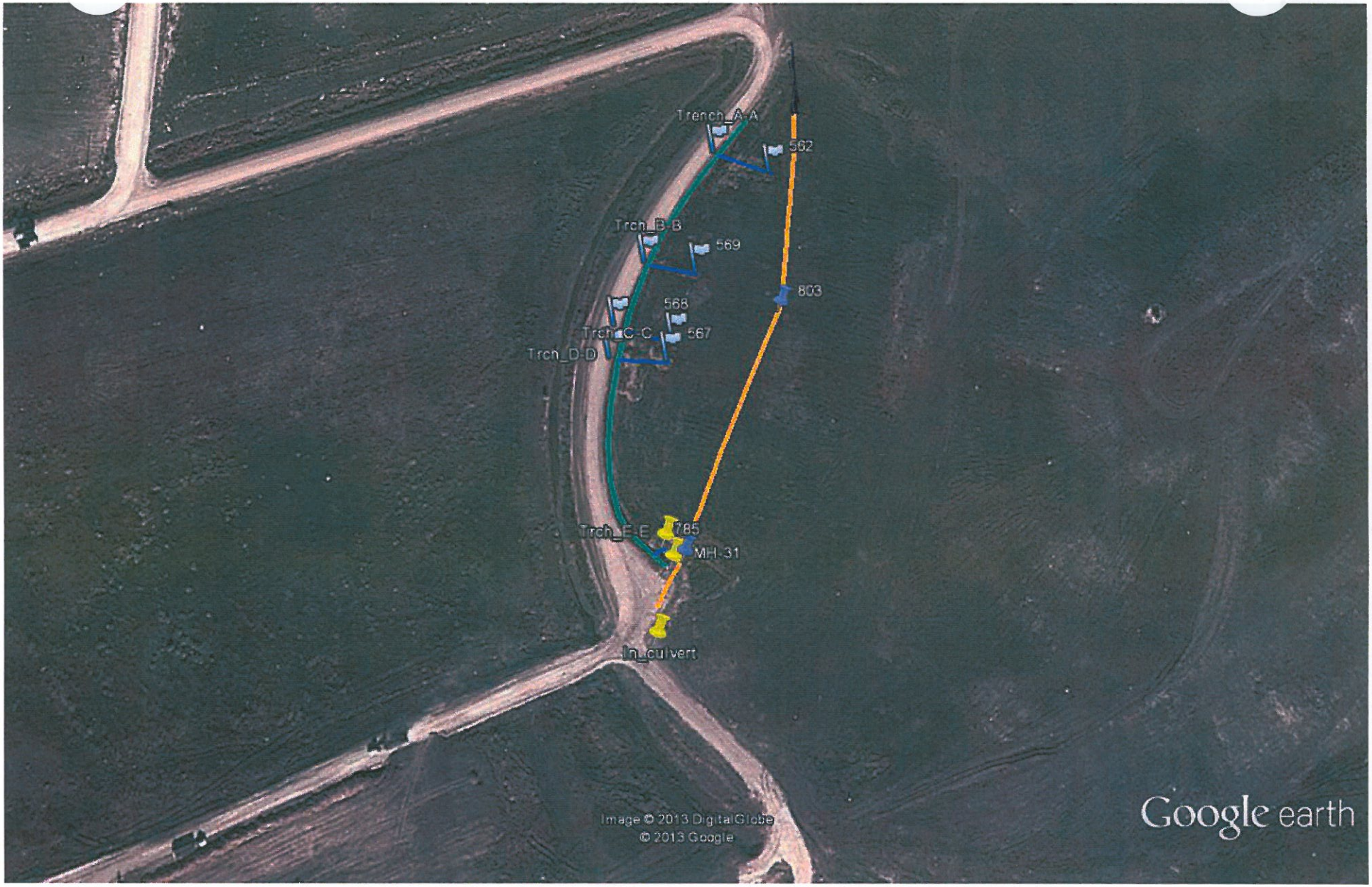
DIST MH to MH 1,170m.
Pto. Fuga 1735m.

MH-31

DATA FROM DWG. No.: SWD-D-241
FILE #: SW10416
DATE : 18/02/93

METRIC
NON INSCALE
WHOLE NO. INDICATE MILLIMETRES
DECIMALIZED NO. INDICATE METRE


205m
MA-31
234.73
234.12
232.4
230.40 INV.
A
B
C
D
233.40
232.302
231.756
231.532
231.337
232.40
56
23
20
96
205
195
139
116
96



Google earth

Berma

MH-31, 32

feet 1000

meters 500

Update Apl. 18, 2013

KJ

MH-31 - MH-32

North

Brady Rd. Landfill Feb. 6-2013

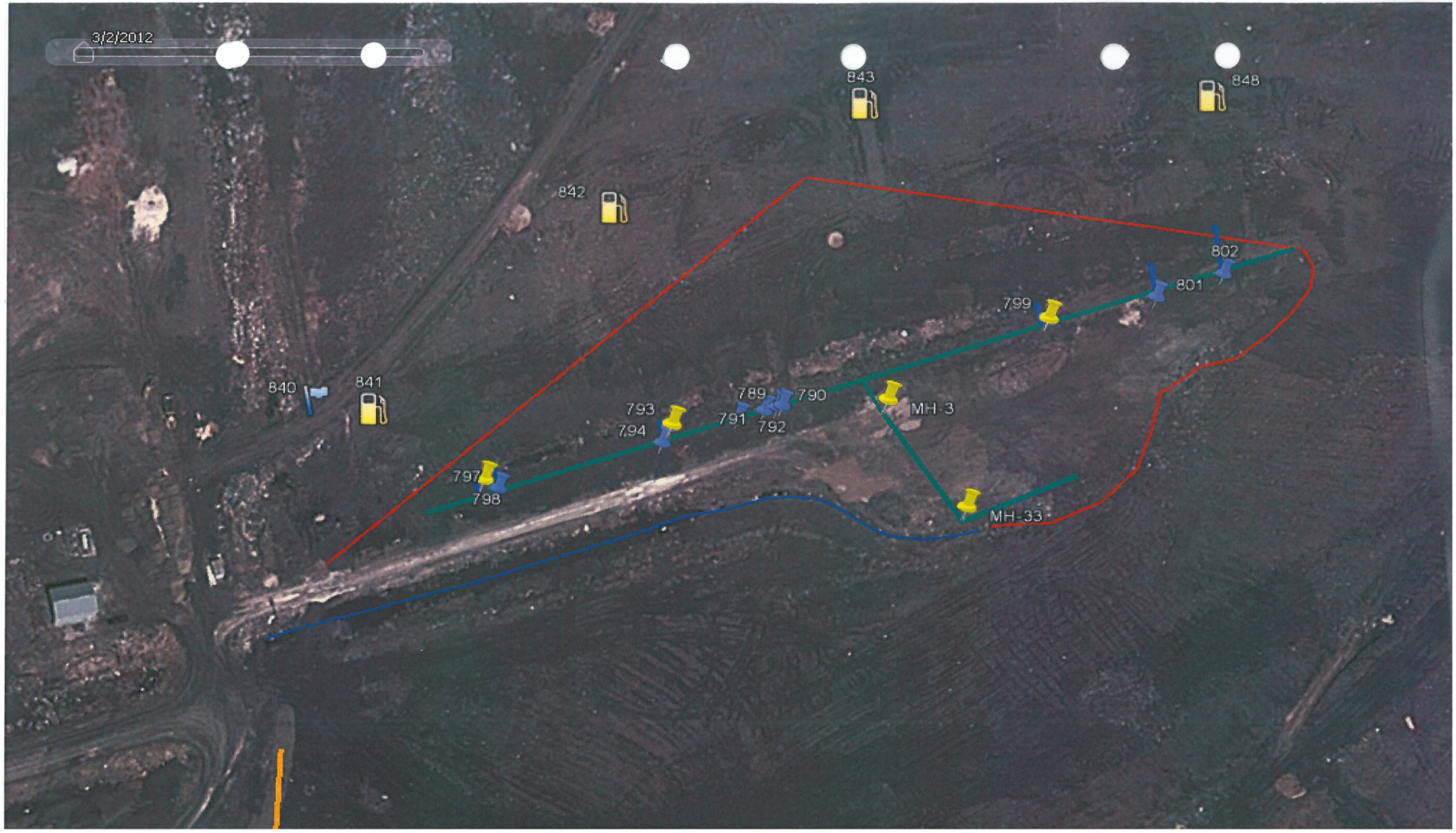


MH-31

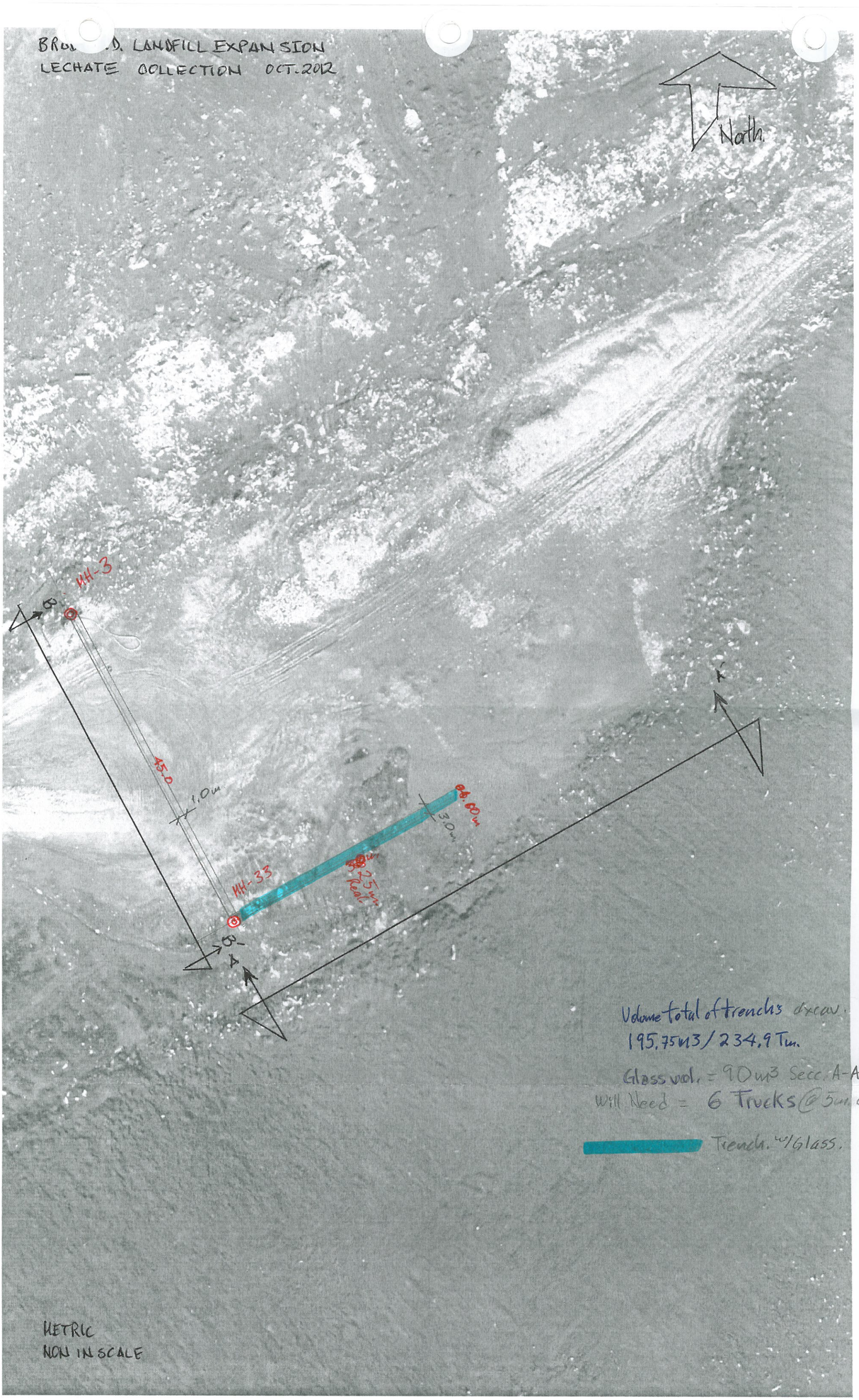
SCALE APPX:
1:1,500

LEACHATE SEEP CONTROL DESIGNS

MANHOLES 3, 33


3/2/2012
843
848
842
802
801
799
840
841
789
790
793
791
794
792
MH-3
797
798
MH-33

BR[illegible].D. LANDFILL EXPANSION
LECHATE COLLECTION OCT. 2012



Volume total of trenchs excav.
195.75m3 / 234.9 Tm.
Glass vol. = 90m3 Secc. A-A'
Will Need = 6 Trucks @ 5m. dist.

Trench. w/Glass.

METRIC
NON IN SCALE

MH-33

BRADY RD. LANDFILL EXPASION
LEACHATE COLLECTION OCT, 2012
SECC - A-A'
N-W - View

Volume calc of trench.
30.0 x 1.00 x 3.0 = .90 M3/1 Tru.
6 Trucks @ 5 m. dist.

MH-33
E-Trench

MH 33

A

30.0
only diging 25 m long.

K



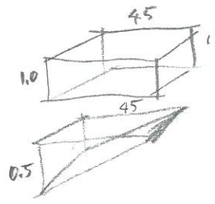
→ Glass

METRIC

NOT IN SCALE
DECIMALIZED NUMBERS INDICATE METRES
WHOLE NUMBERS INDICATE MILLIMETRES

SCALE
1:50

BRADY RD. LANDFILL EXPANSION
LEACHATE COLLECTION OCT. 2012
SECC (NW-SE VIEW)
B-B'



45 x 1.0 x 1.0 = 45 M3

(45 x 0.5 x 1.0)/2 = 11.25 M3 Vdome for this trech.

56.25M3 / 67.5 Tm.

Trench over road (horiz)

This secc. MH-33 to MH-3
Don't have Gloss.

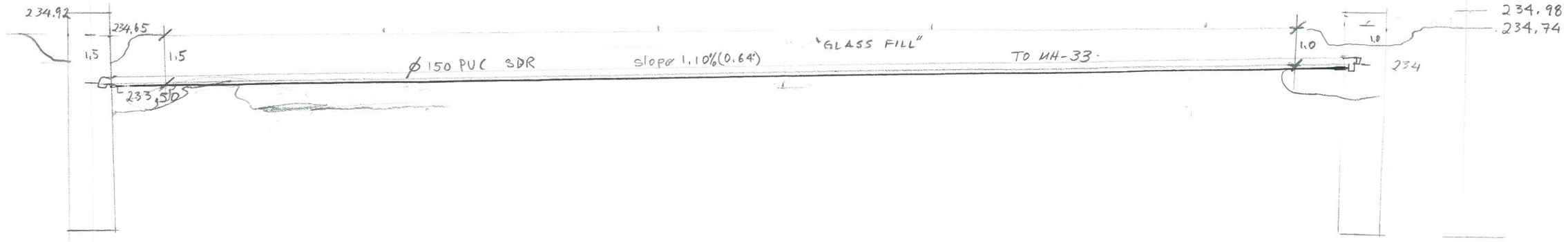
MH-3
↓
MH-33

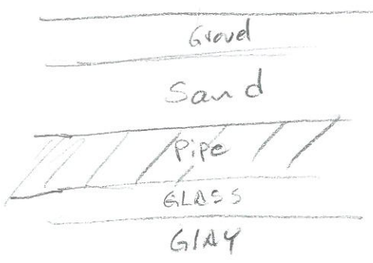
Secc. N-S

MH
(3)

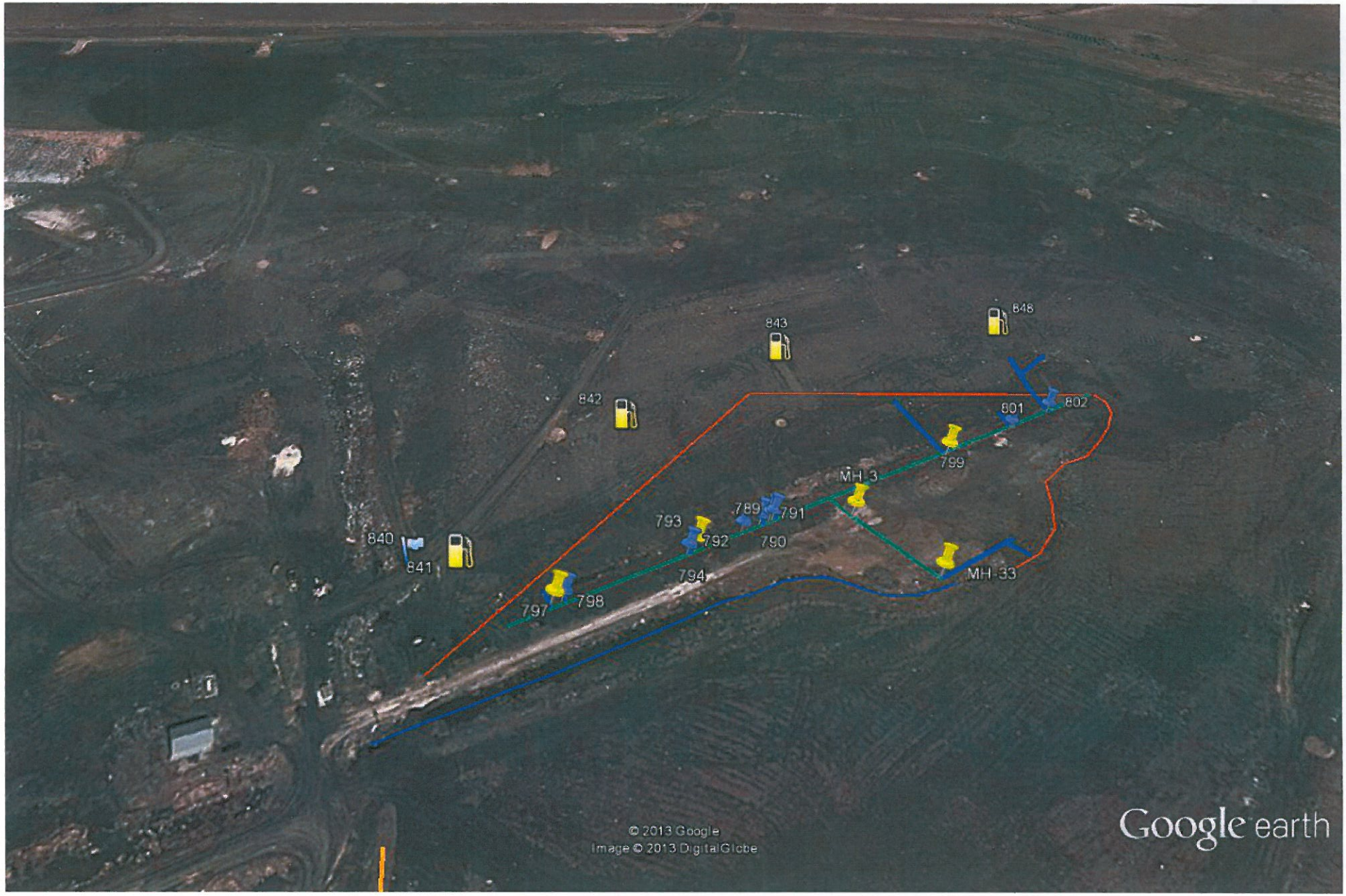
MH
(33)

45.0





METRIC
NON IN SCALE

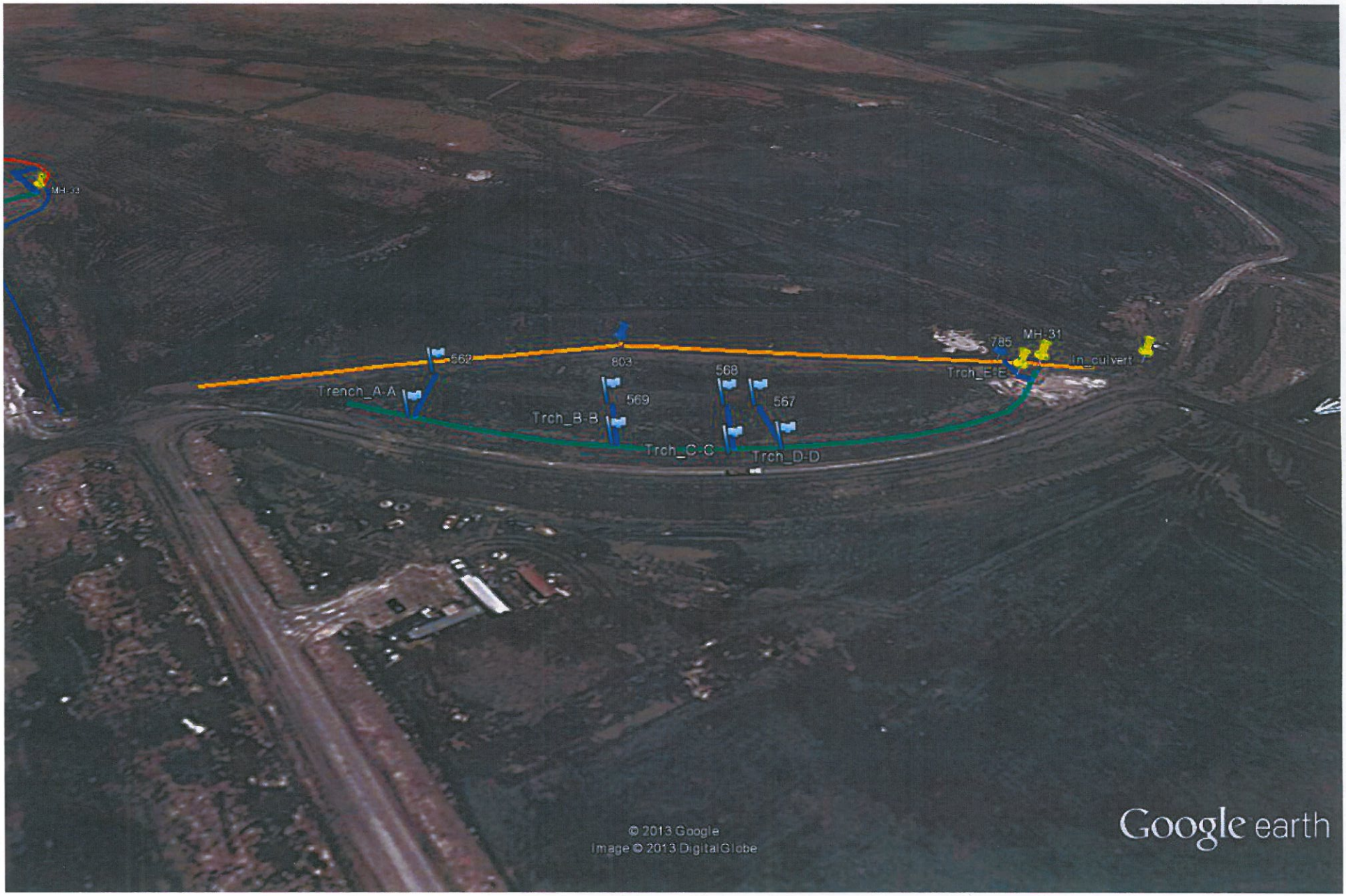


Google earth

feet 1000

meters 500

Berm
Glass Trench



Google earth

feet 1000

meters 500

Berm

Trench (Gless)

APPENDIX E

BACKGROUND DOCUMENTS

DRAFT

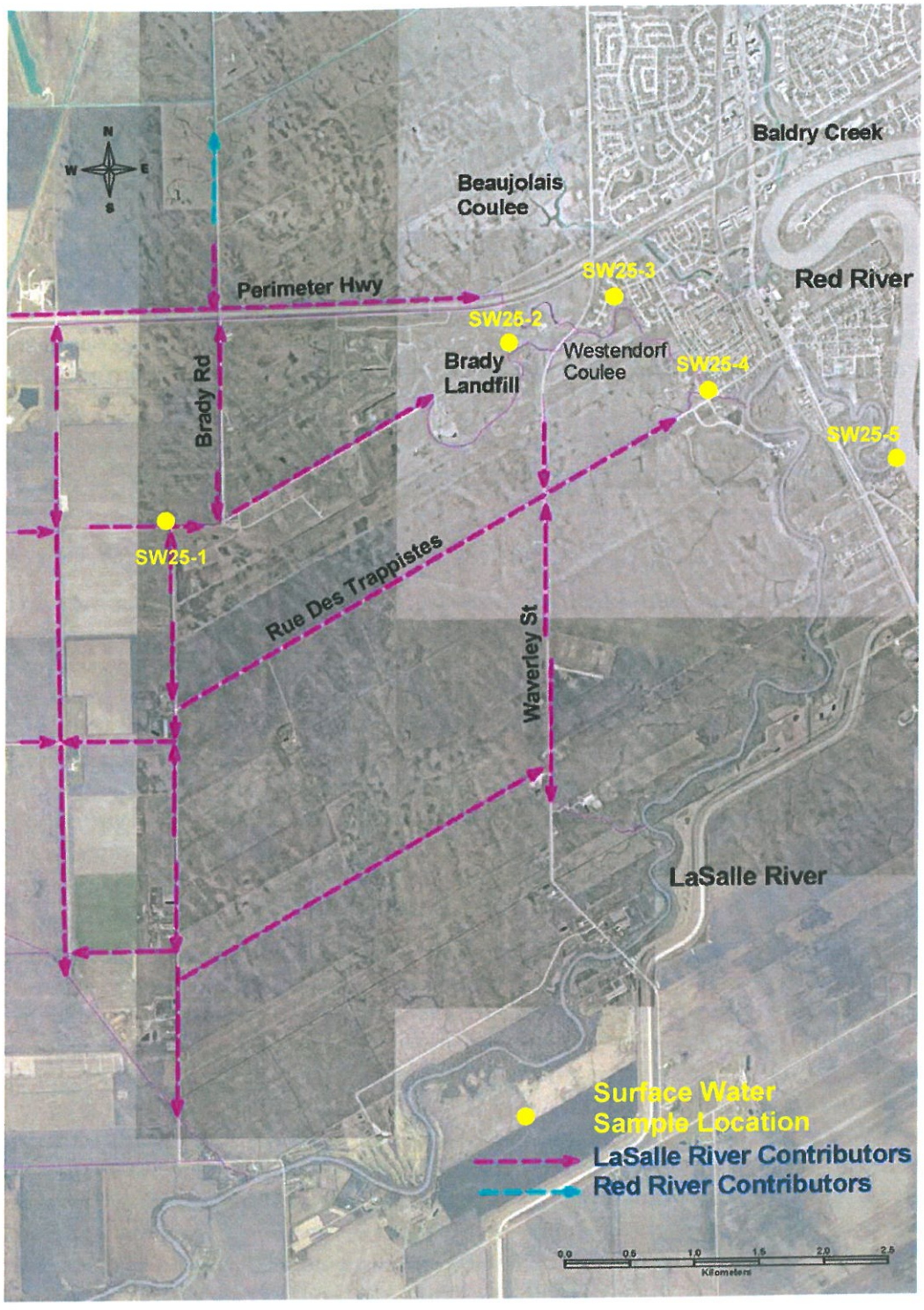


FIGURE 7-1

Current Surface Water Sampling Locations

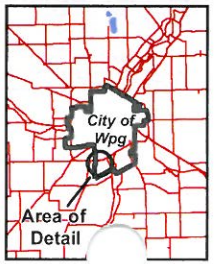
Source: Environmental Impact Assessment of Brady Road Landfill and Future Resource Management Facility, Stantec, December 2011.

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Groundwater and Leachate Sampling Locations at Brady Road Landfill

Figure 5-9



NORTH

220 110 0 220 440

Metres

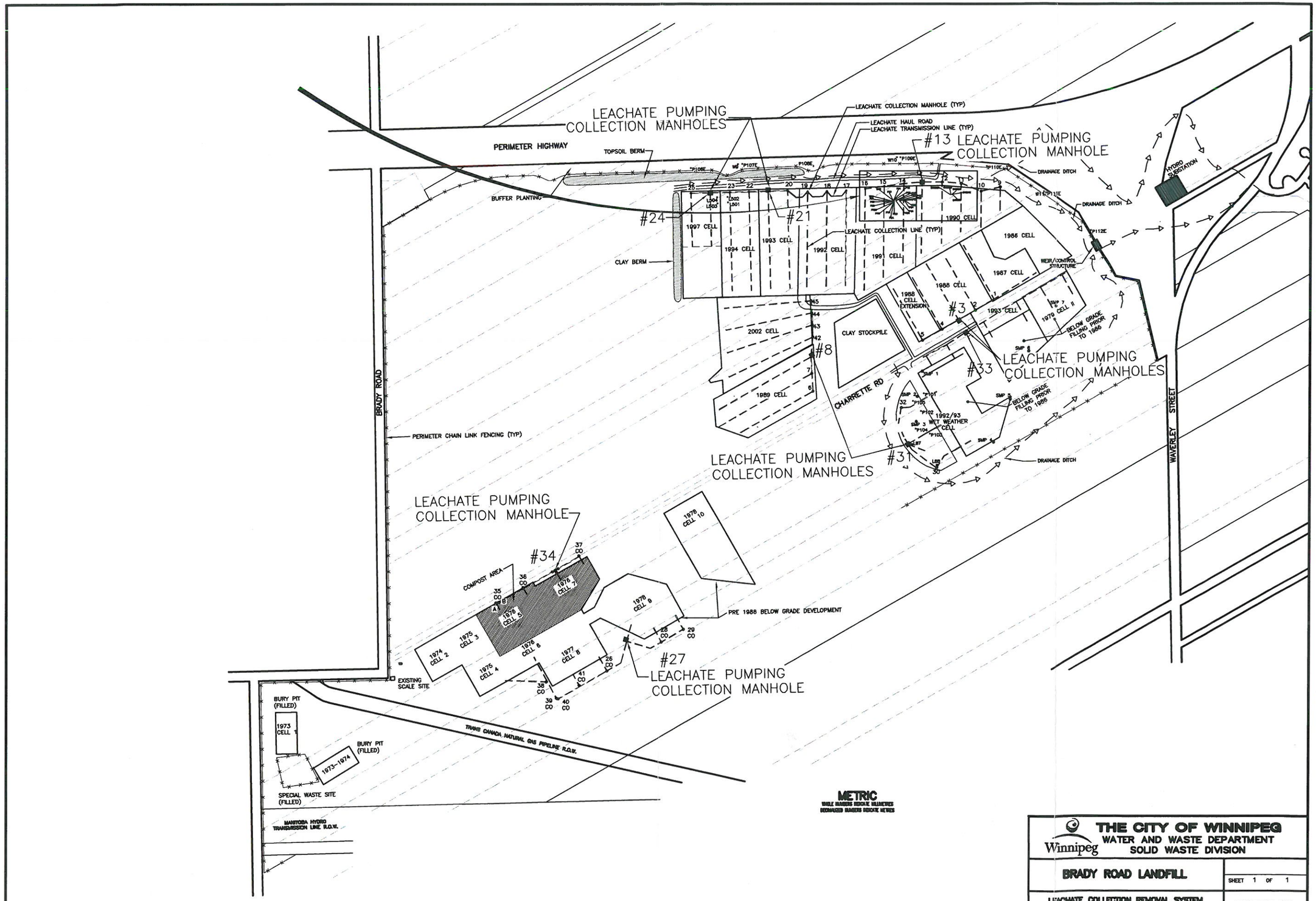
Acknowledgements:
Data provided by Government of Manitoba, ESRI, City of Winnipeg, Stantec Consulting Ltd.
Projection: NAD83 Zone 14N

PREPARED BY

Stantec

MAP SCALE	DATA SCALE
1:17,000	N/A
DATE: January 26, 2011	PROJECT: 1114 10000

G:\1_GIS_Project_Folder\0110_COW\66_Brady_LandFill\ArcMap\BradyLechate_GWSampling_20110330.mxd

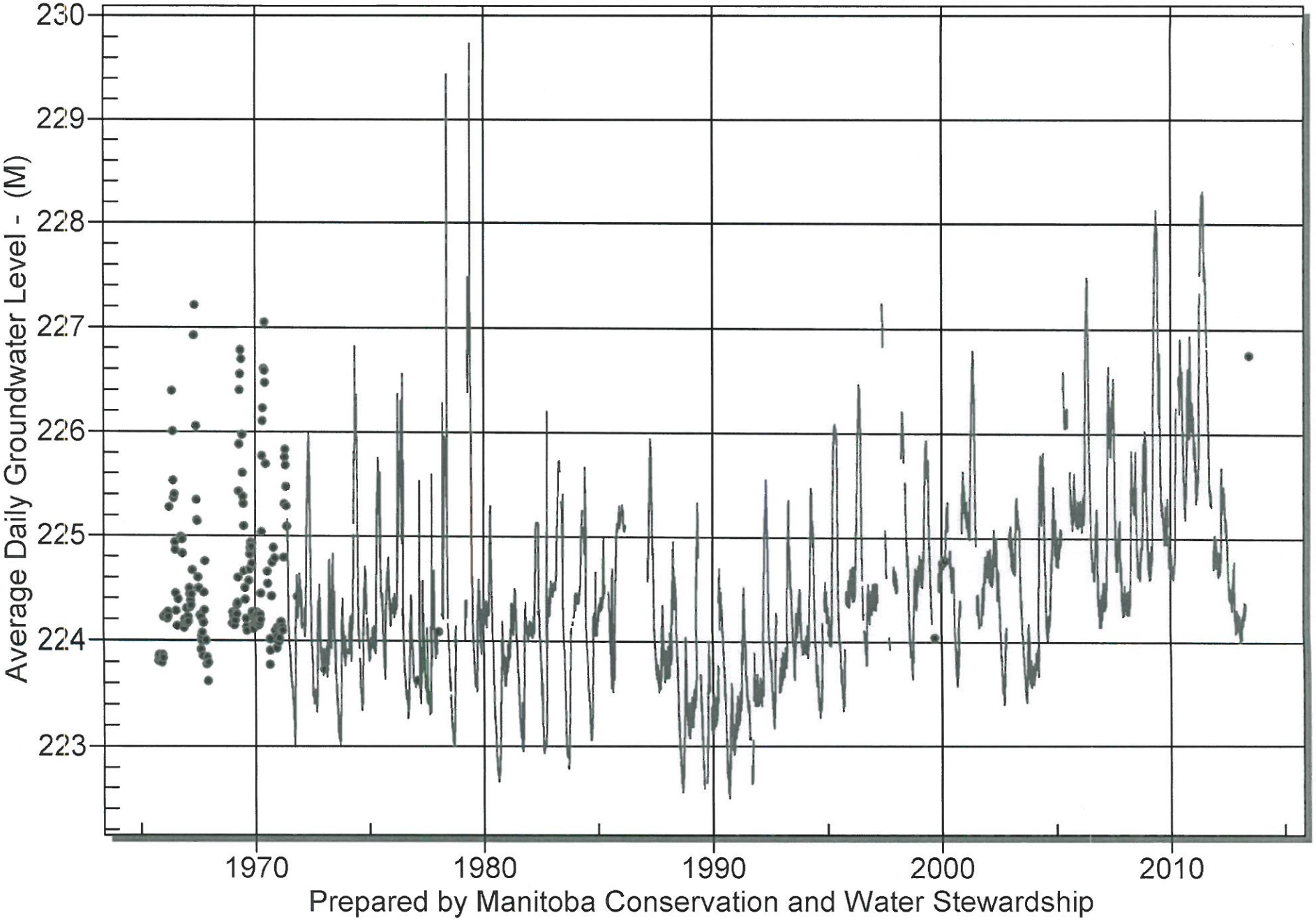


THE CITY OF WINNIPEG
Winnipeg
WATER AND WASTE DEPARTMENT
SOLID WASTE DIVISION

BRADY ROAD LANDFILL	SHEET 1 OF 1
LEACHATE COLLECTION REMOVAL SYSTEM	FIGURE 2-3

G05OC018 M-189 PERIMETER & HWY 75 93 ST NORBERT

GROUND LEVEL ELEVATION 231.237 METRES (758.65 FEET)



Prepared by Manitoba Conservation and Water Stewardship

APPENDIX F

SURFACE WATER

DRAFT

TABLE F-1
INORGANICS IN SURFACE WATER
BRADY ROAD LANDFILL

Location	Sample No.	Date	Parameter [1]																											
			pH	$CaCO_3$	HCO_3	CO_3	OH	Total Hardness	Calcium	Total Solids	Total Dissolved Solids	Suspended Solids	Fecal Coliform	Total Coliform	E coli	Fecal Streptococcus	Standard Plate Count	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate + Nitrite Nitrogen	Sulfate	Chloride	Total Organic Carbon	Soluble Organic Carbon	Chemical Oxygen Demand	Biochemical Oxygen Demand	Color Apparent	Color TRUE	TURBIDITY	SPECIFIC CONDUCTANCE
Units			*pH units*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*CFU/100 mL*	*CFU/100 mL*	*CFU/100 mL*			*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	-	-	*NTU*	*µS/cm*
Upstream	SW-25-1	17-Apr-08	7.84	126	124	-	-	133	68	210	209	13	-	-	-	-	-	0.4	<2	<0.05	1.26	N/S	N/S	15	-	-	-	-	-	23	323
Upstream	SW-25-1	18-Sep-08	7.6	272	252	-	-	288	126	468	464	<4	-	-	-	-	-	0.8	<2	0.523	0.131	11	58	23	-	-	-	-	-	2.04	712
Upstream	SW-25-1	07-Apr-11	8.01	60	60	-	-	72.8	38.2	216	130	-	-	430	43	-	-	0.5	<2	0.018	1.490	12.5	6.13	-	-	-	-	-	-	134	185
Upstream	SW-25-1	02-May-12	8	275	275	-	-	414	194	784	776	-	-	>200	0	-	-	0.222	4	<0.003	<0.003	142	121	30	-	-	-	-	-	3.54	1130
Upstream	SW-25-1	07-May-12	8.35	392	392	-	-	362	155	746	720	-	-	>200	>200	-	-	1.6	2	0.098	0.009	21.6	92.3	NA	-	-	-	-	-	6.42	968
Downstream	SW-25-2	17-Apr-08	7.95	139	137	-	-	166	82	263	274	16	-	-	-	-	-	<0.3	<2	0.37	1.39	N/S	N/S	15	-	-	-	-	-	27.3	393
Downstream	SW-25-2	18-Sep-08	7.49	376	376	-	-	502	179	1020	924	60	-	-	-	-	-	0.3	3	0.73	0.141	129	190	26	-	-	-	-	-	5.36	1440
Weir	SW-25-2	07-Apr-11	7.97	105	105	-	-	123	62.2	424	327	-	-	200	93	-	-	0.5	2	0.814	0.841	18.4	16.7	-	-	-	-	-	-	88.9	296
Down Stream	SWA25-2	25-Aug-11	8.31	612	612	-	-	1020	261	2390	1880	-	-	2100	2100	-	-	1.2	11	6.57	0.021	290	426	81	-	-	-	-	-	201	2680
Weir	SW-25-2	2-May-12	9.31	437	442	-	-	820	89	2380	2010	-	-	>200	118	-	-	0.7	20	3.3	8.51	454	618	84	-	-	-	-	-	36	3280
Weir	SW-25-2	7-May-12	8.52	453	453	-	-	433	113	1190	1120	-	-	>200	200	-	-	<0.3	3	0.587	0.22	99.8	234	NA	-	-	-	-	-	79.6	1590
Weir	SW-25-2	25-Oct-12	8.27	340	340	-	-	851	202	1880	1850	-	20	1180	20	-	-	<0.3	4	0.31	0.193	459	410	-	-	94	-	-	-	8.03	2460
Wastendorf Coolie	SW-25-3	07-Apr-11	7.82	105	105	-	-	108	55.0	384	255	-	-	200	43	-	-	0.5	2	0.610	0.770	16.9	21.7	-	-	-	-	-	-	50.5	302
Wastendorf Coolie	SW-25-3	02-May-12	7.96	291	291	-	-	665	206	1440	1060	-	-	>200	11	-	-	6	82.6	0.023	0.018	309	472	48	-	-	-	-	-	2.3	3430
LaSalle	SW-25-4	07-Apr-11	7.8	96	96	-	-	101	52.3	352	235	-	-	750	43	-	-	0.6	<2	0.165	0.977	15.5	17.4	-	-	-	-	-	-	49.3	269
LaSalle	SW-25-4	25-Aug-11	7.92	262	262	-	-	376	160	740	628	-	-	24000	9300	-	-	1.1	3	0.739	0.076	196	82.5	32	-	-	-	-	-	30.7	628
LaSalle	SW-25-4	02-May-12	8.39	227	232	-	-	335	64.9	1100	784	-	-	>200	21	-	-	<0.3	3	<0.003	0.021	125	121	19	-	-	-	-	-	8.95	1030
LaSalle	SW-25-4	07-May-12	7.94	297	297	-	-	233	101	544	498	-	-	>200	>200	-	-	0.3	3	0.851	0.399	68.6	65.4	NA	-	-	-	-	-	75.4	699
LaSalle	SW-25-4	25-Oct-12	8.02	231	231	-	-	439	218	866	798	-	90	560	40	-	-	0.4	2	0.103	0.325	144	153	-	-	33	-	-	-	44.7	1130
Red River	SW-25-5	07-Apr-11	7.99	132	132	-	-	199	114	596	332	-	-	750	9	-	-	0.7	<2	0.027	2.430	60	16.6	-	-	-	-	-	-	123	474
Red River	SW-25-5	25-Aug-11	8.38	253	253	-	-	411	201	872	746	-	-	73	43	-	-	0.6	<2	0.065	0.305	496	48.2	40	-	-	-	-	-	70.9	1020
Red River	SW-25-5	02-May-12	8.34	153	155	-	-	259	144	960	816	-	-	200	2	-	-	<0.3	2	0.007	0.924	166	87.3	17	-	-	-	-	-	34.2	898
Red River	SW-25-5	07-May-12	8.42	211	211	-	-	259	140	822	756	-	-	>200	78	-	-	0.6	2	0.113	0.302	127	54.7	NA	-	-	-	-	-	97.5	768
Red River	SW-25-5	25-Oct-12	8.35	290	290	-	-	578	294	1640	1150	-	20	60	20	-	-	0.3	<2	0.014	0.175	-	178	-	-	42	-	-	-	242	1580
East pond	SW-Eastpond	02-May-12	-	-	-	-	-	-	-	-	-	-	-	>200	>200	-	-	-	-	-	-	114	51	-	-	-	-	-	-	-	-
East pond	SW-Eastpond	07-May-12	-	-	-	-	-	-	-	-	-	-	-	>200	>200	-	-	-	-	-	-	113	56.7	-	-	-	-	-	-	-	-
East pond	SW-Eastpond	25-Oct-12	8.05	342	342	-	-	502	175	782	676	-	400	510	90	-	-	0.5	8	4.78	0.017	115	66.5	-	-	74	-	-	-	87.9	989
West Pond	SW-Westpond	02-May-12	-	-	-	-	-	-	-	-	-	-	-	145	130	-	-	-	-	-	-	120	58.1	-	-	-	-	-	-	-	-
West Pond	SW-Westpond	07-May-12	-	-	-	-	-	-	-	-	-	-	-	>200	>200	-	-	-	-	-	-	133	85.8	-	-	-	-	-	-	-	-
West Pond	SW-Westpond	25-Oct-12	7.89	346	346	-	-	553	157	832	770	-	540	OVERGROWN	160	-	-	0.6	8	5.48	0.02	126	95.6	-	-	71	-	-	-	59.2	1110
Manitoba Water Quality Standards, Objectives, Guidelines [1]																														
Freshwater Aquatic Life			6.5 - 9.0	-	-	-	-	-	-	-	-	[2]	200 [4]	-	200 [4]	-	-	0.05 [6]	-	-	-	-	-	-	-	-	-	-	-	Narrative [3]	1500 [5]

Notes:
"-" = No Data
N/S = Not enough Sample
NA = Not Applicable

1. Manitoba Water Stewardship Report 2011-01. Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG). November 28, 2011. Tier III guidelines are adapted from:
   CCME - Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, 1999, Updated November 2012.
2. Total Suspended Sediments:
   5 mg/L induced change from background where background total suspended sediment is ≤ 25 mg/L for exposures between 1 and 30 days.
3. Turbidity Guidelines (see Note 3).
   Equivalent induced levels of change as calculated from site specific or regional specific correlation between total suspended sediment and turbidity.
4. Fecal Coliform or Escherichia Coli 1 day average during recreational season.
5. Guideline is for field park or garden irrigation.
6. Narrative guideline for streams.

- Exceedance of MWQSOG

TABLE F-2
METALS IN SURFACE WATER
BRADY ROAD LANDFILL

Location	Sample No.	Date	Parameter																			
			Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved	Arsenic (As)-Dissolved	Barium (Ba)-Dissolved	Beryllium (Be)-Dissolved	Bismuth (Bi)-Dissolved	Boron (B)-Dissolved	Cadmium (Cd)-Dissolved	Calcium (Ca)-Dissolved	Cesium (Cs)-Dissolved	Chromium (Cr)-Dissolved	Cobalt (Co)-Dissolved	Copper (Cu)-Dissolved	Hexavalent Chromium-Dissolved	Iron (Fe)-Dissolved	Lead (Pb)-Dissolved	Lithium (Li)-Dissolved	Magnesium (Mg)-Dissolved	Manganese (Mn)-Dissolved	Mercury (Hg)-Dissolved	Molybdenum (Mo)-Dissolved
	Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
Upstream	SWQ 25-1	07-Apr-11	0.0117	<0.00020	0.00261	0.0138	<0.00020	<0.00020	0.014	<0.000010	14.5	<0.00010	<0.0020	<0.00020	0.00273		<0.10	<0.000090	0.0099	8.21	0.00242	<0.000050	0.00067
Upstream		02-May-12	0.0037	0.00031	0.00885	0.0718	<0.00020	<0.00020	0.012	0.000022	86.1	<0.00010	<0.0020	0.00065	0.00185		<0.10	<0.000090	0.0684	49.6	0.170		0.00399
Upstream		05-Jul-12	<0.020	<0.0020	0.0099	0.0517	<0.0020	<0.0020	<0.10	<0.00010	60.5	<0.0010	<0.020	<0.0020	<0.0020		<1.0	<0.00090	0.090	57.3	1.01	<0.000020	<0.0010
Weir	SWQ 25-2	07-Apr-11	0.0084	<0.00020	0.00306	0.0232	<0.00020	<0.00020	0.058	<0.000010	21.9	<0.00010	0.005	0.00033	0.00251		<0.10	<0.000090	0.0153	13.8	0.0197	<0.000050	0.00095
Weir		25-Aug-11	0.0076	0.00094	0.0299	0.147	0.00046	<0.00020	0.800	<0.000010	85.3	<0.00010	<0.0020	0.00225	0.00233		<0.10	0.000224	0.249	162	0.630		0.00934
Weir		02-May-12	0.0081	0.00171	0.0106	0.0329	<0.00020	<0.00020	2.0	0.000129	43.3	<0.00010	0.0042	0.00803	0.0371		<0.10	0.000124	0.276	192	0.0115		0.0160
Weir		05-Jul-12	<0.020	<0.0020	0.0137	0.0725	<0.0020	<0.0020	1.11	<0.00010	46.4	<0.0010	<0.020	0.0028	0.0040		<1.0	<0.00090	0.162	90.0	0.147	<0.000020	0.0060
Weir		25-Oct-12	0.0160	0.00033	0.00253	0.168	<0.00020	<0.00020	1.02	0.000033	83.4	<0.00010	<0.0020	0.00091	0.00242	<0.010	<0.10	<0.000090	0.218	174	0.0781	<0.000020	0.00641
Wastendorf Coolie	SWQ 25-3	07-Apr-11	0.0112	<0.00020	0.00288	0.0255	<0.00020	<0.00020	0.049	<0.000010	23.1	<0.00010	0.0057	0.00026	0.00305		<0.10	0.000109	0.0154	13.8	0.0118	<0.000050	0.00097
Wastendorf Coolie		02-May-12	0.0038	0.00075	0.00708	0.121	<0.00020	<0.00020	<1.0	0.000085	98.4	<0.00010	0.0022	0.00317	0.00844		<0.10	0.000118	0.203	114	0.420		0.00996
Wastendorf Coolie		25-Oct-12	0.0059	0.00042	0.00985	0.0712	<0.00020	<0.00020	0.078	0.000022	47.9	<0.00010	<0.0020	0.00303	0.00134		<0.10	<0.000090	0.0859	81.9	0.470	<0.000020	0.00606
LaSalle	SWQ 25-4	07-Apr-11	0.0058	<0.00020	0.00237	0.0234	<0.00020	<0.00020	0.026	<0.000010	22.1	<0.00010	<0.0020	<0.00020	0.00246		<0.10	<0.000090	0.0164	12.4	0.0114	<0.000050	0.00087
LaSalle		25-Aug-11	0.0079	0.00031	0.00819	0.0729	<0.00020	<0.00020	0.078	<0.000010	57.2	<0.00010	<0.0020	0.00131	0.00106		<0.10	<0.000090	0.0691	43.1	0.591		0.00203
LaSalle		25-Oct-11	0.0129	0.00031	0.00981	0.0801	<0.00020	<0.00020	0.101	0.000216	91.1	<0.00010	0.0064	0.00068	0.00268		<0.10	<0.000090	0.0728	55.7	0.0303	<0.000050	0.00354
LaSalle		02-May-12	<0.0020	0.00023	0.00464	0.0575	<0.00020	<0.00020	0.090	0.000015	69.1	<0.00010	<0.0020	0.00044	0.00210		<0.10	<0.000090	0.0667	42.8	0.0216		0.00236
LaSalle		05-Jul-12	<0.020	<0.0020	0.0030	0.0447	<0.0020	<0.0020	0.13	<0.00010	37.3	<0.0010	<0.020	<0.0020	0.0024		<1.0	<0.00090	0.061	35.2	0.220	<0.000020	0.0018
LaSalle		25-Oct-12	<0.0020	0.00025	0.00648	0.0570	<0.00020	<0.00020	0.101	0.000031	80.0	<0.00010	<0.0020	0.00063	0.00158	<0.010	<0.10	<0.000090	0.0808	39.2	0.0284	<0.000020	0.00405
Red River	SWQ 25-5	07-Apr-11	0.0033	<0.00020	0.00367	0.0312	<0.00020	<0.00020	0.028	0.00001	40.4	<0.00010	0.0056	0.00024	0.00308		<0.10	<0.000090	0.0167	18.8	0.0345	<0.000050	0.00122
Red River		25-Aug-11	0.0085	0.00036	0.00811	0.0692	<0.00020	<0.00020	0.115	<0.000010	76	<0.00010	<0.0020	0.00026	0.00496		<0.10	<0.000090	0.0669	45.3	0.046		0.00196
Red River		25-Oct-11	0.0023	0.00028	0.00574	0.0609	<0.00020	<0.00020	0.152	0.00053	83.1	<0.00010	<0.0020	0.00036	0.00277		<0.10	<0.000090	0.0627	51	0.0574	<0.000050	0.00239
Red River		02/05/2012	<0.0020	0.00029	0.00352	0.0631	<0.00020	<0.00020	0.082	0.000021	63.8	<0.00010	<0.0020	0.00032	0.00233		<0.10	<0.000090	0.0464	30.6	0.00722		0.00235
Red River		02-May-12	0.0025	0.00024	0.00619	0.0340	<0.00020	<0.00020	0.054	0.000012	48.9	<0.00010	<0.0020	0.00056	0.00134		<0.10	<0.000090	0.0603	48.0	0.00467		0.00294
Red River		05-Jul-12	<0.020	<0.0020	0.0110	0.0396	<0.0020	<0.0020	0.67	0.00012	56.3	<0.0010	<0.020	<0.0020	0.0068		<1.0	<0.00090	0.045	30.6	0.143	<0.000020	0.0029
Red River		25-Oct-12	0.0408	0.00036	0.00803	0.0814	<0.00020	<0.00020	0.165	0.000098	93.5	<0.00010	<0.0020	0.00053	0.00153	<0.010	<0.10	0.000100	0.0958	51.3	0.172	<0.000020	0.00330
East Pond	SW - EAST POND	05-Jul-12	<0.020	<0.0020	0.0071	0.0837	<0.0020	<0.0020	<0.10	<0.00010	33.6	<0.0010	<0.020	<0.0020	<0.0020		<1.0	<0.00090	0.073	48.0	0.0163	<0.000020	0.0039
East Pond		25-Oct-12	0.0022	0.00028	0.00659	0.0734	<0.00020	<0.00020	0.069	0.000029	54.7	<0.00010	<0.0020	0.00264	0.00111	<0.010	<0.10	<0.000090	0.0824	74.0	0.484	<0.000020	0.00576
West Pond	SW - WEST POND	02-May-12	<0.0020	0.00036	0.00990	0.0373	<0.00020	<0.00020	0.053	0.000015	65.1	<0.00010	<0.0020	0.00102	0.00198		<0.10	<0.000090	0.0699	54.3	0.154		0.00285
West Pond		05-Jul-12	<0.020	<0.0020	0.0101	0.0398	<0.0020	<0.0020	<0.10	<0.00010	30.5	<0.0010	<0.020	<0.0020	<0.0020		<1.0	<0.00090	0.079	64.6	0.0050	<0.000020	0.0041
Manitoba Water Quality Standards, Objectives, Guidelines [1]																							
Freshwater Aquatic Life			0.005 - 0.1 [2]	-	0.15	-	-	-	29 [3] 1.5 [4]	0.0002-0.0012 [5]	-	-	0.057-0.497 (III) [5] 0.011 (VI)	-	0.0068-0.065 [5]	0.011	0.3	0.0018-0.028 [5]	-	-	-	0.000026	0.073

TABLE F-2
METALS IN SURFACE WATER
BRADY ROAD LANDFILL

Location	Sample No.	Date	Parameter																	
			Nickel (Ni)-Dissolved	Phosphorus (P)-Dissolved	Potassium (K)-Dissolved	Rubidium (Rb)-Dissolved	Selenium (Se)-Dissolved	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved	Strontium (Sr)-Dissolved	Tellurium (Te)-Dissolved	Thallium (Tl)-Dissolved	Thorium (Th)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Tungsten (W)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn)-Dissolved	Zirconium (Zr)-Dissolved
	Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
Upstream	SWQ 25-1	07-Apr-11	0.0033	0.26	7.21	0.0005	<0.0010	4.59	<0.00010	3.43	0.0517	<0.00020	<0.00010	0.00012	<0.00020	0.00189	<0.00020	0.00034	0.0105	0.0034	0.00043
Upstream		02-May-12	0.0050	0.232	14.2	0.00094	<0.0010	5.40	<0.00010	60.4	0.346	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	0.00633	0.00361	<0.0020	0.00054
Upstream		05-Jul-12	<0.010	1.37	13.2	<0.0020	<0.010	10.4	<0.0010	54.3	0.305	<0.0020	<0.0010	<0.0010	<0.0020	<0.0020	<0.0010	<0.0010	0.0037	<0.020	<0.0040
Weir	SWQ 25-2	07-Apr-11	0.0038	0.23	8.3	0.00069	<0.0010	4.27	<0.00010	10.4	0.0955	<0.00020	<0.00010	<0.00010	<0.00020	0.00168	<0.00020	0.001	0.00894	0.0051	0.00048
Weir		25-Aug-11	0.0331	0.74	29.0	0.00248	0.0026	12.7	<0.00010	229	0.769	<0.00020	<0.00010	<0.00010	<0.00020	0.00233	<0.00020	0.0102	0.0121	0.0048	0.00085
Weir		02-May-12	0.100	0.159	74.6	0.00706	0.0019	2.58	<0.00010	422	0.434	<0.00020	<0.00010	<0.00010	0.00022	0.00787	0.00086	0.0222	0.00454	0.0090	0.00407
Weir		05-Jul-12	0.033	<0.30	31.8	0.0030	<0.010	5.61	<0.0010	146	0.387	<0.0020	<0.0010	<0.0010	<0.0020	0.0031	<0.0010	0.0056	0.0068	<0.020	<0.0040
Weir		25-Oct-12	0.0411	<0.030	42.6	0.00121	<0.0010	1.38	<0.00010	307	0.688	<0.00020	<0.00010	<0.00010	<0.00020	0.00710	<0.00010	0.00861	0.00023	<0.0020	0.00066
Wastendorf Coolie	SWQ 25-3	07-Apr-11	0.0038	0.24	8.6	0.00075	<0.0010	4.27	<0.00010	8.1	0.0895	<0.00020	<0.00010	<0.00010	<0.00020	0.00192	<0.00020	0.00087	0.00782	0.0071	0.00043
Wastendorf Coolie		02-May-12	0.0451	0.079	35.9	0.00253	0.0010	2.21	<0.00010	239	0.498	<0.00020	<0.00010	<0.00010	<0.00020	0.00510	0.00028	0.0168	0.00154	0.0202	0.00070
Wastendorf Coolie		25-Oct-12	0.0120	0.365	13.5	0.00316	<0.0010	6.38	<0.00010	82.0	0.355	<0.00020	<0.00010	<0.00010	<0.00020	0.00202	<0.00010	0.00439	0.00174	<0.0020	<0.00040
LaSalle	SWQ 25-4	07-Apr-11	0.003	0.21	7.53	0.00062	<0.0010	4.15	<0.00010	9.87	0.0715	<0.00020	<0.00010	<0.00010	<0.00020	0.00079	<0.00020	0.00085	0.00618	0.0046	<0.00040
LaSalle		25-Aug-11	0.0068	0.36	11.9	0.00126	0.0012	6.72	<0.00010	47.9	0.288	<0.00020	<0.00010	<0.00010	<0.00020	0.00069 [7]	<0.00020	0.00216	0.00505	0.0029	0.00042
LaSalle		25-Oct-11	0.007	0.17	10.7	0.00074	0.0012	3.41	<0.00010	84.4	0.452	<0.00020	<0.00010	<0.00010	<0.00020	0.00168	<0.00020	0.00455	0.0094	0.0085	0.00068
LaSalle		02-May-12	0.0053	0.049	9.90	0.00064	<0.0010	2.16	<0.00010	81.2	0.336	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	0.00277	0.00195	0.0040	<0.00040
LaSalle		05-Jul-12	<0.010	<0.30	9.11	0.0026	<0.010	2.99	<0.0010	40.5	0.200	<0.0020	<0.0010	<0.0010	<0.0020	<0.0020	<0.0010	0.0044	0.0033	<0.020	<0.0040
LaSalle		25-Oct-12	0.0046	0.175	10.1	0.00082	<0.0010	8.08	<0.00010	108	0.378	<0.00020	<0.00010	<0.00010	<0.00020	0.00244	<0.00010	0.00324	0.00361	0.0077	<0.00040
Red River	SWQ 25-5	07-Apr-11	0.004	0.4	7.17	0.0012	<0.0010	5.94	<0.00010	10.5	0.125	<0.00020	<0.00010	<0.00010	<0.00020	0.00052	<0.00020	0.00326	0.00601	0.004	<0.00040
Red River		25-Aug-11	0.007	0.34	9.68	0.00199	<0.0010	9.90	<0.00010	57.4	0.325	<0.00020	<0.00010	<0.00010	<0.00020	0.00151	<0.00020	0.00296	0.00732	0.0069	<0.00040
Red River		25-Oct-11	0.0041	0.12	9.68	0.00203	0.0013	6.28	<0.00010	91.4	0.375	<0.00020	<0.00010	<0.00010	<0.00020	0.00154	<0.00020	0.00328	0.00487	0.009	<0.00040
Red River		02/05/2012	0.0041	0.084	8.91	0.00143	<0.0010	2.77	<0.00010	68.6	0.282	<0.00020	<0.00010	<0.00010	<0.00020	0.00231	<0.00020	0.00316	0.00291	<0.0020	<0.00040
Red River		02-May-12	0.0065	<0.030	8.37	0.00150	<0.0010	1.70	<0.00010	46.7	0.339	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	0.00300	0.00138	<0.0020	<0.00040
Red River		05-Jul-12	<0.010	<0.30	8.80	<0.0020	<0.010	7.61	<0.0010	60.8	0.273	<0.0020	<0.0010	<0.0010	<0.0020	0.0042	<0.0010	0.0022	0.0086	<0.020	<0.0040
Red River		25-Oct-12	0.0054	0.223	14.2	0.00189	<0.0010	7.38	<0.00010	188	0.533	<0.00020	<0.00010	<0.00010	<0.00020	0.00528	<0.00010	0.00322	0.00396	0.0022	<0.00040
East Pond	SW - EAST POND	05-Jul-12	<0.010	<0.30	8.24	<0.0020	<0.010	2.19	<0.0010	45.6	0.298	<0.0020	<0.0010	<0.0010	<0.0020	0.0021	<0.0010	0.0042	0.0032	<0.020	<0.0040
East Pond		25-Oct-12	0.0098	0.137	10.4	0.00228	<0.0010	6.57	<0.00010	79.1	0.401	<0.00020	<0.00010	<0.00010	<0.00020	0.00195	<0.00010	0.00376	0.00083	<0.0020	<0.00040
West Pond	SW - WEST POND	02-May-12	0.0083	0.253	11.6	0.00226	<0.0010	4.49	<0.00010	53.4	0.367	<0.00020	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	0.00404	0.00253	<0.0020	<0.00040
West Pond		05-Jul-12	<0.010	<0.30	11.3	<0.0020	<0.010	4.01	<0.0010	60.6	0.249	<0.0020	<0.0010	<0.0010	<0.0020	0.0024	<0.0010	0.0051	0.0046	<0.020	<0.0040
Manitoba Water Quality Standards, Objectives, Guidelines [1]																					
Freshwater Aquatic Life			0.040 - 0.37 [5]	0.05	-	-	0.001	-	0.0001	-	-	-	0.0008	-	-	-	-	(0.033[3]) 0.015 [4]	-	0.090-0.85 [5]	-

Notes:

1. Manitoba Water Stewardship Report 2011-01. Manitoba Water Quality Standards, Objectives, Guidelines. November 28, 2011.
   a. CCME - Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, 1999, Updated November 2012.
3. Total aluminum should not exceed 0.005 mg/L in waters with a pH below 6.5.
   The concentration of total aluminum should not exceed 0.1 mg/L in waters with a pH greater or equal to 6.5.
4. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events
   (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
   These are NOT protective guidelines.
5. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7d exposures for fish and invertebrates, 24h exposures for aquatic plants and algae).
6. See Tier II Objectives for calculations
7. Units to be confirmed by the COW.

Sample ID	Date	Hardness (mg/L)	Cadmium (mg/L)	Chromium III (mg/L)	Copper (mg/L)	Lead (mg/L)	Nickel (mg/L)	Zinc (mg/L)
SW-25-1	07-Apr-11	72.8	0.0002	0.06	0.01	0.002	0.04	0.09
SW-25-1	02-May-12	414	0.0007	0.24	0.03	0.011	0.17	0.39
SW-25-1	07-May-12	362	0.0006	0.21	0.03	0.010	0.15	0.35
SW-25-2	07-Apr-11	123	0.0003	0.09	0.01	0.003	0.06	0.14
SW-25-2	25-Aug-11	1020	0.0012	0.50	0.07	0.028	0.37	0.85
SW-25-2	2-May-12	820	0.0011	0.42	0.05	0.022	0.31	0.70
SW-25-2	7-May-12	433	0.0007	0.25	0.03	0.012	0.18	0.41
SW-25-2	25-Oct-12	851	0.0011	0.43	0.06	0.023	0.32	0.72
SW-25-3	07-Apr-11	108	0.0003	0.08	0.01	0.003	0.06	0.13
SW-25-3	02-May-12	665	0.0009	0.35	0.05	0.018	0.26	0.59
SW-25-4	07-Apr-11	101	0.0002	0.07	0.01	0.003	0.05	0.12
SW-25-4	25-Aug-11	376	0.0006	0.22	0.03	0.010	0.16	0.36
SW-25-4	02-May-12	335	0.0006	0.20	0.03	0.009	0.14	0.33
SW-25-4	25-Oct-12	439	0.0007	0.25	0.03	0.012	0.18	0.41
SW-25-5	07-Apr-11	199	0.0004	0.13	0.02	0.005	0.09	0.21
SW-25-5	25-Aug-11	411	0.0007	0.24	0.03	0.011	0.17	0.39
SW-25-5	02-May-12	259	0.0005	0.16	0.02	0.007	0.12	0.26
SW-25-5	25-Oct-12	578	0.0008	0.31	0.04	0.016	0.23	0.52
SW-Eastpond	25-Oct-12	502	0.0008	0.28	0.04	0.014	0.20	0.46
SW-Westpond	25-Oct-12	553	0.0008	0.30	0.04	0.015	0.22	0.50

- Exceedance of MWQSOG

APPENDIX G

GROUNDWATER

DRAFT

TABLE G-1
INORGANICS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter [1]																		
		Alkalinity as Bicarbonate	Total Hardness	Hardness as Ca	Total Alkalinity	pH	Total Dissolved Solids	Total Organic Carbon	Total Solids	Turbidity	Specific Conductance at 25°C	Total Kjeldahl Nitrogen	Total Phosphorus	Nitrate + Nitrite Nitrogen	Total Ammonia	Chloride	Sulfate	Total Coliforms	E.coli	Fecal Coliforms
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*units*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*MPN/100mL*	*MPN/100mL*	*CFU/100mL*
GWQ 25-4N34A	*14-Jul-09*	740	3400	2400	740	6.81	6140	15	6900	673	6410	5	0.7	0.190	0.258	432	3010	NS	NS	-
	22-Oct-09	605	3400	1790	605	6.66	No Aliquot	14	NA	90.0	6220	2	<0.3	0.123	0.288	333	3060	NS	NS	-
GWQ 25-4N34B	*14-Jul-09*	692	2550	1300	692	7.09	4680	7	8760	544	4910	<2	0.8	0.566	0.144	387	1960	NS	NS	-
	22-Oct-09	730	2790	1890	730	7.11	No Aliquot	9	NA	740	4830	3	1.0	0.900	0.080	392	1700	NS	NS	-
	05-Aug-10	700	4100	2170	700	7.51	4020	7	4500	1460	4640	<2	<0.3	0.155	<0.003	403	1910	<3	<3	-
	19-Oct-11	691	3050	1440	691	7.36	4740	11	4820	36.2	5000	<2	<0.3	3.05	<0.003	387	2260	0	0	-
	06-Jun-12	740	2560	1200	740	7.24	4840	6.7	5110	151	7590	<2	<0.3	5.39	<0.003	549	1830	5	0	-
	24-Oct-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	29-Oct-12	619	2750	1460	619	7.28	5140	12.4	5370	59.7	4900	<2	<0.3	1.33	0.13	559	2180	<3	<10	<3
Duplicate 102	*29-Oct-12*	513	2560	1350	513	7.25	5120		5360	110	4980	<2	<0.3	1.7	0.146	537	2120	<3	<3	<10
GWQ 25-4N34C	*14-Jul-09*	728	1400	1200	728	7.18	2320	7	7920	256	3010	<2	0.3	0.034	0.143	322	609	NS	NS	-
	22-Oct-09	890	7650	960	890	7.10	No Aliquot	17	NA	106000	2960	17	145.4	0.013	0.177	289	640	NS	NS	-
	05-Aug-10	650	1690	988	650	7.54	2300	9	23200	22200	3000	30	12.0	0.226	0.059	367	774	<3	<3	-
	06-Jun-11	17200	9340	6800	17200	7.24	2500	25	198000	112000	2940	18	60.1	<0.003	1.180	339	922	<3	<3	-
GWQ 25-4N34D	*06-Jul-09*	735	3350	440	735	7.79	5650	9	6240	96.8	5970	2	<0.3	0.165	0.020	2810	311	NS	NS	-
	22-Oct-09	800	3480	990	800	7.24	No Aliquot	12	NA	113	588	<2	<0.3	0.113	<0.003	333	2700	NS	NS	-
	05-Aug-10	700	4370	1510	700	7.37	6690	9	14700	436	6610	15	2.9	0.586	0.059	328	4390	<3	<3	-
	06-Jun-11	856	3760	1040	856	7.53	6410	14	7530	1000	6040	<2	0.9	0.935	<0.003	404	3300	<3	<3	-
	19-Oct-11	983	4510	1280	983	7.52	7730	74	9810	2780	6900	2	1.9	3.48	<0.003	478	3630	0	0	-
	05-Jul-12	326	3060	1340	326	7.72	6060		8010	7.12	-	<2	0.4	0.062	0.912	487	2870	18	0	-
GWQ 25-4N34DR	*29-Oct-12*	427	2900	1200	427	7.39	6080	7.9	10100	1650	5630	3	0.4	0.133	0.861	500	2830	<3	<10	<3
Duplicate 100	*29-Oct-12*	414	3060	1320	414	7.54	6090		11300	2100	5700	<2	0.7	0.132	0.94	512	2900	<3	<3	<10
GWQ 25-5N62C	*03-Aug-10*	536	3670	3080	536	6.80	8590	36	8640	24.9	10000	4	0.3	0.657	0.488	1770	2440	1	0	-
GWQ 25-5N62D	*03-Aug-10*	424	3400	2970	424	7.12	7950	25	9380	27.5	8480	4	0.3	2.56	0.163	1830	2850	10	0	-
	09-Jun-11	482	3770	1880	482	7.35	9340	20	9720	508	9390	4	0.8	1.160	0.464	1600	3620	4	0	-
	10-Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-
	20-Oct-11	503	3460	2080	503	6.95	7520	38	8230	256	9330	3	1.0	1.97	0.048	2030	2690	0	0	-
	06-Jun-12	480	2840	1720	480	6.9	7420	13.5	7680	39.2	8170	3	<0.3	2.04	<0.003	2020	2110	1	0	-
	23-Oct-12	372	3190	1980	372	6.94	7370	15.8	7450	22.8	8690	2	<0.3	<0.003	0.014	1940	1980	Overgrown	Overgrown	<1
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-
GWQ 25-5N62E	*03-Aug-10*	160	1540	1110	160	7.33	5280	16	96700	61200	8480	11	26.7	0.113	1.16	2260	779	<3	<3	-
	06-Jun-11	4980	5030	3430	4980	7.54	5550	73	20700	8790	8090	3	3.9	<0.003	1.190	2360	810	<3	<3	-
	20-Oct-11	4660	7220	4600	4660	7.37	5610	175	19500	1260	8360	4	2.9	<0.003	1.140	4330	1540	0	0	-
	06-Jun-12	2810	3230	2090	2810	7.48	5760	1	16300	5320	6390	4	2.9	0.022	1.04	2450	847	<10	<10	-
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	<1
	23-Oct-12	109	3000	1900	109	7.4	6270	1.3	15500	4390	8210	3	0.9	0.006	1.13	2340	809	3	<1	1
GWQ 25-6N57B	*08-Jul-09*	648	2720	900	648	7.06	3960	22	8490	1500	5620	6	1.7	0.045	0.767	512	2480	NS	NS	-
	21-Oct-09	710	2750	2300	710	6.88	4930	14	6870	895	5590	4	0.6	0.021	0.690	480	2640	NS	NS	-
GWQ 25-6N57C	*08-Jul-09*	528	2580	680	528	7.00	5370	18	6710	493	5990	4	0.5	0.032	0.683	738	2260	NS	NS	-
	21-Oct-09	550	2790	2070	550	6.93	5610	15	6270	232	5950	4	<0.3	0.014	0.741	771	2400	NS	NS	-
	18-Aug-10	500	2800	1990	500	7.24	5010	25	10700	1960	5920	<2	6.7	0.073	0.638	732	2110	NS	NS	-
GWQ 25-6N57D	*08-Jul-09*	456	2460	760	456	7.02	5310	13	6040	590	6340	5	0.8	0.062	0.943	1210	1750	NS	NS	-
	21-Oct-09	470	2480	1880	470	6.94	4830	14	35800	556	6360	3	0.5	0.019	1.050	1200	1820	NS	NS	-
	18-Aug-10	420	2500	1780	420	7.16	4790	20	6960	1050	6310	<2	5.6	0.038	0.903	1150	1680	NS	NS	-
	14-Jun-11	600	2370	1600	600	7.94	5980	12	7590	4760	6080	5	1.3	0.052	0.941	1200	1760	-	-	-
	20-Oct-11	437	2900	1870	437	7.02	4910	42	6650	785	6120	3	1.1	0.335	0.764	1240	1780	-	-	-
	12-Jun-12	331	1940	1240	331	7.86	5600	11.4	6860	525	6240	4	0.6	0.521	0.505	576	1500	-	-	-
GWQ 25-6N57DR	*29-Oct-12*	443	2440	1560	443	7.14	5990	12.5	6110	50.6	6140	7	0.4	3	0.239	930	2300	<3	<10	<3
GWQ 25-6N57E	*08-Jul-09*	312	2040	480	312	7.26	5040	9	29000	12800	6590	7	5.0	0.192	0.907	1480	1410	NS	NS	-
	21-Oct-09	2020	7080	1560	2020	7.34	4860	8	5940	15800	6770	NR	NR	0.013	1.000	1540	1530	NS	NS	-
	18-Aug-10	250	1380	944	250	7.53	5100	12	9300	1360	8400	<2	4.8	0.004	1.13	1470	1380	NS	NS	-
MOE Standards [1]																				
Table 3 (Non-potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	2300	-	-	-	-
Other Standards - For Reference Only																				
Health Canada Drinking Water [2]		-	-	-	-	6.5-8.5 (AO)	500 (AO)	-	-	0.3/1.0/.01 (3)	-	-	-	10	-	≤250 (AO) (6)	500 (AO)	None Detectable per 100 mL (MAC)	None Detectable per 100 mL (MAC)	-
MOE Standards - Table 2 (Potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	790	-	-	-	-

TABLE G-1
INORGANICS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter [1]																		
		Alkalinity as Bicarbonate	Total Hardness	Hardness as Ca	Total Alkalinity	pH	Total Dissolved Solids	Total Organic Carbon	Total Solids	Turbidity	Specific Conductance at 25°C	Total Kjeldahl Nitrogen	Total Phosphorus	Nitrate + Nitrite Nitrogen	Total Ammonia	Chloride	Sulfate	Total Coliforms	E.coli	Fecal Coliforms
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*units*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*MPN/100mL*	*MPN/100mL*	*CFU/100mL*
GWQ 25-6N57F	*06-Jul-09*	310	1250	360	310	7.57	5380	2	6030	480	8210	4	<0.3	0.019	1.149	2500	829	NS	NS	-
	18-Aug-10	320	1800	1230	320	7.54	4710	33	33300	13100	6780	<2	12.9	0.024	1.02	2420	880	NS	NS	-
	13-Jun-11	1210	1460	778	1210	7.61	5390	2	9360	2360	8270	4	0.7	<0.003	1.140	2430	978	-	-	-
	20-Oct-11	704	3620	2100	704	7.33	7010	44	10400	4050	8720	5	2.6	<0.003	1.210	2580	968	0	0	-
	12-Jun-12	293	3680	2350	293	7.81	5380	4.3	14200	5140	6680	6	3.2	0.061	1.27	1460	1390	-	-	-
	01-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	02-Nov-12	324	2500	1500	324	7.4	5220		7590	1710	6650	3	1	0.099	1.7	1460	1400	-	-	-
GWQ 25-6N58A	*21-Oct-09*	610	2890	2570	610	6.98	5000	17	5690	294	5590	<2	0.3	0.021	0.069	385	2770	NS	NS	-
GWQ 25-6N58B	*21-Oct-09*	600	2850	2410	600	6.96	5310	18	6060	410	5890	3	0.4	0.021	0.400	647	2780	NS	NS	-
GWQ 25-6N58C	*21-Oct-09*	550	2570	2440	550	6.82	4940	15	5120	129	5920	4	<0.3	0.015	0.666	787	1870	NS	NS	-
	04-Aug-10	555	2780	2400	555	7.12	4780	16	6370	483	5990	4	0.8	0.19	0.419	905	1930	NS	NS	-
GWQ 25-6N58D	*14-Jul-09*	440	2700	1800	440	6.92	4680	12	6210	547	6270	6	0.5	0.135	0.913	1210	1220	NS	NS	-
	21-Oct-09	440	2400	2330	440	6.86	5190	12	5440	246	6250	4	<0.3	0.037	0.962	1260	1510	NS	NS	-
	04-Aug-10	470	2550	2110	470	7.23	4260	14	6740	658	6290	5	0.4	0.097	0.727	1230	1370	NS	NS	-
	13-Jun-11	750	2620	1640	750	7.10	5530	13	6990	1460	5990	5	1.0	0.064	0.851	1310	1430	NS	NS	-
	24-Oct-11	663	3240	2020	663	7.35	2240	13	9410	3560	6060	3	1.5	0.274	0.850	1330	1450	-	-	-
	07-Jun-12	-	-	-	-	-	-	6.7	-	-	-	-	-	-	-	-	-	-	-	-
	12-Jun-12	326	2500	1590	326	7.88	5540	-	6890	815	6050	4	0.9	0.43	0.537	1310	1440	-	-	-
GWQ 25-6N58DR	*24-Oct-12*	465	2890	1810	465	7.66	5660	22	5780	49.5	6450	4	<0.3	1.64	0.721	1140	1920	Overgrown	Overgrown	Overgrown
	06-Nov-12	326	2500	1590	326	7.88	5540	-	6890	815	6050	4	0.9	0.43	0.537	-	-	Overgrown	Overgrown	Overgrown
	13-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
GWQ 25-6N58E	*14-Jul-09*	220	2200	1400	220	7.32	4530	8	15200	10700	6060	9	4.6	0.056	1.576	1470	1090	NS	NS	-
	21-Oct-09	315	1860	1710	315	7.30	4330	9	4520	204	5810	4	<0.3	0.009	1.525	1030	1260	NS	NS	-
	05-Aug-10	350	2020	1600	350	7.22	4160	51	42700	34800	5430	27	15.5	0.005	1.11	1100	1430	<3	<3	-
GWQ 25-6N58F	*14-Jul-09*	1260	1950	900	1260	7.20	3350	11	39900	28400	5370	13	13.4	0.098	1.262	884	1260	NS	NS	-
	21-Oct-09	1460	6010	3340	1460	7.23	3990	9	14300	6320	5430	7	3.5	0.025	1.323	954	1540	NS	NS	-
	05-Aug-10	420	2060	1730	420	7.03	4140	20	22200	18800	5450	17	6.5	0.007	0.925	984	1460	<3	<3	-
	09-Jun-11	1600	5820	3420	1600	7.18	5110	8	14800	6770	5210	6	4.0	0.016	1.030	925	1420	0	0	-
	24-Oct-11	7020	6740	4370	7020	7.14	3980	8	37800	16100	5280	5	2.6	0.030	1.660	969	1370	-	-	-
	07-Jun-12	578	8440	5860	578	7.67	4640	5.1	58400	245000	5410	11	11	0.013	1.27	1060	1410	-	-	-
	24-Oct-12	324	4830	2930	324	7.68	4500	16.1	20700	664	5540	7	4.8	0.024	1.3	1100	1360	NS	NS	NS
GWQ 25-6N59A	*14-Jul-09*	660	2350	1530	660	7.02	3240	12	4770	184	4860	<2	<0.3	0.334	0.053	496	2220	NS	NS	-
	21-Oct-09	690	2130	834	690	7.08	3770	10	4320	270	4410	<2	<0.3	0.043	<0.003	384	2060	NS	NS	-
GWQ 25-6N59B	*14-Jul-09*	548	2750	2400	548	6.78	5070	13	5660	161	5790	4	<0.3	0.079	0.452	680	2170	NS	NS	-
	21-Oct-09	620	2880	1560	620	6.83	4680	14	5690	242	5800	<2	<0.3	0.013	0.469	589	2320	NS	NS	-
GWQ 25-6N59C	*14-Jul-09*	476	2500	1650	476	6.78	4710	9	5150	112	5690	4	<0.3	0.052	1.230	827	1580	NS	NS	-
	21-Oct-09	560	2330	1530	560	6.76	4650	11	5850	655	5720	4	<0.3	0.014	0.788	754	1760	NS	NS	-
	05-Aug-10	520	2640	2040	520	6.85	4660	14	6600	846	5710	6	0.5	0.121	0.548	971	1990	NS	NS	-
GWQ 25-6N59D	*14-Jul-09*	624	900	400	624	7.69	876	4	1490	141	1560	<2	<0.3	0.067	0.060	117	67.9	NS	NS	-
	21-Oct-09	710	913	328	710	7.62	1280	6	2560	605	1930	<2	0.4	0.017	0.016	201	190	NS	NS	-
	05-Aug-10	720	832	580	720	7.63	1160	9	85800	2560	1960	<2	<0.3	0.144	0.028	182	161	NS	NS	-
	09-Jun-11	4950	1030	255	4950	7.69	2060	5	2090	349	2200	<2	0.5	0.443	<0.003	183	263	0	0	-
	06-Jun-12	380	1320	580	380	7.95	1880	-	12100	58200	2390	2	2.2	0.119	0.175	-	-	-	-	-
	07-Jun-12	-	-	-	-	-	-	4.1	-	-	-	-	-	-	-	-	-	-	-	-
	24-Oct-11	517	1700	899	517	7.49	4900	7	7500	6190	3300	3	2.6	0.376	0.266	589	430	-	-	-
GWQ 25-6N59DR	*24-Oct-12*	505	2760	1820	505	7.57	5350	15.1	5440	558	6170	4	<0.3	2.61	0.862	962	2000	Overgrown	Overgrown	Overgrown
	29-Oct-12	-	-	-	-	-	-	4.7	-	-	-	-	-	-	-	-	-	-	-	-
	06-Nov-12	380	1320	580	380	7.95	1880	-	12100	582000	2390	2	2.2	0.119	0.175	-	-	1	<1	<1
	13-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-
GWQ 25-6N59E	*14-Jul-09*	260	1800	1500	260	7.28	4200	6	36200	11700	6560	15	10.0	0.129	1.208	1680	840	NS	NS	-
	21-Oct-09	720	3460	1830	720	7.26	4700	4	11800	4040	7250	5	1.8	0.011	1.067	2000	914	NS	NS	-
	05-Aug-10	330	2010	1640	330	7.05	3710	34	45400	32000	5650	14	18.1	0.096	0.756	1340	1090	<3	<3	-
MOE Standards [1]																				
Table 3 (Non-potable groundwater condition)			-	-	-	-	-	-	-	-	-	-	-	-	-	2300	-	-	-	-
Other Standards - For Reference Only																				
Health Canada Drinking Water [2]		-	-	-	-	6.5-8.5 (AO)	500 (AO)	-	-	0.3/1.0/.01 (3)	-	-	-	10	-	≤250 (AO) (6)	500 (AO)	None Detectable per 100 mL (MAC)	None Detectable per 100 mL (MAC)	-
MOE Standards - Table 2 (Potable groundwater condition)			-	-	-	-	-	-	-	-	-	-	-	-	-	790	-	-	-	-

TABLE G-1
INORGANICS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter [1]																		
		Alkalinity as Bicarbonate	Total Hardness	Hardness as Ca	Total Alkalinity	pH	Total Dissolved Solids	Total Organic Carbon	Total Solids	Turbidity	Specific Conductance at 25°C	Total Kjeldahl Nitrogen	Total Phosphorus	Nitrate + Nitrite Nitrogen	Total Ammonia	Chloride	Sulfate	Total Coliforms	E.coli	Fecal Coliforms
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*units*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*MPN/100mL*	*MPN/100mL*	*CFU/100mL*
GWQ 25-6N59F	*14-Jul-09*	316	2150	1400	316	7.02	3840	8	35400	20200	5740	19	9.7	0.129	1.077	1390	1020	NS	NS	-
	21-Oct-09	1110	6340	1590	1110	7.00	3100	7	17600	7280	5820	8	3.3	0.008	1.080	1390	1110	NS	NS	-
	05-Aug-10	345	3030	1830	345	7.12	4470	25	67200	39300	6370	12	12.0	0.09	0.612	1650	963	<3	<3	-
	09-Jun-11	5490	5460	3810	5490	7.13	5560	5	16600	12700	5830	9	6.2	<0.003	1.080	1400	1040	0	0	-
	24-Oct-11	3950	4780	3010	3950	7.07	4300	74	14100	9470	5680	7	3.5	0.015	0.986	1330	1070	-	-	-
	07-Jun-12	160	4270	2720	160	7.56	4960	3.1	11800	956000	5950	5	2.5	0.034	0.903	1330	1100	-	-	-
	24-Oct-12	290	5920	4470	290	7.49	4930	7.4	31900	13900	6340	8	6.2	0.005	0.814	1490	1040	NS	NS	NS
GWQ 25-6N60A	*08-Jul-09*	688	1950	320	688	7.11	3610	10	4670	378	3910	<2	0.3	0.057	0.185	187	1750	NS	NS	-
	21-Oct-09	680	2810	1420	680	6.97	3400	11	4610	262	3980	3	0.4	0.030	0.205	173	1550	NS	NS	-
GWQ 25-6N60B	*08-Jul-09*	560	2200	440	560	6.94	3530	10	4470	285	4380	<2	<0.3	0.039	0.429	295	1900	NS	NS	-
	21-Oct-09	520	2270	1650	520	6.93	3620	12	4160	157	4320	<2	<0.3	0.020	0.504	296	1790	NS	NS	-
GWQ 25-6N60C	*08-Jul-09*	504	2250	620	504	6.68	4740	17	4270	63.8	4670	5	0.6	0.044	0.731	486	1850	NS	NS	-
	21-Oct-09	540	2050	1960	540	6.83	3840	12	4090	775	4650	<2	<0.3	0.018	0.725	389	1670	NS	NS	-
	06-Aug-10	530	2720	1990	530	7.22	3870	11	5420	8260	4640	19	2.4	0.063	0.744	476	1800	NS	NS	-
GWQ 25-6N60D	*08-Jul-09*	544	2400	520	544	6.90	4280	7	4150	246	4500	<2	<0.3	0.025	0.672	518	1580	NS	NS	-
	21-Oct-09	550	1850	1490	550	6.89	3440	9	3760	148	4390	3	<0.3	0.033	0.820	444	1410	NS	NS	-
	06-Aug-10	550	2390	1760	550	7.17	3430	6	5880	13200	4330	17	2.0	0.159	0.387	532	1440	NS	NS	-
	13-Jun-11	960	2130	1370	960	7.28	4020	10	7410	2440	4220	4	2.2	0.035	0.766	571	1500	-	-	-
	24-Oct-11	420	2290	1460	420	7.29	3560	8	7620	2410	4220	3	2.0	0.299	0.646	575	1530	-	-	-
	07-Jun-12	-	-	-	-	-	-	6.1	-	-	-	-	-	-	-	582	1510	-	-	-
	12-Jun-12	428	1940	1250	428	7.55	4090	-	5100	660	4350	3	0.7	0.726	0.166	-	-	-	-	-
GWQ 25-6N60DR	*29-Oct-12*	495	1950	1240	495	7.25	4660	4.7	5000	137	4620	3	0.5	3.17	0.753	504	1930	<3	<10	<3
GWQ 25-6N60E	*08-Jul-09*	160	1480	200	160	7.91	1940	9	26300	15900	5540	12	7.2	0.087	1.084	1310	1070	NS	NS	-
	21-Oct-09	1100	4000	870	1100	7.79	3410	6	14800	7480	5650	6	2.7	0.017	0.710	1240	1230	NS	NS	-
	06-Aug-10	230	1720	897	230	7.88	3670	6	12000	29800	5390	18	3.7	0.041	0.568	1010	1160	NS	NS	-
	14-Jun-11	1930	2180	1330	1930	7.22	3910	11	9680	1160	4820	4	2.8	0.046	0.655	908	1050	-	-	-
	24-Oct-11	700	2020	1060	700	8.06	3270	8	7040	3120	4850	2	1.5	0.314	0.667	919	1050	-	-	-
	12-Jun-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	900	990	-	-	-
	14-Jun-12	712	924	459	712	7.76	3460	-	5560	1120	4890	3	1.4	0.07	0.588	-	-	-	-	-
	01-Nov-12	-	-	-	-	-	-	8.9	-	-	-	-	-	-	-	-	-	-	-	-
	05-Nov-12	214	5640	4180	214	8.02	3670		37400	17100	5100	-	-	0.101	0.576	1060	963	-	-	-
GWQ 25-6N63C	*03-Aug-10*	620	3630	2980	620	6.85	7530	39	7610	15.5	8220	4	<0.3	2.58	0.426	112	308	1	0	-
GWQ 25-6N63D	*03-Aug-10*	556	3290	2640	556	7.01	7310	27	7340	7.45	8560	5	<0.3	5.76	0.669	134	276	>200	0	-
GWQ 25-6N63E	*03-Aug-10*	532	3240	2570	532	6.95	7710	25	7740	101	8810	5	0.4	7.08	0.849	138	238	2	0	-
	02-Jun-11	541	2850	1690	541	7.31	4990	17	5680	252	6270	3	0.8	1.760	0.789	823	1540	-	-	-
	10-Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-
	20-Oct-11	550	3120	1900	550	6.93	6640	23	6680	84.4	7890	<2	0.6	3.26	0.185	1330	2500	0	0	-
	06-Jun-12	560	3030	1800	560	6.9	7190	15	7210	11.3	6330	2	<0.3	3.04	<0.003	1370	2500	0	0	-
	23-Oct-12	446	3140	1880	446	6.88	7150	21.4	7220	6.95	7560	2	<0.3	2.85	<0.003	1370	2410	Overgrown	Overgrown	<1
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-
GWQ 25-6N63F	*03-Aug-10*	293	2310	1900	293	7.08	5900	33	88900	5220	6580	21	28.9	0.126	0.832	156	129	3	<3	-
	02-Jun-11	1750	6990	4320	1750	7.20	4500	213	20400	5540	6480	5	4.3	0.010	1.270	1570	1270	-	-	-
	20-Oct-11	2680	6740	3790	2680	7.02	5520	73	15500	9480	6580	4	2.9	0.048	0.941	1600	1300	0	0	-
	06-Jun-12	2200	4020	2250	2200	6.98	5490	4.3	13800	37.4	8680	4	2.6	0.232	0.665	1560	1260	0	0	-
	23-Oct-12	271	3090	1630	271	6.98	6070	15.1	7740	662	6370	3	<0.3	0.174	0.661	1530	1240	1	<1	<1
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-
GWQ 25-6N67D	*26-Aug-10*	720	2750	2420	720	7.08	5120	16	5370	8.97	5850	3	<0.3	4.43	0.553	465	2550	<3	<3	-
GWQ 25-6N67E	*26-Aug-10*	560	2390	2050	560	7.19	4420	15	4580	12.8	5320	2	<0.3	2.68	0.729	632	1910	<3	<3	-
	09-Jun-11	474	2320	1450	474	7.10	4530	8	5580	525	4770	2	1.4	1.170	0.491	635	1720	5	2	-
	10-Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	>200	53	-
	17-Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-
	24-Oct-11	600	2680	1640	600	7.00	4440	41	6230	965	5690	3	1.8	1.49	0.675	1030	1870	0	0	-
	06-Jun-12	526	2180	1350	526	6.96	4640	11.7	5100	82.2	4190	3	<0.3	0.435	0.655	755	1820	<10	<10	-
	22-Oct-12	481	2260	1360	481	7.16	4380	17.3	4580	116	4980	3	<0.3	0.316	0.742	711	1730	Overgrown	Overgrown	<10
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1
MOE Standards [1]																				
Table 3 (Non-potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	2300	-	-	-	-
Other Standards - For Reference Only																				
Health Canada Drinking Water [2]		-	-	-	-	6.5-8.5 (AO)	500 (AO)	-	-	0.3/1.0/.01 (3)	-	-	-	10	-	≤250 (AO) (6)	500 (AO)	None Detectable per 100 mL (MAC)	None Detectable per 100 mL (MAC)	-
MOE Standards - Table 2 (Potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	790	-	-	-	-

TABLE G-1
INORGANICS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter [1]																		
		Alkalinity as Bicarbonate	Total Hardness	Hardness as Ca	Total Alkalinity	pH	Total Dissolved Solids	Total Organic Carbon	Total Solids	Turbidity	Specific Conductance at 25°C	Total Kjeldahl Nitrogen	Total Phosphorus	Nitrate + Nitrite Nitrogen	Total Ammonia	Chloride	Sulfate	Total Coliforms	E.coli	Fecal Coliforms
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*units*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*MPN/100mL*	*MPN/100mL*	*CFU/100mL*
GWQ 25-6N67F	*26-Aug-10*	440	2000	1700	440	7.30	3250	6	10600	2650	4380	2	0.6	0.048	0.592	681	1110	<3	<3	-
	08-Jun-11	383	1550	967	383	7.30	3770	6	4000	170	4180	2	0.3	0.013	0.704	717	1160	>200	>200	-
	17-Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-
	19-Oct-11	377	2050	1080	377	7.03	3760	6	4000	128	4400	<2	<0.3	0.026	0.742	737	1200	-	-	-
	19-Oct-11	416	2000	1060	416	7.03	3660	7	3920	101	4390	<2	<0.3	0.017	0.742			-	-	-
	06-Jun-12	544	2010	1090	544	6.98	3830	3.9	4820	422	4750	2	0.4	2	0.56	747	1210	<10	<10	-
	22-Oct-12	388	1840	998	388	7.05	3750	5.5	4310	321	4200	2	<0.3	0.178	0.609	733	1180	<1	<1	<1
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-
GWQ 25-W04	*29-Jun-09*	30	840	960	30	9.37	4520	47	4790	50.5	6780	15	<0.3	0.025	1.686	2310	733	0	0	-
	16-Oct-09	NS	1850	NS	NS	7.61	4990	3	6970	820	8760	4	<0.3	0.022	1.219	1950	532	0	0	-
	04-Aug-10	89	850	731	89	7.72	4160	9	5120	24.8	7000	5	<0.3	0.012	1.16	2010	570	<3	<3	-
	02-Jun-11	77	977	520	77	8.28	4250	3	4320	17.8	6920	2	<0.3	<0.003	0.872	2160	604	-	-	-
	18-Oct-11	81	875	483	81	7.80	4610	12	4800	32.1	7090	4	<0.3	<0.003	1.420	2010	565	0	0	-
	31-May-12	260	738	391	260	7.89	5000	-	5200	30.6	6910	4	<0.3	0.037	0.913	1980	555	1	0	-
	24-Oct-12	75	872	472	75	8.06	4890	-	4980	33.9	6910	4	<0.3	0.009	0.888	1990	555	Overgrown	Overgrown	Overgrown
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Overgrown	Overgrown	<1
	13-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-
GWQ 25-W05	*29-Jun-09*	135	1300	760	135	7.54	3800	3	6230	86.5	8260	4	<0.3	0.008	1.131	2010	440	0	0	-
	15-Oct-09	NS	1660	NS	NS	10.7	5990	3	6830	550	8160	4	<0.3	0.020	0.978	2360	841	0	0	-
	26-Oct-09	570	392	207	570	7.52	508	9	536	2.38	918	<2	<0.3	<0.003	0.194	NA	NA	0	0	-
	05-Aug-10	180	1390	896	180	7.44	5200	2	5260	141	8120	4	<0.3	0.003	0.968	2440	918	<3	<3	-
	02-Jun-11	132	1910	1020	132	7.62	5130	2	5460	62.0	8080	2	<0.3	<0.003	1.140	2470	931	-	-	-
	18-Oct-11	139	1430	742	139	7.43	5170	2	5330	61.0	8290	<2	2.5	<0.003	1.090	2260	856	0	0	-
	31-May-12	162	1240	660	162	7.78	5470	-	5630	65.4	8010	4	<0.3	<0.003	1.06	2240	845	0	0	-
	24-Oct-12	160	1460	796	160	7.93	5630	-	6000	95.8	8020	3	<0.3	0.005	1.02	2240	850	1	<1	<1
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-
GWQ 25-W06	*06-Jul-09*	130	1350	320	130	7.63	5450	2	6710	25.4	10300	4	<0.3	0.010	1.559	2970	865	0	0	-
	20-Oct-09	170	1520	975	170	7.37	3740	5	6420	18.9	10100	4	<0.3	0.018	1.423	2670	1120	0	0	-
	06-Aug-10	185	1700	1140	185	7.49	6440	<1	6450	5.81	10200	4	3.1	0.013	1.46	2850	947	<3	<3	-
	08-Jun-11	133	1240	690	133	7.61	6950	1	8390	8	9880	3	<0.3	<0.003	1.480	3010	1000	1	0	-
	10-Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-
	17-Oct-11	137	1450	807	137	7.53	6500	2	6600	2.59	10200	2	<0.3	<0.003	1.520	2960	994	0	0	-
	04-Jun-12	140	1510	844	140	7.51	6820	-	6900	1.82	9810	4	<0.3	0.01	1.49	2950	1000	0	0	-
	22-Oct-12	134	1510	844	134	7.52	6730	-	6800	7.56	9750	4	<0.3	0.007	1.47	2950	995	<1	<1	<1
GWQ 25-W07	*29-Jun-09*	110	1050	620	110	7.62	4400	2	4920	10.7	6730	4	<0.3	0.012	2.007	2030	551	1	0	-
	20-Oct-09	145	1000	720	145	7.52	4100	4	4110	9.81	6700	4	<0.3	0.022	1.908	1610	643	0	0	-
	05-Aug-10	160	2830	1880	160	7.51	4000	1	5050	10.2	6690	4	<0.3	<0.003	1.74	1860	626	<3	<3	-
	08-Jun-11	122	860	457	122	7.70	4510	1	4530	58	6470	3	<0.3	<0.003	1.950	1840	622	0	0	-
Duplicate 100	*08-Jun-11*	123	875	38.5	123	7.71	4450	2	4550	56	6460	3	<0.3	<0.003	1.890	1830	620	0	0	-
	19-Oct-11	114	1110	586	114	7.46	4160	3	4460	44.1	6850	3	0.3	<0.003	1.960	1870	641	0	0	-
Duplicate 100	*19-Oct-11*	17	1140	597	17	7.54	4390	3	4450	38.9	6870	2	<0.3	<0.003	1.980	1850	637	0	0	-
	22-Oct-12	123	984	538	123	7.57	4340	-	4350	21.2	6480	4	<0.3	0.005	1.86	1860	625	51	<1	<1
	24-Oct-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	<1	-
	05-Jun-12	120	1140	616	120	7.66	4490	-	4540	8.33	6530	4	<0.3	<0.003	1.93	1830	629	0	0	-
	13-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	<1	-
Duplicate 100	*05-Jun-12*	120	1100	644	120	7.63	4500	-	4640	8.03	6530	4	<0.3	<0.003	1.93	1810	626	0	0	-
GWQ 25-W08	*06-Jul-09*	135	1350	310	135	7.71	5770	2	5640	13.6	8660	4	<0.3	0.009	1.209	2370	815	0	0	-
	20-Oct-09	160	1380	880	160	7.51	5310	5	5320	10.6	8430	4	<0.3	0.012	1.150	2190	874	0	0	-
	05-Aug-10	180	2670	1630	180	7.50	5450	1	5460	11.3	8440	3	<0.3	<0.003	1.02	2370	831	<3	<3	-
	06-Jun-11	138	1260	704	138	7.55	5400	2	5600	11.6	8210	<2	<0.3	<0.003	1.190	2480	856	<3	<3	-
	18-Oct-11	143	1500	803	143	7.78	5290	2	5450	8.82	8500	<2	0.7	<0.003	1.180	2400	849	0	0	-
	01-Jun-12	172	1350	755	172	7.89	5650	-	5740	8.03	8050	4	<0.3	<0.003	<0.003	2370	837	0	0	-
	23-Oct-12	130	1500	809	130	7.48	7720	-	8870	10.6	9290	3	<0.3	0.005	1.4	730	1190	0	0	-
Duplicate 101	*24-Oct-12*	156	1440	794	156	8.09	5800	-	5840	13.4	8260	3	<0.3	0.005	1.01	2320	828	<1	<1	<1
GWQ 25-W09	*26-Jun-09*	150	1420	900	150	7.98	10800	2	6920	47.5	9430	4	<0.3	0.018	1.434	2800	828	0	0	-
	15-Oct-09	NS	851	NS	NS	8.59	4160	14	4280	37.4	NR	6	<0.3	0.009	1.048	2910	974	0	0	-
	03-Aug-10	155	1440	1110	155	7.36	6280	3	6300	87.7	9690	3	<0.3	<0.003	1.23	2540	868	0	0	-
	02-Jun-11	132	1990	1090	132	7.61	5920	2	6270	15.1	9390	3	<0.3	<0.003	5.020	2850	977	-	-	-
	17-Oct-11	131	1360	733	131	7.57	6160	2	6220	4.86	9630	<2	<0.3	<0.003	1.400	2670	919	0	0	-
MOE Standards [1]																				
Table 3 (Non-potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	2300	-	-	-	-
Other Standards - For Reference Only																				
Health Canada Drinking Water [2]		-	-	-	-	6.5-8.5 (AO)	500 (AO)	-	-	0.3/1.0/.01 (3)	-	-	-	10	-	≤250 (AO) (6)	500 (AO)	None Detectable per 100 mL (MAC)	None Detectable per 100 mL (MAC)	-
MOE Standards - Table 2 (Potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	790	-	-	-	-

TABLE G-1
INORGANICS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter [1]																		
		Alkalinity as Bicarbonate	Total Hardness	Hardness as Ca	Total Alkalinity	pH	Total Dissolved Solids	Total Organic Carbon	Total Solids	Turbidity	Specific Conductance at 25°C	Total Kjeldahl Nitrogen	Total Phosphorus	Nitrate + Nitrite Nitrogen	Total Ammonia	Chloride	Sulfate	Total Coliforms	E.coli	Fecal Coliforms
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*units*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*MPN/100mL*	*MPN/100mL*	*CFU/100mL*
	31-May-12	150	1320	723	150	7.94	6430	-	6560	25.8	9360	4	0.004	<0.003	1.39	2720	927	0	0	-
	23-Oct-12	130	1500	809	130	7.48	7720	-	8870	10.6	9290	3	<0.3	0.005	1.4	3330	1140	2	<1	-
	29-Oct-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	-	-
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-
GWQ 25-W10	*26-Jun-09*	130	1220	760	130	8.11	3900	2	6240	118	8560	4	<0.3	0.014	1.316	2570	697	0	0	-
	15-Oct-09	NS	1490	NS	NS	7.44	4300	3	5460	117	8170	3	<0.3	0.012	0.976	2750	863	Overgrown	Overgrown	-
	03-Aug-10	124	1270	1080	124	7.46	5840	2	5850	119	8780	3	<0.3	0.085	1.02	2370	782	0	0	-
	02-Jun-11	121	1640	915	121	7.78	5440	2	5600	46.7	8650	2	<0.3	<0.003	0.127	2660	878	-	-	-
	17-Oct-11	124	1440	774	124	7.62	5340	2	5840	473	8870	2	<0.3	0.004	1.270	2490	831	0	0	-
	31-May-12	370	1230	738	370	8.3	6910	-	9440	578	8150	4	0.5	0.004	1.09	-	-	-	-	-
	01-Jun-12	148	1200	670	148	7.87	5790	-	6030	66.1	8420	4	<0.3	0.084	<0.003	2530	842	0	0	0
	23-Oct-12	125	1440	798	125	7.57	6320	-	6330	71.7	8610	3	<0.3	0.039	1.18	3240	1070	<1	<1	<1
	24-Oct-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10
GWQ 25-W11	*26-Jun-09*	NR	940	930	NR	11.5	5210	6	5510	157	7730	4	<0.3	0.020	0.811	2300	442	0	0	-
	15-Oct-09	NS	1430	NS	NS	7.49	5940	3	6100	46.5	9400	4	<0.3	0.012	1.281	2450	608	Overgrown	Overgrown	-
	03-Aug-10	<1	1470	1060	52	10.8	6110	1	8080	163	8070	2	1.0	0.919	0.097	2220	647	0	0	-
	06-Jun-11	135	998	607	135	7.55	5150	4	5310	141	7850	2	<0.3	0.076	1.010	2370	719	-	-	-
	17-Oct-11	210	1350	805	210	8.42	5380	4	5930	468	8360	<2	0.3	<0.003	1.130	2350	732	0	0	-
	31-May-12	370	1230	738	370	8.3	6910	-	9440	578	8150	4	0.5	0.004	1.09	2360	734	1	0	-
	23-Oct-12	116	1330	757	116	7.99	6380	-	6580	360	8150	3	<0.3	0.012	1.04	2670	823	Overgrown	Overgrown	<1
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-
GWQ 25-W12	*26-Aug-10*	220	1270	1120	220	7.66	5290	2	7060	1710	8450	4	0.6	0.055	1.08	2050	716	<3	<3	-
	08-Jun-11	184	1370	215	184	7.67	5630	3	7370	192	8200	3	<0.3	<0.003	1.130	2350	586	0	0	-
	19-Oct-11	264	1530	818	264	7.52	6150	3	6230	835	8750	<2	0.4	<0.003	1.180	2520	893	0	0	-
	06-Jun-12	167	1400	785	167	7.42	5820	-	6150	206	8430	3	<0.3	<0.003	1.22	2500	877	0	0	-
	22-Oct-12	243	1420	781	243	7.53	5890	-	6380	392	8470	4	<0.3	0.006	1.1	2460	857	3	<1	<1
	06-Nov-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3	<3	-
GWQ25-FIELD BLANK	24-Oct-12	154	1440	807	154	8.17	5740	-	6220	15	8200	3	<0.3	3	1.07	<0.50	<0.50	<1	<1	<1
MOE Standards [1]																				
Table 3 (Non-potable groundwater condition)			-	-	-	-	-	-	-	-	-	-	-	-	-	2300	-	-	-	-
Other Standards - For Reference Only																				
Health Canada Drinking Water [2]		-	-	-	-	6.5-8.5 (AO)	500 (AO)	-	-	0.3/1.0/.01 (3)	-	-	-	10	-	≤250 (AO) (6)	500 (AO)	None Detectable per 100 mL (MAC)	None Detectable per 100 mL (MAC)	-
MOE Standards - Table 2 (Potable groundwater condition)			-	-	-	-	-	-	-	-	-	-	-	-	-	790	-	-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																	
		Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved	Arsenic (As)-Dissolved	Barium (Ba)-Dissolved	Beryllium (Be)-Dissolved	Bismuth (Bi)-Dissolved	Boron (B)-Dissolved	Cadmium (Cd)-Dissolved	Calcium (Ca)-Dissolved	Cesium (Cs)-Dissolved	Chromium (Cr)-Dissolved	Hexavalent Chromium-Dissolved	Cobalt (Co)-Dissolved	Copper (Cu)-Dissolved	Iron (Fe)-Dissolved	Lead (Pb)-Dissolved	Lithium (Li)-Dissolved	Magnesium (Mg)-Dissolved
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
GWQ 25-4N34A	*24-Nov-09*	0.0060	0.0026	0.00456	0.0138	<0.0010	<0.00030	0.141	0.000181	556	<0.00010	0.0137	-	0.0101	0.00387	0.261	0.00010	-	535
GWQ 25-4N34B	*24-Nov-09*	0.0075	<0.0010	0.00418	0.00720	<0.0010	<0.00030	0.224	0.000482	509	<0.00010	0.0155	-	0.00064	0.0165	<0.0020	0.00014	-	347
	05-Aug-10	0.0452	<0.00020	0.00567	0.00792	<0.00020	<0.00020	0.178	0.000083	487	<0.00010	<0.00020	<0.010	0.00095	0.00336	0.032	<0.000090	0.557	320
	19-Oct-11	0.0034	<0.00020	0.00363	0.00915	<0.00020	<0.00020	0.193	0.000404	525	<0.00010	<0.0020	<0.010	0.00027	0.00428	<0.10	<0.000090	0.604	365
	06-Jun-12	<0.020	<0.0020	<0.0020	0.0071	<0.0020	<0.0020	0.16	<0.00010	539	<0.0010	<0.020	<0.010	<0.0020	0.0043	<1.0	<0.00090	0.647	336
	29-Oct-12	<0.0020	<0.00020	0.0022	0.0181	<0.00020	<0.00020	0.3	0.000169	646	<0.00010	<0.0020	<0.010	0.0008	0.00367	<0.10	<0.00090	0.634	303
GWQ 25-4N34C	*24-Nov-09*	0.0873	0.0028	0.00637	0.0154	<0.0010	<0.00030	0.231	0.000156	319	<0.00010	0.0143	-	0.00277	0.0103	0.576	0.00019	-	231
	05-Aug-10	<0.0020	0.00021	0.00436	0.0206	<0.00020	<0.00020	0.205	0.000122	236	<0.00010	<0.00020	<0.010	0.00157	0.00341	0.221	<0.000090	0.450	187
	06-Jun-11	0.0879	<0.00020	0.00572	0.0231	<0.00020	<0.00020	0.183	0.000036	290	<0.00010	<0.0020	<0.010	0.00332	0.00250	0.26	0.000736	0.445	298
GWQ 25-4N34D	*24-Nov-09*	0.0080	0.0015	0.00384	0.0143	<0.0010	<0.00030	0.198	0.000036	374	<0.00010	0.0147	-	0.00032	0.0184	0.237	0.00013	-	648
	05-Aug-10	<0.0020	<0.00020	0.00424	0.0171	<0.00020	<0.00020	0.156	0.000058	426	<0.00010	<0.00020	<0.010	0.00064	0.00488	0.434	<0.000090	0.865	781
	06-Jun-11	<0.0020	<0.00020	0.00483	0.0148	<0.00020	<0.00020	0.152	0.000043	373	<0.00010	<0.0020	<0.010	0.00028	0.00371	<0.10	<0.000090	0.678	713
	19-Oct-11	<0.0020	<0.00020	0.00382	0.0161	<0.00020	<0.00020	0.191	0.000426	416	<0.00010	<0.0020	<0.010	<0.00020	0.00608	<0.10	<0.000090	0.790	814
	07-May-12	<0.020	<0.0020	0.0065	0.0204	<0.0020	<0.0020	0.56	<0.00010	495	<0.0010	<0.020	<0.010	0.0024	<0.0020	<1.0	<0.00090	0.483	472
GWQ 25-4N34DR	*29-Oct-12*	<0.0020	<0.00020	0.00198	0.0136	<0.00020	<0.00020	0.59	0.000035	478	<0.00010	<0.0020	-	0.00289	0.00169	<0.10	<0.000090	0.429	390
GWQ 25-5N62C	*03-Aug-10*	<0.0020	<0.0010	0.0196	0.0198	<0.0010	<0.00030	0.310	0.000506	890	<0.00010	<0.0010	<0.010	0.00967	0.0179	<0.0020	0.00027	-	346
GWQ 25-5N62D	*03-Aug-10*	<0.0020	<0.0010	0.0196	0.0192	<0.0010	<0.00030	0.391	0.000329	728	<0.00010	<0.0010	<0.010	0.00452	0.00610	<0.0020	0.00011	-	395
	09-Jun-11	0.0026	0.00068	0.0289	0.0167	<0.00020	<0.00020	0.210	0.000528	770	<0.00010	0.0066	<0.010	0.00551	0.0108	<0.10	<0.000090	1.09	469
	20-Oct-11	0.0021	0.00039	0.0117	0.0154	<0.00020	<0.00020	0.439	0.000552	838	<0.00010	0.0113	<0.010	0.00595	0.00524	<0.10	<0.000090	0.956	417
	06-Jun-12	<0.020	<0.0020	0.0025	0.0144	<0.0020	<0.0020	0.33	0.00054	788	<0.0010	<0.020	<0.010	0.0047	0.0053	<1.0	<0.00090	0.867	265
	23-Oct-12	0.28	0.00071	0.00279	0.0178	<0.00020	<0.00020	0.39	0.000398	781	<0.00010	<0.0020	<0.010	0.00578	0.00234	<0.10	<0.000090	0.86	293
GWQ 25-5N62E	*03-Aug-10*	<0.0020	<0.0010	0.0202	0.0205	<0.0010	<0.00030	0.994	0.000020	349	<0.00010	<0.0010	<0.010	0.00122	0.00139	0.612	<0.00010	-	158
	06-Jun-11	<0.0020	<0.00020	0.0258	0.0142	<0.00020	<0.00020	0.701	0.000021	293	<0.00010	<0.0020	<0.010	0.00077	0.00048	0.60	<0.000090	0.268	155
	20-Oct-11	0.0053	<0.00020	0.0102	0.0147	<0.00020	<0.00020	1.02	0.000524	327	<0.00010	0.0138	<0.010	0.00109	0.00113	<0.10	<0.000090	0.383	160
	06-Jun-12	<0.020	<0.0020	0.0054	0.0122	<0.0020	<0.0020	0.79	<0.00010	310	<0.0010	<0.020	<0.010	<0.0020	<0.0020	<1.0	<0.00090	0.334	140
	23-Oct-12	32.4	0.00035	0.0122	0.0374	0.00036	<0.00020	1.1	0.000166	808	0.00021	<0.0020	-	0.00301	0.0111	4.64	0.00744	0.327	337
GWQ 25-6N57B	*25-Nov-09*	<0.0020	0.0059	0.00838	0.00859	<0.0010	<0.00030	0.195	0.00472	681	0.00011	0.0072	-	0.0120	0.00652	0.280	0.00043	-	303
GWQ 25-6N57C	*25-Nov-09*	0.0070	0.0027	0.00862	0.00842	<0.0010	<0.00030	0.257	0.00266	752	<0.00010	0.0065	-	0.0158	0.0272	0.252	0.00031	-	255
	18-Aug-10	<0.0020	0.00092	0.00688	0.00853	<0.00020	<0.00020	0.267	0.00220	633	<0.00010	<0.00020	<0.010	0.0157	0.00499	0.119	0.000112	0.569	238
GWQ 25-6N57D	*25-Nov-09*	0.0049	0.0042	0.0132	0.0109	<0.0010	<0.00030	0.323	0.00321	677	<0.00010	0.0057	-	0.0177	0.00776	0.309	0.00064	-	222
	18-Aug-10	<0.0020	0.00077	0.0107	0.00944	<0.00020	<0.00020	0.345	0.00213	620	<0.00010	<0.00020	<0.010	0.0135	0.00320	<0.010	0.000120	0.443	215
	13-Jun-11	0.0115	<0.00020	0.0119	0.0174	<0.00020	0.00030	0.788	0.000196	297	<0.00010	<0.0020	<0.010	0.00098	0.00384	<0.10	0.000094	0.340	155
	20-Oct-11	<0.0020	0.00065	0.00628	0.00898	<0.00020	<0.00020	0.581	0.00314	715	<0.00010	0.0030	<0.010	0.0116	0.00850	<0.10	0.000218	0.590	244
	07-Jun-12	<0.020	<0.0020	0.0023	0.01	<0.0020	<0.0020	0.45	0.00049	703	<0.0010	<0.020	<0.010	0.0137	0.0066	<1.0	<0.00090	0.54	228
GWQ 25-6N57DR	*29-Oct-12*	<0.0020	<0.00020	0.00207	0.0148	<0.00020	<0.00020	0.46	0.000183	755	<0.00010	<0.0020	<0.010	0.00505	0.00276	<0.10	<0.000090	0.611	213
GWQ 25-6N57E	*25-Nov-09*	0.0340	0.0037	0.0124	0.0118	<0.0010	<0.00030	0.272	0.00514	460	<0.00010	0.0040	-	0.00226	0.00470	0.142	0.00057	-	214
	18-Aug-10	0.0029	0.00073	0.0127	0.0124	<0.00020	<0.00020	0.321	0.00160	429	<0.00010	<0.00020	<0.010	0.00270	0.00381	<0.010	0.000179	0.380	205
GWQ 25-6N57F	*18-Aug-10*	0.0073	0.00035	0.0184	0.0158	<0.00020	<0.00020	0.774	0.000440	279	<0.00010	0.00021	<0.010	0.00100	0.00163	<0.010	<0.000090	0.312	137
	13-Jun-11	0.0122	<0.00020	0.0125	0.0177	<0.00020	<0.00020	0.808	0.000198	305	<0.00010	<0.0020	<0.010	0.00105	0.00362	<0.10	<0.000090	0.345	157
	20-Oct-11	0.0026	<0.00020	0.00783	0.0119	<0.00020	<0.00020	0.667	0.000583	448	<0.00010	0.0073	<0.010	0.00189	0.00284	<0.10	<0.000090	0.465	217
	12-Jun-12	<0.020	<0.0020	0.0021	0.0097	<0.0020	<0.0020	0.33	0.00054	379	<0.0010	<0.020	<0.010	<0.0020	0.0024	<1.0	<0.00090	0.459	193
	01-Nov-12	0.0037	0.00055	0.00185	0.00936	0.00027	<0.00020	0.358	0.00335	477	<0.00010	0.0023	<0.010	0.00215	0.00209	<0.10	<0.000090	0.519	188
MOE Standards [1]																			
Table 3 (Non-potable groundwater condition)		-	20	1.9	29	0.067	-	45	0.0027	-	-	0.81	0.14	0.066	0.087	-	0.025		-
Other Standards - For Reference Only																			
Health Canada Drinking Water [2]		0.1- 0.2 [3] (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	-	5.0 (MAC)	0.005 (MAC)	-	-	0.05 (MAC)	-	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	0.006	0.025	1	0.004	-	5	0.0027	-	-	0.05	0.025	0.0038	0.087	-	0.01	-	-

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																	
		Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved	Arsenic (As)-Dissolved	Barium (Ba)-Dissolved	Beryllium (Be)-Dissolved	Bismuth (Bi)-Dissolved	Boron (B)-Dissolved	Cadmium (Cd)-Dissolved	Calcium (Ca)-Dissolved	Cesium (Cs)-Dissolved	Chromium (Cr)-Dissolved	Hexavalent Chromium-Dissolved	Cobalt (Co)-Dissolved	Copper (Cu)-Dissolved	Iron (Fe)-Dissolved	Lead (Pb)-Dissolved	Lithium (Li)-Dissolved	Magnesium (Mg)-Dissolved
GWQ 25-6N58A	*26-Nov-09*	0.0424	0.0023	0.00547	0.0141	<0.0010	<0.00030	0.081	0.00487	553	<0.00010	0.0037	-	0.00631	0.0130	<0.0020	0.00081	-	398
GWQ 25-6N58B	*26-Nov-09*	0.0032	0.0051	0.00788	0.00964	<0.0010	<0.00030	0.087	0.00349	649	<0.00010	0.0032	-	0.0155	0.0403	<0.0020	0.00063	-	341
GWQ 25-6N58C	*26-Nov-09*	0.0028	0.0028	0.0103	0.0106	<0.0010	<0.00030	0.154	0.00612	677	<0.00010	0.0035	-	0.0292	0.0318	<0.0020	0.00061	-	248
	04-Aug-10	<0.0020	0.00137	0.00665	0.00961	<0.00020	<0.00020	0.324	0.00210	697	<0.00010	<0.00020	<0.010	0.0187	0.00881	<0.010	0.000103	0.667	255
GWQ 25-6N58D	*26-Nov-09*	0.0022	0.0035	0.0135	0.0103	<0.0010	<0.00030	0.262	0.00588	662	<0.00010	0.0028	-	0.0158	0.0301	0.0162	0.00021	-	234
	04-Aug-10	0.0024	0.00136	0.00939	0.0110	<0.00020	<0.00020	0.400	0.00379	638	<0.00010	<0.00020	<0.010	0.0138	0.00558	<0.010	0.000096	0.488	246
	09-Jun-11	0.0227	0.00122	0.0182	0.0115	<0.00020	<0.00020	0.293	0.000858	644	<0.00010	0.0044	<0.010	0.00955	0.00611	1.37	0.000218	0.655	260
	24-Oct-11	0.0020	0.00073	0.00954	0.0107	<0.00020	<0.00020	0.350	0.00185	613	<0.00010	0.0223	<0.010	0.0124	0.00802	0.20	0.000286	0.527	223
	07-Jun-12	<0.020	<0.0020	0.0022	0.0115	<0.0020	<0.0020	0.36	0.00061	693	<0.0010	<0.020	<0.0010 [4]	0.0103	0.0034	<1.0	<0.00090	0.513	249
	24-Oct-12	0.0027	0.0004	0.00173	0.0147	<0.00020	<0.00020	0.483	0.000267	695	<0.00010	<0.0020	<0.010	0.00614	0.0013	<0.10	<0.000090	0.81	266
GWQ 25-6N58E	*26-Nov-09*	0.0188	<0.0010	0.0107	0.0123	<0.0010	<0.00030	0.293	0.000509	336	<0.00010	0.0019	-	0.00138	0.00174	0.777	0.00076	-	280
	04-Aug-10	<0.0020	<0.00020	0.0120	0.0119	<0.00020	<0.00020	0.334	0.000063	329	<0.00010	<0.00020	<0.010	0.00135	0.00090	1.34	<0.000090	0.342	287
GWQ 25-6N58F	*26-Nov-09*	0.0040	0.0011	0.00831	0.0109	<0.0010	<0.00030	0.264	0.000447	354	<0.00010	0.0018	-	0.00233	0.00152	0.131	0.00023	-	286
	04-Aug-10	<0.0020	<0.00020	0.0130	0.0103	<0.00020	<0.00020	0.320	0.000051	349	<0.00010	<0.00020	<0.010	0.00204	0.00113	0.687	<0.000090	0.391	293
	09-Jun-11	0.0063	<0.00020	0.0172	0.00975	<0.00020	<0.00020	0.252	0.000050	358	<0.00010	0.0052	<0.010	0.00199	0.00445	1.02	<0.000090	0.578	298
	24-Oct-11	<0.0020	<0.00020	0.00871	0.0114	<0.00020	<0.00020	0.341	0.000067	313	<0.00010	0.0225	<0.010	0.00086	0.00040	1.98	<0.000090	0.375	260
	07-Jun-12	<0.020	<0.0020	0.005	0.0103	<0.0020	<0.0020	0.32	<0.00010	370	<0.0010	<0.020	<0.010	<0.0020	<0.0020	<1.0	<0.00090	0.408	297
	24-Oct-12	0.0052	0.0007	0.00354	0.0107	<0.00020	<0.00020	0.436	0.000055	371	<0.00010	<0.010	<0.010	0.00234	<0.00020	<0.10	<0.000090	0.44	302
GWQ 25-6N59A	*26-Nov-09*	<0.0020	0.0029	0.00595	0.0103	<0.0010	<0.00030	0.147	0.00351	508	<0.00010	0.0073	-	0.00625	0.0203	0.181	0.00012	-	372
GWQ 25-6N59B	*26-Nov-09*	0.0027	0.0061	0.00863	0.00772	<0.0010	<0.00030	0.211	0.00971	714	<0.00010	0.0058	-	0.0224	0.0180	<0.0020	0.00020	-	302
GWQ 25-6N59C	*26-Nov-09*	0.222	0.0021	0.0102	0.0103	<0.0010	<0.00030	0.253	0.00621	705	<0.00010	0.0057	-	0.0236	0.0113	0.157	0.00196	-	226
	05-Aug-10	<0.0020	0.00075	0.0116	0.00830	<0.00020	<0.00020	0.360	0.00287	652	<0.00010	<0.00020	<0.010	0.0145	0.00445	<0.010	<0.000090	0.619	220
GWQ 25-6N59D	*26-Nov-09*	0.0089	0.0011	0.00271	0.142	<0.0010	<0.00030	0.094	0.00102	85.1	<0.00010	0.0110	-	0.00073	0.00495	0.125	0.00058	-	162
	05-Aug-10	<0.0020	0.00026	0.00288	0.110	<0.00020	<0.00020	0.108	0.000189	92.1	<0.00010	<0.00020	<0.010	0.00051	0.00365	0.046	0.000166	0.208	151
	09-Jun-11	0.0022	<0.00020	0.00295	0.145	<0.00020	<0.00020	0.096	0.000222	87.7	<0.00010	0.0108	<0.010	<0.00020	0.00361	<0.10	<0.000090	0.389	228
	24-Oct-11	0.0054	0.00047	0.00372	0.0719	<0.00020	<0.00020	0.379	0.000900	218	<0.00010	0.0126	<0.010	0.00238	0.00572	<0.10	<0.000090	0.312	154
	07-Jun-12	<0.020	<0.0020	<0.0020	0.094	<0.0020	<0.0020	<0.10	0.00028	59.5	<0.0010	<0.020	<0.010	<0.0020	0.0044	<1.0	<0.00090	0.205	146
	24-Oct-12	0.0028	0.00046	0.00349	0.0145	<0.00020	<0.00020	0.44	0.000213	700	<0.00010	<0.020	<0.010	0.00581	<0.00020	<0.10	<0.000090	0.68	235
GWQ 25-6N59E	*26-Nov-09*	0.0216	<0.0010	0.0199	0.0175	<0.0010	<0.00030	0.411	0.000488	416	<0.00010	0.0027	-	0.00223	0.00091	1.41	0.00027	-	185
	05-Aug-10	<0.0020	0.00045	0.0149	0.0139	<0.00020	<0.00020	0.450	0.000222	522	<0.00010	<0.00020	<0.010	0.00506	0.00262	<0.010	0.000130	0.425	191
GWQ 25-6N59F	*26-Nov-09*	0.0159	0.0011	0.0143	0.0134	<0.0010	<0.00030	0.345	0.000275	511	<0.00010	0.0025	-	0.00573	0.00136	2.47	<0.00010	-	184
	05-Aug-10	<0.0020	0.00057	0.0174	0.0150	0.00021	<0.00020	0.429	0.000094	644	<0.00010	<0.00020	<0.010	0.00205	0.00193	0.136	<0.000090	0.350	286
	09-Jun-11	0.0196	0.00021	0.0137	0.0136	<0.00020	<0.00020	0.354	0.000305	517	<0.00010	0.0045	109 [4]	0.00521	0.00401	1.31	<0.000090	0.544	205
	24-Oct-11	<0.0020	<0.00020	0.0100	0.0118	<0.00020	<0.00020	0.553	0.000319	472	<0.00010	0.0249	<0.010	0.00514	0.00120	1.59	<0.000090	0.418	166
	07-Jun-12	<0.020	<0.0020	0.0037	0.0137	<0.0020	<0.0020	0.56	0.00018	451	<0.0010	<0.020	<0.010	0.002	<0.0020	<1.0	<0.00090	0.377	191
	24-Oct-12	0.0084	0.00061	0.00313	0.0139	<0.00020	<0.00020	0.59	0.000092	462	<0.00010	<0.0020	<0.010	0.0027	<0.00020	<0.10	<0.000090	0.442	204
GWQ 25-6N60A	*26-Nov-09*	0.0045	0.0016	0.00244	0.00928	<0.0010	<0.00030	0.125	0.00175	403	<0.00010	0.0031	-	0.00555	0.0153	0.115	0.00060	-	269
GWQ 25-6N60B	*26-Nov-09*	0.0085	0.0012	0.00514	0.00748	<0.0010	<0.00030	0.211	0.00286	613	<0.00010	0.0025	-	0.0129	0.0152	0.578	0.00070	-	228
GWQ 25-6N60C	*26-Nov-09*	0.0142	0.0041	0.0103	0.00886	<0.0010	<0.00030	0.269	0.0104	637	<0.00010	0.0031	-	0.00952	0.0174	2.06	0.00111	-	204
	06-Aug-10	<0.0020	<0.0010	0.0166	0.00814	<0.0010	<0.00030	0.293	0.000074	582	<0.00010	<0.0010	<0.010	0.00750	0.00120	4.39	<0.00010	-	201
GWQ 25-6N60D	*26-Nov-09*	0.0084	0.0013	0.00676	0.00819	<0.0010	<0.00030	0.262	0.00155	513	<0.00010	0.0020	-	0.00926	0.00177	0.226	0.00012	-	179
	06-Aug-10	<0.0020	0.0012	0.00429	0.00841	<0.0010	<0.00030	0.282	0.00142	489	<0.00010	<0.0010	<0.010	0.00484	0.00382	<0.0020	<0.00010	-	176
	13-Jun-11	0.0027	0.00040	0.00742	0.00809	<0.00020	<0.00020	0.315	0.000839	507	<0.00010	<0.0020	<0.010	0.00862	0.00551	0.67	0.000141	0.437	184
	24-Oct-11	0.0042	0.00086	0.00388	0.00835	<0.00020	<0.00020	0.257	0.00138	486	<0.00010	0.0100	<0.010	0.00846	0.00820	<0.10	0.000186	0.489	166
	07-Jun-12	<0.020	<0.0020	<0.0020	0.0125	<0.0020	<0.0020	0.33	0.00063	536	<0.0010	<0.020	<0.010	0.007	0.0071	2.4	0.0685	0.456	190
GWQ25-6N60DR	*29-Oct-12*	0.002	<0.00020	0.00198	0.0136	<0.00020	<0.00020	0.59	0.000035	478	<0.00010	<0.0020	<0.010	0.00289	0.00169	<0.10	<0.000090	0.429	390
GWQ 25-6N60E	*26-Nov-09*	0.0928	0.0011	0.0113	0.0150	<0.0010	<0.00030	0.155	0.00651	147	<0.00010	0.0034	-	0.00135	0.0510	0.187	0.00555	-	141
	06-Aug-10	<0.0020	<0.0010	0.00704	0.0161	<0.0010	<0.00030	0.171	0.000286	141	<0.00010	<0.0010	<0.010	0.00116	0.00084	<0.0020	0.00012	-	137
MOE Standards [1]																			
Table 3 (Non-potable groundwater condition)		-	20	1.9	29	0.067	-	45	0.0027	-	-	0.81	0.14	0.066	0.087	-	0.025		-
Other Standards - For Reference Only																			
Health Canada Drinking Water [2]		0.1- 0.2 [3] (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	-	5.0 (MAC)	0.005 (MAC)	-	-	0.05 (MAC)	-	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	0.006	0.025	1	0.004	-	5	0.0027	-	-	0.05	0.025	0.0038	0.087	-	0.01	-	-

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																	
		Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved	Arsenic (As)-Dissolved	Barium (Ba)-Dissolved	Beryllium (Be)-Dissolved	Bismuth (Bi)-Dissolved	Boron (B)-Dissolved	Cadmium (Cd)-Dissolved	Calcium (Ca)-Dissolved	Cesium (Cs)-Dissolved	Chromium (Cr)-Dissolved	Hexavalent Chromium-Dissolved	Cobalt (Co)-Dissolved	Copper (Cu)-Dissolved	Iron (Fe)-Dissolved	Lead (Pb)-Dissolved	Lithium (Li)-Dissolved	Magnesium (Mg)-Dissolved
GWQ 25-6N60E	*13-Jun-11*	0.0124	0.00104	0.00776	0.0152	<0.00020	<0.00020	0.215	0.00348	106	<0.00010	<0.0020	<0.010	0.00085	0.00614	<0.10	0.000239	0.180	104
	24-Oct-11	<0.0020	<0.00020	0.0114	0.0148	<0.00020	<0.00020	0.270	0.000237	125	<0.00010	0.0202	<0.010	0.00108	<0.00020	0.51	<0.000090	0.167	123
	07-Jun-12	<0.020	<0.0020	0.0034	0.0175	<0.0020	<0.0020	0.35	0.00077	140	<0.0010	<0.020	<0.010	<0.0020	<0.0020	<1.0	<0.00090	0.162	149
	01-Nov-12	0.0078	0.00061	0.00347	0.0148	<0.00020	<0.00020	0.331	0.00141	166	<0.00010	<0.0020	<0.010	0.00262	<0.00020	<0.10	<0.000090	0.161	127
GWQ 25-6N63C	*03-Aug-10*	0.0030	<0.0010	0.00992	0.0149	<0.0010	<0.00030	0.199	0.000378	745	<0.00010	<0.0010	<0.010	0.00437	0.00815	<0.0020	0.00013	-	487
GWQ 25-6N63D	*03-Aug-10*	0.0023	<0.0010	0.0123	0.0137	<0.0010	<0.00030	0.284	0.000418	776	<0.00010	<0.0010	<0.010	0.00655	0.00557	<0.0020	<0.00010	-	333
GWQ 25-6N63E	*03-Aug-10*	<0.0020	<0.0010	0.0129	0.0151	<0.0010	<0.00030	0.320	0.000188	772	<0.00010	<0.0010	<0.010	0.00570	0.00449	<0.0020	0.00016	-	318
	06-Jun-11	0.0043	<0.00020	0.00832	0.0162	<0.00020	<0.00020	0.266	0.000105	566	<0.00010	0.0052	<0.010	0.00789	0.0104	<0.10	<0.000090	0.661	219
	20-Oct-11	0.0022	<0.00020	0.00770	0.0115	<0.00020	<0.00020	0.323	0.000256	801	<0.00010	0.0075	<0.010	0.00597	0.00550	<0.10	<0.000090	0.858	316
	06-Jun-12	<0.020	<0.0020	<0.020	0.0111	<0.0020	<0.0020	0.23	0.00022	781	<0.0010	<0.020	<0.010	0.0061	0.0054	<1.0	<0.00090	0.883	296
	23-Oct-12	0.0407	0.00059	0.00163	0.0121	<0.00020	<0.00020	0.376	0.000326	776	<0.00010	<0.0020	<0.010	0.0064	0.00258	<0.10	<0.000090	0.9	315
GWQ 25-6N63F	*03-Aug-10*	<0.0020	<0.0010	0.0142	0.0213	<0.0010	<0.00030	0.464	0.000061	538	<0.00010	<0.0010	<0.010	0.00367	0.00243	<0.0020	0.00013	-	289
	06-Jun-11	0.0091	<0.00020	0.0205	0.0141	<0.00020	<0.00020	0.425	0.000066	524	<0.00010	0.0040	<0.010	0.00355	0.00571	2.39	<0.000090	0.460	279
	20-Oct-11	0.0035	<0.00020	0.00850	0.0119	<0.00020	<0.00020	0.496	0.000612	558	<0.00010	0.0126	<0.010	0.00272	0.00213	<1.0	<0.000090	0.429	321
	06-Jun-12	<0.020	<0.0020	<0.0020	0.0107	<0.0020	<0.0020	0.39	<0.00010	540	<0.0010	<0.020	<0.010	0.0029	0.0022	<1.0	<0.00090	0.434	288
	23-Oct-12	40.5	0.00034	0.015	0.106	0.00063	<0.00020	0.46	0.000297	1120	0.00107	<0.0020	<0.010	0.00807	0.0229	12.5	0.0137	0.389	581
GWQ 25-6N67D	*26-Aug-10*	0.0026	0.00049	0.00403	0.0128	<0.00020	<0.00020	0.420	0.000157	652	<0.00010	<0.00020	<0.010	0.00650	0.00485	<0.010	<0.000090	0.780	257
GWQ 25-6N67E	*26-Aug-10*	0.0057	0.00044	0.00435	0.0144	<0.00020	<0.00020	0.548	0.000161	564	<0.00010	<0.00020	<0.010	0.00358	0.00283	<0.010	<0.000090	0.534	232
	09-Jun-11	0.0114	<0.00020	0.00598	0.0117	<0.00020	<0.00020	0.312	0.000132	514	<0.00010	0.0042	<0.010	0.00412	0.00682	<0.10	<0.000090	0.540	218
	24-Oct-11	0.0038	0.00031	0.00651	0.0158	<0.00020	<0.00020	0.252	0.000574	559	<0.00010	0.0165	<0.010	0.00344	0.0137	<0.10	<0.000090	0.557	222
	06-Jun-12	<0.020	<0.0020	0.017	0.0242	<0.0020	<0.0020	0.33	0.0002	576	<0.0010	<0.020	<0.010	0.0065	0.0064	<1.0	<0.00090	0.558	224
	22-Oct-12	<0.0020	<0.00020	0.00143	0.0149	<0.00020	<0.00020	<1.0	0.000176	548	<0.00010	<0.0020	<0.010	0.00539	0.00419	<0.10	<0.000090	0.57	232
GWQ 25-6N67F	*26-Aug-10*	0.0176	0.00025	0.00453	0.0224	<0.00020	<0.00020	0.596	0.000051	394	<0.00010	<0.00020	<0.010	0.00301	0.00159	<0.010	<0.000090	0.368	228
	08-Jun-11	0.0100	<0.00020	0.00867	0.0147	<0.00020	<0.00020	0.319	0.000042	404	<0.00010	0.0063	<0.010	0.00265	0.00368	0.73	<0.000090	0.320	209
	24-Oct-11	<0.0020	<0.00020	0.00866	0.00978	<0.00020	<0.00020	0.379	0.000013	418	<0.00010	<0.0020	<0.010	0.00225	0.00186	<0.10	<0.000090	0.323	216
Duplicate 25-101	*24-Oct-11*	<0.0020	<0.00020	0.00876	0.00978	<0.00020	<0.00020	0.394	0.000085	419	<0.00010	<0.0020	<0.010	0.00237	0.00182	0.16	<0.000090	0.330	228
	06-Jun-12	<0.0020	<0.0020	0.0027	0.0101	<0.0020	<0.0020	0.38	<0.00010	417	<0.0010	<0.020	<0.0010 [4]	0.0024	<0.0020	<1.0	<0.00090	0.355	213
	22-Oct-12	<0.0020	<0.00020	0.00199	0.00852	<0.00020	<0.00020	<1.0	0.00017	395	<0.00010	<0.0020	<0.010	0.00219	0.00063	<0.10	<0.000090	0.351	241
GWQ 25-W04	*30-Nov-09*	0.0178	0.0019	0.00878	0.0115	<0.0010	<0.00030	0.754	0.000113	153	<0.00010	<0.0010	<0.010	0.00044	0.00164	1.57	0.00021	-	83.7
	04-Aug-10	<0.0020	0.00025	0.00717	0.00946	<0.00020	<0.00020	0.637	0.000040	185	<0.00010	0.00038	<0.010	0.00094	0.00088	3.24	0.000093	0.212	93.2
	06-Jun-11	0.0030	<0.00020	0.0113	0.0104	<0.00020	0.00023	0.549	0.000021	180	<0.00010	<0.0020	<0.010	0.00031	0.00366	3.50	<0.000090	0.254	86.9
	18-Oct-11	0.0029	<0.00020	0.0112	0.0107	<0.00020	<0.00020	0.527	0.000159	183	0.00015	<0.0020	<0.010	0.00028	0.00182	4.31	<0.000090	0.211	91.8
	31-May-12	<0.0020	<0.00020	0.00168	0.00974	0.00022	<0.00020	0.562	0.000084	183	<0.00010	<0.0020	-	0.00037	0.00159	2.9	<0.000090	0.211	32.1
	24-Oct-12	<0.0020	0.00023	0.00426	0.00915	<0.00020	<0.00020	0.63	0.000147	185	<0.00010	<0.0020	<0.010	<0.00020	<0.00020	0.86	<0.000090	0.035	98.9
GWQ 25-W05	*24-Nov-09*	0.0161	0.0023	0.0168	0.0143	<0.0010	<0.00030	1.16	0.000019	243	<0.00010	<0.0010	-	0.00069	0.00248	0.823	<0.00010	-	149
	05-Aug-10	<0.0020	<0.00020	0.0270	0.0130	0.00026	<0.00020	0.775	0.000022	309	<0.00010	0.00096	<0.010	0.00069	0.00054	0.458	<0.000090	0.318	160
	06-Jun-11	0.0026	<0.00020	0.0198	0.0144	<0.00020	<0.00020	0.812	<0.000010	293	<0.00010	<0.0020	<0.010	0.00107	0.00489	0.85	<0.000090	0.332	148
	18-Oct-11	0.0079	<0.00020	0.0186	0.0144	<0.00020	<0.00020	0.890	0.000031	294	0.00012	<0.0020	<0.010	0.00060	0.00204	0.69	<0.000090	0.282	156
	31-May-12	<0.0020	<0.00020	0.00666	0.0131	0.00055	<0.00020	0.821	<0.000010	290	<0.00010	<0.0020	-	0.00038	0.002	0.47	<0.000090	0.305	139
	24-Oct-12	<0.0020	0.00026	0.00555	0.0128	<0.00020	<0.00020	0.94	0.000021	306	<0.00010	<0.0020	<0.010	0.00041	<0.00020	<0.10	<0.000090	0.339	165
GWQ 25-W06	*26-Nov-09*	0.265	<0.0010	0.0232	0.0123	<0.0010	<0.00030	1.05	0.000028	340	0.00011	0.0014	-	0.00077	0.00097	1.55	0.00035	-	151
	06-Aug-10	<0.0020	<0.0010	0.0202	0.0120	<0.0010	<0.00030	0.896	0.000028	324	<0.00010	<0.0010	<0.010	0.00061	0.00044	1.16	0.00028	-	152
	08-Jun-11	0.0026	0.0026	0.0187	0.0134	<0.00020	<0.00020	1.20	0.000044	314	<0.00010	0.0026	<0.010	0.00060	0.00298	1.43	0.000163	0.394	142
	08-Jun-11	0.0021	<0.00020	0.0180	0.0118	0.00025	<0.00020	0.693	<0.000010	329	<0.00010	<0.0020	<0.010	0.00034	<0.00020	1.26	0.000167	0.380	150
	17-Oct-11	0.0021	<0.00020	0.018	0.0118	0.00025	<0.00020	0.693	<0.000010	329	<0.00010	<0.10	<0.01	0.00034	<0.00020	1.26	0.000167	0.38	150
	04-Jun-12	0.303	<0.0020	0.0063	0.0123	<0.0020	<0.0020	1.35	<0.00010	369	<0.0010	<0.020	<0.010	<0.0020	<0.0020	<1.0	<0.00090	0.432	176
GWQ 25-W07	*27-Nov-09*	0.0037	0.0044	0.00988	0.00956	<0.0010	<0.00030	0.343	0.000029	238	<0.00010	<0.0010	-	0.00026	0.00503	0.613	<0.00010	-	104
	05-Aug-10	<0.0020	<0.00020	0.0195	0.0111	0.00024	<0.00020	0.685	0.000013	232	<0.00010	0.00080	<0.010	0.00035	0.00028	0.764	<0.000090	0.208	116
	08-Jun-11	0.0020	<0.00020	0.0104	0.0123	<0.00020	<0.00020	0.781	0.000013	230	0.00010	0.0022	<0.010	<0.00020	0.00206	0.81	<0.000090	0.268	110
MOE Standards [1]																			
Table 3 (Non-potable groundwater condition)		-	20	1.9	29	0.067	-	45	0.0027	-	-	0.81	0.14	0.066	0.087	-	0.025		-
Other Standards - For Reference Only																			
Health Canada Drinking Water [2]		0.1- 0.2 [3] (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	-	5.0 (MAC)	0.005 (MAC)	-	-	0.05 (MAC)	-	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	0.006	0.025	1	0.004	-	5	0.0027	-	-	0.05	0.025	0.0038	0.087	-	0.01	-	-

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																	
		Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved	Arsenic (As)-Dissolved	Barium (Ba)-Dissolved	Beryllium (Be)-Dissolved	Bismuth (Bi)-Dissolved	Boron (B)-Dissolved	Cadmium (Cd)-Dissolved	Calcium (Ca)-Dissolved	Cesium (Cs)-Dissolved	Chromium (Cr)-Dissolved	Hexavalent Chromium-Dissolved	Cobalt (Co)-Dissolved	Copper (Cu)-Dissolved	Iron (Fe)-Dissolved	Lead (Pb)-Dissolved	Lithium (Li)-Dissolved	Magnesium (Mg)-Dissolved
Duplicate 25-100	*08-Jun-11*	<0.0020	<0.00020	0.0103	0.0122	<0.00020	<0.00020	0.676	0.000011	222	0.00010	0.0021	<0.010	<0.00020	0.00172	0.80	<0.000090	0.278	107
	19-Oct-11	<0.0020	<0.00020	0.0130	0.0111	<0.00020	<0.00020	0.721	0.000123	242	<0.00010	<0.0020	<0.010	<0.00020	0.00111	0.87	<0.000090	0.218	121
Duplicate 25-100	*19-Oct-11*	<0.0020	<0.00020	0.0135	0.0112	<0.00020	<0.00020	0.735	0.000015	233	<0.00010	<0.0020	<0.010	<0.00020	0.00072	0.87	<0.000090	0.220	119
	05-Jun-12	<0.0020	<0.00020	0.00466	0.0116	<0.00020	<0.00020	0.922	0.000068	257	0.0001	<0.0020	<0.010	<0.00020	0.00104	0.8	<0.000090	0.238	129
Duplicate 25-100	*05-Jun-12*	<0.0020	<0.00020	0.0066	0.0125	<0.00020	<0.00020	0.899	0.00013	256	0.00011	0.0021	<0.010	<0.00020	0.00108	0.78	<0.000090	0.236	128
GWQ 25-W08	*27-Nov-09*	<0.0020	<0.0010	0.0136	0.00914	<0.0010	<0.00030	0.328	0	289	<0.00010	<0.0010	-	0.00067	0.00083	0.497	<0.00010	-	127
	05-Aug-10	<0.0020	<0.00020	0.0282	0.0110	0.00026	<0.00020	0.766	0.000010	296	<0.00010	0.00090	<0.010	0.00103	0.00026	0.811	<0.000090	0.313	149
	06-Jun-11	<0.0020	<0.00020	0.0287	0.0134	<0.00020	<0.00020	0.722	0.000012	282	<0.00010	<0.0020	<0.010	0.00085	0.00043	0.72	<0.000090	0.252	155
	18-Oct-11	0.0322	<0.00020	0.0191	0.0135	<0.00020	0.00025	0.919	0.000044	304	<0.00010	<0.0020	<0.010	0.00094	0.00213	0.77	<0.000090	0.263	153
	31-May-12	<0.020	<0.00020	0.0079	0.0129	<0.0020	<0.0020	0.76	<0.00010	316	<0.0010	<0.020	-	<0.0020	<0.0020	<1.0	<0.000090	0.34	124
	24-Oct-12	0.0039	<0.00020	0.00689	0.0119	<0.00020	<0.00020	1.01	0.000026	299	<0.00010	<0.0020	<0.010	0.0005	<0.00020	<0.10	<0.000090	0.352	156
Duplicate 25-101	*24-Oct-12*	<0.0020	0.00021	0.00749	0.0134	<0.00020	<0.00020	0.86	0.000021	315	<0.0010	<0.0020	<0.010	0.00064	<0.00020	<0.10	<0.000090	0.361	162
GWQ 25-W09	*27-Nov-09*	<0.0020	0.0016	0.0162	0.0102	<0.0010	<0.00030	0.353	0.000022	306	<0.00010	<0.0010	-	0.00082	0.00142	0.478	<0.00010	-	145
	03-Aug-10	0.0040	<0.0010	0.0235	0.0118	<0.0010	<0.00030	1.01	0.000076	327	<0.00010	<0.0010	<0.010	0.00087	0.00130	0.688	0.00022	-	173
	06-Jun-11	0.0031	<0.00020	0.0253	0.0124	<0.00020	<0.00020	0.936	0.000026	314	<0.00010	<0.0020	<0.010	0.00141	0.00507	1.05	<0.000090	0.414	144
	17-Oct-11	0.0025	<0.00020	0.0202	0.0120	<0.00020	<0.00020	0.672	0.000418	322	<0.00010	<0.0020	<0.010	0.00072	0.00053	0.87	<0.000090	0.344	157
	31-May-12	0.0024	<0.00020	0.00999	0.012	<0.00020	<0.00020	0.997	0.000034	327	<0.00010	<0.0020	-	0.0009	0.00265	0.76	0.000118	0.374	152
	24-Oct-12	<0.0020	<0.00020	0.0107	0.0103	<0.00020	<0.00020	0.98	0.000027	308	<0.00010	<0.0020	-	0.00071	0.00068	0.72	<0.000090	-	138
GWQ 25-W10	*27-Nov-09*	0.0124	0.0025	0.0129	0.0153	<0.0010	<0.00030	0.315	0.000186	288	<0.00010	<0.0010	-	0.00038	0.00314	0.387	0.00043	0.346	127
	03-Aug-10	0.0072	<0.0010	0.0237	0.0180	<0.0010	<0.00030	1.00	0.000273	284	0.00010	<0.0010	<0.010	0.00042	0.00120	0.657	<0.00010	-	130
	06-Jun-11	0.0038	0.00021	0.0212	0.0184	<0.00020	<0.00020	0.922	0.000034	286	0.00015	<0.0020	<0.010	0.00077	0.00412	0.83	<0.000090	0.407	126
	17-Oct-11	0.0033	0.00026	0.0153	0.0199	<0.00020	<0.00020	0.635	0.000533	280	0.00010	<0.0020	<0.010	0.00023	0.00040	0.47	<0.000090	0.327	131
	31-May-12	<0.020	<0.0020	0.0065	0.0164	<0.0020	<0.0020	0.82	<0.00010	319	<0.0010	<0.020	-	<0.0020	<0.0020	<1.0	<0.00090	0.353	121
GWQ 25-W11	*27-Nov-09*	<0.0020	0.0028	0.0105	0.0571	<0.0010	<0.00030	0.226	0.000052	259	0.00014	<0.0010	-	<0.00020	0.00463	<0.0020	<0.00010	-	78.7
	03-Aug-10	0.0093	<0.0010	0.0180	0.0712	<0.0010	<0.00030	0.287	0.000054	340	0.00035	0.0102	<0.010	0.00021	0.00089	0.235	<0.00010	-	37.1
	06-Jun-11	0.0095	0.00041	0.0210	0.0324	<0.00020	<0.00020	0.574	0.000039	300	0.00012	<0.0020	<0.010	0.00029	0.00035	0.14	<0.000090	0.237	174
	17-Oct-11	0.0084	0.00024	0.0139	0.0322	<0.00020	<0.00020	0.525	0.000172	286	<0.00010	<0.0020	<0.010	<0.00020	<0.00020	<0.10	<0.000090	0.297	102
	31-May-12	0.0158	0.00022	0.00778	0.0243	0.00054	<0.00020	0.803	0.000023	266	<0.00010	<0.0020	-	<0.00020	0.00205	<0.10	<0.000090	0.295	108
GWQ 25-W12	*26-Aug-10*	0.0033	0.00032	0.0134	0.0122	0.00021	<0.00020	1.24	0.000061	284	<0.00010	<0.00020	<0.010	0.00070	0.00069	<0.010	<0.000090	0.321	146
	08-Jun-11	<0.0020	<0.00020	0.0146	0.0134	<0.00020	0.00031	0.957	0.000035	296	0.00012	0.0030	<0.010	0.00074	0.00253	0.60	<0.000090	0.263	144
	19-Oct-11	<0.0020	<0.00020	0.0185	0.0115	<0.00020	<0.00020	0.872	0.000029	281	<0.00010	<0.0020	<0.010	0.00048	0.00110	0.59	<0.000090	0.310	143
	04-Jun-12	0.057	<0.0020	0.0055	0.129	<0.0020	<0.0020	1.14	<0.00010	321	<0.0010	<0.020	<0.010	<0.0020	<0.0020	<1.0	<0.00090	0.358	167
	22-Oct-12	<0.0020	<0.00020	0.00651	0.00934	<0.00020	<0.00020	<1.0	0.000023	293	<0.00010	<0.0020	<0.010	0.00036	<0.00020	0.23	<0.000090	0.31	161
MOE Standards [1]																			
Table 3 (Non-potable groundwater condition)		-	20	1.9	29	0.067	-	45	0.0027	-	-	0.81	0.14	0.066	0.087	-	0.025		-
Other Standards - For Reference Only																			
Health Canada Drinking Water [2]		0.1- 0.2 [3] (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	-	5.0 (MAC)	0.005 (MAC)	-	-	0.05 (MAC)	-	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	0.006	0.025	1	0.004	-	5	0.0027	-	-	0.05	0.025	0.0038	0.087	-	0.01	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants.
4. Units to be confirmed by the COW.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																				
		Manganese (Mn)-Dissolved	Mercury (Hg)-Dissolved	Molybdenum (Mo)-Dissolved	Nickel (Ni)-Dissolved	Phosphorus (P)-Dissolved	Potassium (K)-Dissolved	Rubidium (Rb)-Dissolved	Selenium (Se)-Dissolved	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved	Strontium (Sr)-Dissolved	Tellurium (Te)-Dissolved	Thallium (Tl)-Dissolved	Thorium (Th)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Tungsten (W)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn)-Dissolved	Zirconium (Zr)-Dissolved
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
GWQ 25-4N34A	*24-Nov-09*	6.38	0	0.00111	0.0302	<0.020	14.6	0.00325	0.0025	9.47	<0.00010	525	5.36	<0.00050	<0.00010	-	<0.00030	0.00611	<0.00020	0.0351	0.0122	0.0128	0.00059
GWQ 25-4N34B	*24-Nov-09*	0.141	0	0.00313	0.0179	0.031	12.0	0.00092	0.0054	11.9	<0.00010	303	3.32	<0.00050	<0.00010	-	<0.00030	0.00629	<0.00020	0.193	0.0125	0.0065	0.00042
	05-Aug-10	0.141	<0.000050	0.00279	0.0186	<0.10	8.97	0.00101	0.0051	11.3	<0.00010	281	3.12	<0.00020	<0.00010	<0.00010	<0.00020	0.0237	<0.0010	0.188	0.00596	0.0069	0.00048
	19-Oct-11	0.179	<0.000050	0.00273	0.0128	<0.10	10.9	0.00101	0.0040	11.6	<0.00010	304	3.51	<0.00020	<0.00010	<0.00010	0.00039	0.0252	<0.00020	0.179	0.00556	0.0100	0.00044
	06-Jun-12	0.0191	-	0.0022	<0.010	<0.30	9.13	<0.0020	<0.010	11.9	<0.0010	278	3.05	<0.0020	<0.0010	<0.0010	<0.0020	0.044	<0.0010	0.18	0.0022	<0.020	<0.0040
	29-Oct-12	0.47	-	0.00177	0.0097	<0.030	11.3	0.0053	0.0034	9.05	<0.00010	339	3.63	<0.00020	<0.00010	<0.00010	0.00023	0.0322	<0.00010	0.12	0.00058	<0.0020	0.00056
GWQ 25-4N34C	*24-Nov-09*	0.765	0	0.00275	0.0168	0.130	10.0	0.00148	0.0064	11.2	<0.00010	251	2.27	<0.00050	<0.00010	-	<0.00030	0.00778	<0.00020	0.138	0.0113	<0.0050	0.00052
	05-Aug-10	0.458	<0.000050	0.00321	0.0170	<0.10	7.64	0.00141	0.0042	9.31	<0.00010	212	1.79	<0.00020	<0.00010	<0.00010	0.00050	0.00831	<0.0010	0.128	0.00760	0.0089	<0.00040
	06-Jun-11	0.907	<0.000050	0.00341	0.0110	<0.10	9.30	0.00171	0.0033	8.86	<0.00010	279	2.14	<0.00020	<0.00010	<0.00010	<0.00020	0.00989	0.00071	0.138	0.00566	0.0082	0.00058
GWQ 25-4N34D	*24-Nov-09*	0.00487	0	0.00765	0.0121	0.036	13.6	0.00055	0.0058	10.1	<0.00010	465	4.22	<0.00050	<0.00010	-	<0.00030	0.0101	<0.00020	0.210	0.0133	0.0093	0.00078
	05-Aug-10	0.00528	<0.000050	0.00819	0.0161	<0.10	13.1	0.00053	0.0101	9.05	<0.00010	508	4.46	<0.00020	<0.00010	<0.00010	<0.00020	0.0460	<0.0010	0.210	0.00597	0.0095	0.00076
	06-Jun-11	0.00966	<0.000050	0.00687	0.0043	<0.10	14.8	0.00042	0.0045	8.71	<0.00010	467	3.78	<0.00020	<0.00010	<0.00010	<0.00020	0.0189	<0.00020	0.210	0.00938	0.0065	0.00074
	19-Oct-11	0.00784	<0.000050	0.00805	0.0082	<0.10	12.3	0.00052	0.0108	9.70	<0.00010	492	5.07	<0.00020	<0.00010	<0.00010	<0.00020	0.0369	<0.00020	0.239	0.00607	0.0127	0.00081
	07-May-12	0.138	<0.000020	0.0033	<0.010	<0.30	18.7	0.005	<0.010	12.7	<0.0010	642	4.55	<0.0020	<0.0010	<0.0010	<0.0020	0.0664	<0.0010	0.0315	<0.0020	<0.020	<0.0040
GWQ 25-4N34DR	*29-Oct-12*	0.133	<0.000020	0.00388	0.0062	<0.030	14.5	0.00517	0.0012	8.24	<0.00010	494	3.69	<0.00020	<0.00010	<0.00010	<0.00020	0.0432	0.00011	0.0238	0.00045	<0.0020	0.00044
GWQ 25-5N62C	*03-Aug-10*	6.07	<0.000050	0.00321	0.0232	0.028	13.8	0.00666	0.0133	10.9	<0.00010	899	6.11	<0.00050	<0.00010	-	0.00048	0.0246	<0.00020	0.110	0.0136	0.0211	0.00155
GWQ 25-5N62D	*03-Aug-10*	1.42	<0.000050	0.0196	0.0139	0.030	14.1	0.00937	0.0235	9.57	<0.00010	1300	6.59	<0.00050	<0.00010	-	<0.00030	0.0323	<0.00020	0.244	0.0104	0.0156	0.00093
	09-Jun-11	1.63	<0.000050	0.00968	0.0071	<0.10	17.1	0.00860	0.0033	12.1	<0.00010	1280	6.59	0.00024	<0.00010	<0.00010	<0.00020	0.0445	<0.00020	0.212	0.00370	0.0213	0.00079
	20-Oct-11	1.76	<0.000050	0.00706	0.0075	<0.10	15.5	0.00753	0.0018	11.0	<0.00010	1250	6.69	<0.00020	<0.00010	<0.00010	<0.00020	0.0133	<0.00020	0.169	0.00549	0.0179	0.00066
	06-Jun-12	1.73	<0.000020	0.0055	<0.010	<0.30	12.8	0.0059	<0.010	13.1	<0.0010	1250	5.59	<0.0020	<0.0010	<0.0010	<0.0020	0.0489	<0.0010	0.106	<0.0020	<0.020	<0.0040
	23-Oct-12	1.69	<0.000020	0.00547	0.0184	<0.030	12.5	0.00574	0.0022	17.1	<0.00010	1040	6.01	<0.00020	<0.00010	<0.00010	0.00021	0.0492	<0.00010	0.0839	0.00456	<0.0020	0.00067
GWQ 25-5N62E	*03-Aug-10*	0.154	<0.000050	0.00330	0.00474	<0.020	28.4	0.0112	0.0138	5.51	<0.00010	1280	3.66	<0.00050	<0.00010	-	<0.00030	0.00939	<0.00020	0.00723	0.0045	<0.0050	<0.00040
	06-Jun-11	0.0800	<0.000050	0.00279	<0.0010	<0.10	36.3	0.0112	0.0100	5.67	<0.00010	1360	3.40	0.00025	<0.00010	<0.00010	<0.00020	0.00554	<0.00020	0.00258	0.00127	0.0027	<0.00040
	20-Oct-11	0.207	<0.000050	0.00298	<0.0010	<0.10	30.8	0.0122	0.0014	5.40	<0.00010	1410	3.93	<0.00020	<0.00010	<0.00010	<0.00020	0.00393	<0.00020	0.00396	0.00182	0.0078	<0.00040
	06-Jun-12	0.0782	<0.000020	0.0027	<0.010	<0.30	29	0.0113	<0.010	5.33	<0.0010	1490	3.59	<0.0020	<0.0010	<0.0010	<0.0020	0.0193	<0.0010	0.0033	<0.0020	<0.020	<0.0040
	23-Oct-12	0.722	<0.000020	0.00279	0.009	1.05	46.5	0.0162	0.0014	19.2	<0.00010	1390	4.04	<0.00020	<0.00010	0.0064	<0.00020	0.0998	<0.00010	0.00337	0.0114	0.0086	0.00587
GWQ 25-6N57B	*25-Nov-09*	4.69	0	0.00296	0.0356	<0.020	10.7	0.00403	0.0031	11.9	<0.00010	476	4.34	<0.00050	0.00026	-	<0.00030	0.00563	0.00031	0.183	0.0073	0.0616	0.00103
GWQ 25-6N57C	*25-Nov-09*	2.64	0	0.00187	0.0302	<0.020	11.3	0.00615	0.0029	11.1	<0.00010	525	4.56	<0.00050	0.00034	-	<0.00030	0.00551	<0.00020	0.0521	0.0061	0.0787	0.00074
	18-Aug-10	2.64	<0.000050	0.00105	0.0201	<0.10	10.9	0.00581	0.0025	9.40	<0.00010	475	4.00	<0.00020	0.00024	<0.00010	<0.00020	0.0163	<0.0010	0.0354	0.00323	0.0552	0.00047
GWQ 25-6N57D	*25-Nov-09*	1.97	0	0.00201	0.0314	<0.020	11.0	0.00653	0.0034	11.0	<0.00010	617	4.23	<0.00050	0.00037	-	<0.00030	0.00478	<0.00020	0.0468	0.0051	0.0555	0.00050
	18-Aug-10	2.04	<0.000050	0.00118	0.0167	<0.10	11.0	0.00640	0.0030	9.64	<0.00010	552	3.88	<0.00020	0.00020	<0.00010	<0.00020	0.0126	<0.0010	0.0270	0.00258	0.0245	<0.00040
	13-Jun-11	0.0705	<0.000050	0.00387	0.0045	<0.10	34.2	0.0156	0.0046	5.33	<0.00010	1460	3.78	0.00020	<0.00010	<0.00010	<0.00020	0.0129	<0.00020	0.00367	<0.00020	0.0117	<0.00040
	20-Oct-11	1.94	<0.000050	0.00182	0.0117	<0.10	12.5	0.00646	0.0021	10.2	<0.00010	671	4.34	<0.00020	0.00037	<0.00010	<0.00020	0.00946	<0.00020	0.0232	0.00602	0.0461	0.00042
	07-Jun-12	1.91	<0.000020	0.0011	0.016	<0.30	11.8	0.0061	<0.010	11.4	<0.0010	644	4.11	<0.0020	<0.0010	<0.0010	<0.0020	0.0377	<0.0010	0.0269	<0.0020	<0.020	<0.0040
GWQ 25-6N57DR	*29-Oct-12*	1.96	<0.000020	0.00144	0.0093	<0.030	10.3	0.00753	0.0059	7.06	<0.00010	549	4.34	<0.00020	<0.00010	<0.00010	0.00085	0.0342	<0.00010	0.0285	0.00063	<0.0020	0.00067
GWQ 25-6N57E	*25-Nov-09*	0.339	0	0.00367	0.0131	0.022	12.9	0.00757	0.0044	8.98	<0.00010	906	3.49	<0.00050	<0.00010	-	<0.00030	0.00538	<0.00020	0.0429	0.0032	0.0086	<0.00040
	18-Aug-10	0.354	<0.000050	0.00321	0.0200	<0.10	13.9	0.00813	0.0038	7.54	<0.00010	773	3.27	<0.00020	<0.00010	<0.00010	<0.00020	0.0109	<0.0010	0.0323	0.00183	0.0405	<0.00040
GWQ 25-6N57F	*18-Aug-10*	0.0580	<0.000050	0.00343	0.00435	<0.10	32.3	0.0145	0.0042	3.34	<0.00010	1300	3.65	0.00022	<0.00010	<0.00010	<0.00020	0.00713	<0.0010	0.00287	<0.00020	0.0131	<0.00040
	13-Jun-11	0.0721	<0.000050	0.00399	0.0052	<0.10	35.4	0.0159	0.0048	5.42	<0.00010	1470	3.94	0.00024	<0.00010	<0.00010	<0.00020	0.0133	<0.00020	0.00372	0.00061	0.0119	<0.00040
	20-Oct-11	0.347	<0.000050	0.00318	0.0060	<0.10	20.8	0.0109	0.0016	7.94	<0.00010	1190	3.60	<0.00020	<0.00010	<0.00010	<0.00020	0.00694	<0.00020	0.0247	0.00333	0.0181	<0.00040
	12-Jun-12	0.258	<0.000020	0.0048	<0.010	<0.30	12.4	0.0078	<0.010	9.92	<0.0010	947	3.05	<0.0020	<0.0010	<0.0010	<0.0020	0.0247	<0.0010	0.0361	0.003	0.027	<0.0040
	01-Nov-12	0.291	<0.000020	0.00423	0.0106	<0.030	13.4	0.00698	0.0018	12.6	<0.00010	669	3.01	<0.00020	<0.00010	<0.00010	<0.00020	0.0235	0.00011	0.0317	<0.00020	0.0161	<0.00040
MOE Standards [1]																							
Table 3 (Non-potable groundwater condition)		-	(0.0028) 0.00029	9.2	0.49	-	-	-	0.063		0.0015	2300	-	-	0.51	-	-	-	-	0.42	0.25	1.1	-
Other Standards - For Reference Only																							
Health Canada Drinking Water [2]		0.05 (AO)	0.001 (MAC)	-	-	-	-	-	0.01 (MAC)	-	-	200 (AO)	-	-	-	-	-	-	-	0.02 (MAC)	-	5 (AO)	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	(0.001) 0.00029	0.07	0.1	-	-	-	0.01		0.0015	490	-	-	0.002	-	-	-	-	0.02	0.0062	1.1	-

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																				
		Manganese (Mn)-Dissolved	Mercury (Hg)-Dissolved	Molybdenum (Mo)-Dissolved	Nickel (Ni)-Dissolved	Phosphorus (P)-Dissolved	Potassium (K)-Dissolved	Rubidium (Rb)-Dissolved	Selenium (Se)-Dissolved	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved	Strontium (Sr)-Dissolved	Tellurium (Te)-Dissolved	Thallium (Tl)-Dissolved	Thorium (Th)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Tungsten (W)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn)-Dissolved	Zirconium (Zr)-Dissolved
GWQ 25-6N58A	*26-Nov-09*	2.53	0	0.00431	0.0423	<0.020	10.6	0.00117	0.0063	10.8	<0.00010	379	4.43	<0.00050	<0.00010	-	<0.00030	0.0155	<0.00020	0.326	0.0081	0.0365	0.00130
GWQ 25-6N58B	*26-Nov-09*	6.70	0	0.00501	0.0494	0.029	11.7	0.00195	0.0032	11.9	<0.00010	478	4.60	<0.00050	<0.00010	-	<0.00030	0.00857	<0.00020	0.332	0.0056	0.0367	0.00125
GWQ 25-6N58C	*26-Nov-09*	3.66	0	0.00771	0.0424	<0.020	11.2	0.00729	0.0030	12.0	<0.00010	500	4.33	<0.00050	0.00094	-	<0.00030	0.00422	<0.00020	0.119	0.0051	0.179	0.00109
	04-Aug-10	3.16	<0.000050	0.00263	0.0153	<0.10	10.3	0.00607	<0.0010	5.86	<0.00010	504	4.42	<0.00020	0.00025	<0.00010	<0.00020	0.00313	<0.0010	0.0565	0.00324	0.0483	0.00052
GWQ 25-6N58D	*26-Nov-09*	1.89	0	0.00137	0.0307	<0.020	11.1	0.00625	0.0035	10.9	<0.00010	515	4.04	<0.00050	0.00045	-	<0.00030	0.00515	<0.00020	0.0297	0.0032	0.0715	<0.00040
	04-Aug-10	1.86	<0.000050	0.00083	0.0145	<0.10	9.68	0.00629	<0.0010	6.22	<0.00010	521	4.12	<0.00020	0.00024	<0.00010	<0.00020	0.00410	<0.0010	0.0229	0.00227	0.0295	<0.00040
	09-Jun-11	1.93	<0.000050	0.00067	0.0091	<0.10	12.8	0.00657	0.0024	11.7	<0.00010	542	3.98	<0.00020	0.00016	<0.00010	<0.00020	0.0206	<0.00020	0.0189	0.00285	0.0166	0.00044
	24-Oct-11	1.93	<0.000050	0.00087	0.0132	<0.10	10.1	0.00550	0.0028	9.79	<0.00010	483	3.83	<0.00020	0.00031	<0.00010	<0.00020	0.00495	<0.00020	0.0204	0.00574	0.0286	<0.00040
	07-Jun-12	1.89	<0.000020	<0.0010	<0.010	<0.30	11.3	0.006	<0.010	11.7	<0.0010	575	3.97	<0.0020	<0.0010	<0.0010	<0.0020	0.0313	<0.0010	0.0226	<0.0020	<0.020	<0.0040
	24-Oct-12	3.05	<0.000020	0.00103	0.0139	0.041	13.6	0.00567	0.0046	12.3	<0.00010	581	4.16	<0.00020	<0.00010	<0.00010	<0.00020	0.0485	<0.00010	0.0306	0.00099	<0.0020	0.00063
GWQ 25-6N58E	*26-Nov-09*	0.173	0	0.00656	0.00943	<0.020	10.9	0.00415	0.0031	10.7	<0.00010	548	3.16	<0.00050	<0.00010	-	<0.00030	0.00597	<0.00020	0.0136	0.0026	0.0090	<0.00040
	04-Aug-10	0.144	<0.000050	0.00496	0.00700	<0.10	10.9	0.00421	0.0039	11.3	<0.00010	581	3.07	<0.00020	<0.00010	<0.00010	<0.00020	0.0136	<0.0010	0.00836	0.00260	0.0065	<0.00040
GWQ 25-6N58F	*26-Nov-09*	0.168	0	0.00729	0.0108	<0.020	10.0	0.00535	0.0028	10.1	<0.00010	550	3.20	<0.00050	<0.00010	-	<0.00030	0.00582	<0.00020	0.0387	0.0038	0.0170	<0.00040
	04-Aug-10	0.151	<0.000050	0.00539	0.00901	<0.10	9.71	0.00516	0.0036	11.4	<0.00010	591	3.16	<0.00020	<0.00010	<0.00010	<0.00020	0.0139	<0.0010	0.0218	0.00290	0.0119	<0.00040
	09-Jun-11	0.141	<0.000050	0.00480	0.0070	<0.10	11.8	0.00571	0.0020	10.5	<0.00010	559	3.07	<0.00020	<0.00010	<0.00010	<0.00020	0.0207	<0.00020	0.0382	0.00281	0.0161	<0.00040
	24-Oct-11	0.158	<0.000050	0.00444	0.0030	<0.10	9.88	0.00398	0.0025	10.4	<0.00010	540	2.90	<0.00020	<0.00010	<0.00010	<0.00020	0.00494	<0.00020	0.00889	0.00277	0.0173	<0.00040
	07-Jun-12	0.166	<0.000020	0.0045	<0.010	<0.30	9.88	0.0059	<0.010	11.7	<0.0010	585	3.08	<0.0020	<0.0010	<0.0010	<0.0020	0.0324	<0.0010	0.0235	<0.0020	<0.020	<0.0040
	24-Oct-12	0.166	<0.000020	0.00523	0.0072	<0.030	12.4	0.00514	0.0015	11.9	<0.00010	577	3.2	<0.00020	<0.00010	<0.00010	<0.00020	0.0334	<0.00010	0.0202	0.00239	<0.0020	<0.00040
GWQ 25-6N59A	*26-Nov-09*	3.24	0	0.00210	0.0321	0.021	8.97	0.00116	0.0021	11.5	<0.00040	370	3.64	<0.00050	<0.00010	-	<0.00030	0.00639	<0.00020	0.210	0.0066	0.0153	0.00101
GWQ 25-6N59B	*26-Nov-09*	3.92	0	0.00229	0.0417	<0.020	11.4	0.00584	0.0028	11.6	<0.00010	440	4.49	<0.00050	0.00032	-	<0.00030	0.00699	<0.00020	0.138	0.0065	0.0883	0.00076
GWQ 25-6N59C	*26-Nov-09*	2.77	0	0.00439	0.0406	<0.020	11.0	0.00701	0.0032	12.2	<0.00010	451	4.40	<0.00050	0.00040	-	<0.00030	0.0138	<0.00020	0.0644	0.0067	0.0885	0.00158
	05-Aug-10	2.97	<0.000050	0.00175	0.0323	<0.10	10.1	0.00608	0.0047	11.5	<0.00010	437	4.09	<0.00020	0.00016	<0.00010	<0.00020	0.0190	<0.0010	0.0424	0.00640	0.0325	0.00042
GWQ 25-6N59D	*26-Nov-09*	0.0641	0	0.00444	0.00675	<0.020	1.46	0.00138	<0.0010	5.93	<0.00010	125	0.899	<0.00050	<0.00010	-	<0.00030	0.00153	<0.00020	0.0488	0.0108	<0.0050	0.00063
	05-Aug-10	0.0515	<0.000050	0.00387	0.00474	<0.10	1.93	0.00191	0.0014	6.63	<0.00010	124	1.01	<0.00020	<0.00010	<0.00010	<0.00020	0.00207	<0.0010	0.0379	0.00957	0.0057	0.00054
	09-Jun-11	0.00125	<0.000050	0.00386	0.0029	<0.10	1.11	0.00120	0.0011	6.06	<0.00010	149	1.01	<0.00020	<0.00010	<0.00010	<0.00020	0.00481	<0.00020	0.0586	0.00719	0.0059	0.00104
	24-Oct-11	0.215	<0.000050	0.00351	0.0106	<0.10	8.56	0.00369	0.0018	7.24	<0.00010	228	1.61	<0.00020	<0.00010	<0.00010	<0.00020	0.00199	<0.00020	0.0493	0.00620	0.0265	0.00206
	07-Jun-12	0.0042	<0.000020	0.0061	<0.010	<0.30	0.9	<0.0020	<0.010	5.15	<0.0010	139	0.69	<0.0020	<0.0010	0.001	<0.0020	0.0069	<0.0010	0.0505	<0.0020	<0.020	<0.0040
	24-Oct-12	2.01	<0.000020	0.00159	0.0122	0.044	13.6	0.00653	0.0046	13	<0.00010	607	4.47	<0.00020	<0.00010	<0.00010	0.00025	0.0495	<0.00010	0.0327	0.00052	<0.0020	0.00061
GWQ 25-6N59E	*26-Nov-09*	0.252	0	0.00585	0.0147	<0.020	15.1	0.00602	0.0044	10.2	<0.00010	833	3.46	<0.00050	<0.00010	-	<0.00030	0.00521	0.00068	0.0221	0.0025	0.0120	<0.00040
	05-Aug-10	1.53	<0.000050	0.00170	0.0168	<0.10	10.4	0.00775	0.0059	9.83	<0.00010	541	3.27	<0.00020	<0.00010	<0.00010	<0.00020	0.0109	<0.0010	0.0114	0.00335	0.0122	<0.00040
GWQ 25-6N59F	*26-Nov-09*	1.25	0	0.00332	0.0188	<0.020	10.1	0.00689	0.0038	10.5	<0.00010	541	3.36	<0.00050	<0.00010	-	<0.00030	0.00478	0.00027	0.0168	0.0030	0.0119	<0.00040
	05-Aug-10	0.284	<0.000050	0.00619	0.0126	<0.10	21.2	0.00593	0.0065	15.9	<0.00010	1050	4.87	<0.00020	<0.00010	<0.00010	<0.00020	0.00918	<0.0010	0.0210	0.00301	0.0135	<0.00040
	09-Jun-11	1.31	<0.000050	0.00267	0.0065	<0.10	12.0	0.00722	0.0026	10.9	<0.00010	584	3.22	<0.00020	<0.00010	<0.00010	<0.00020	0.0153	0.00022	0.0131	0.00233	0.0184	<0.00040
	24-Oct-11	1.24	<0.000050	0.00250	0.0096	<0.10	9.97	0.00654	0.0030	8.85	<0.00010	477	3.01	<0.00020	<0.00010	<0.00010	<0.00020	0.00307	<0.00020	0.0127	0.00279	0.0248	<0.00040
	07-Jun-12	0.41	<0.000020	0.0041	<0.010	<0.30	14.6	0.007	<0.010	9.9	<0.0010	890	3.34	<0.0020	<0.0010	<0.0010	<0.0020	0.0213	<0.0010	0.0167	<0.0020	<0.020	<0.0040
	24-Oct-12	0.418	<0.000020	0.00551	0.0089	<0.030	16.2	0.00914	0.0024	12.7	<0.00010	763	3.49	<0.00020	<0.00010	<0.00010	<0.00020	0.0258	0.00078	0.0165	0.00177	0.0042	<0.00040
GWQ 25-6N60A	*26-Nov-09*	2.64	0	0.00202	0.0335	<0.020	9.25	0.00081	0.0021	11.7	<0.00010	222	2.80	<0.00050	<0.00010	-	<0.00030	0.00547	<0.00020	0.202	0.0067	0.0178	0.00123
GWQ 25-6N60B	*26-Nov-09*	3.29	0	0.00173	0.0314	<0.020	10.5	0.00403	0.0026	11.7	<0.00010	278	3.67	<0.00050	0.00014	-	<0.00030	0.00633	<0.00020	0.126	0.0058	0.0454	0.00089
GWQ 25-6N60C	*26-Nov-09*	2.04	0	0.00274	0.0292	<0.020	11.3	0.00668	0.0026	11.5	<0.00010	338	3.78	<0.00050	<0.00010	-	<0.00030	0.00692	<0.00020	0.0384	0.0045	0.0519	0.00084
	06-Aug-10	2.11	<0.000050	0.00254	0.0106	<0.020	9.14	0.00579	<0.0010	12.2	<0.00010	327	3.60	<0.00050	<0.00010	-	<0.00030	0.0117	<0.00020	0.0336	0.0062	0.0124	0.00055
GWQ 25-6N60D	*26-Nov-09*	1.39	0	0.00414	0.0228	<0.020	8.96	0.00580	0.0026	12.0	<0.00010	343	3.20	<0.00050	0.00018	-	<0.00030	0.00559	<0.00020	0.0460	0.0048	0.0344	0.00050
	06-Aug-10	0.809	<0.000050	0.00338	0.0101	<0.020	8.11	0.00523	<0.0010	11.9	<0.00010	331	2.98	<0.00050	0.00020	-	<0.00030	0.00890	<0.00020	0.0427	0.0067	0.0362	<0.00040
	13-Jun-11	1.41	<0.000050	0.00271	0.0131	<0.10	9.51	0.00527	0.0020	11.4	<0.00010	341	3.13	<0.00020	0.00013	<0.00010	<0.00020	0.0195	<0.00020	0.0351	0.00555	0.0203	<0.00040
	24-Oct-11	1.19	<0.000050	0.00471	0.0133	<0.10	10.2	0.00498	0.0025	9.88	<0.00010	305	2.92	<0.00020	0.00017	<0.00010	<0.00020	0.00453	<0.00020	0.0372	0.00772	0.0352	0.00051
	07-Jun-12	1.3	<0.000020	0.0023	0.016	<0.30	8.8	0.0049	<0.010	11.4	<0.0010	347	3.05	<0.0020	<0.0010	<0.0010	<0.0020	0.0322	<0.0010	0.0354	<0.0020	0.256	<0.0040
GWQ25-6N60DR	*29-Oct-12*	0.133	-	0.00388	0.0062	<0.030	14.5	0.00517	0.0012	8.24	<0.00010	494	3.69	<0.00020	<0.00010	<0.00010	<0.00020	0.0432	0.00011	0.0238	0.00045	<0.0020	0.00072
GWQ 25-6N60E	*26-Nov-09*	0.149	0	0.0755	0.0115	0.021	12.5	0.00248	0.0040	8.55	<0.00010	914	1.84	<0.00050	<0.00010	-	<0.00030	0.00813	<0.00020	0.0137	0.0016	0.0203	<0.00040
	06-Aug-10	0.160	<0.000050	0.0650	0.00464	<0.020	13.0	0.00221	<0.0010	8.03	<0.00010	905	1.78	<0.00050	<0.00010	-	<0.00030	0.00700	<0.00020	0.0149	0.0013	0.0074	<0.00040
MOE Standards [1]																							
Table 3 (Non-potable groundwater condition)		-	(0.0028) 0.00029	9.2	0.49	-	-	-	0.063		0.0015	2300	-	-	0.51	-	-	-	-	0.42	0.25	1.1	-
Other Standards - For Reference Only																							
Health Canada Drinking Water [2]		0.05 (AO)	0.001 (MAC)	-	-	-	-	-	0.01 (MAC)	-	-	200 (AO)	-	-	-	-	-	-	-	0.02 (MAC)	-	5 (AO)	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	(0.001) 0.00029	0.07	0.1	-	-	-	0.01		0.0015	490	-	-	0.002	-	-	-	-	0.02	0.0062	1.1	-

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																				
		Manganese (Mn)-Dissolved	Mercury (Hg)-Dissolved	Molybdenum (Mo)-Dissolved	Nickel (Ni)-Dissolved	Phosphorus (P)-Dissolved	Potassium (K)-Dissolved	Rubidium (Rb)-Dissolved	Selenium (Se)-Dissolved	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved	Strontium (Sr)-Dissolved	Tellurium (Te)-Dissolved	Thallium (Tl)-Dissolved	Thorium (Th)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Tungsten (W)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn)-Dissolved	Zirconium (Zr)-Dissolved
GWQ 25-6N60E	*13-Jun-11*	0.0985	<0.000050	0.0705	0.0050	<0.10	10.6	0.00302	0.0022	9.31	<0.00010	853	1.32	<0.00020	<0.00010	<0.00010	<0.00020	0.0144	<0.00020	0.0327	0.00340	0.0082	<0.00040
	24-Oct-11	0.130	<0.000050	0.0445	0.0024	<0.10	11.2	0.00223	0.0027	6.20	<0.00010	733	1.58	<0.00020	<0.00010	<0.00010	<0.00020	0.00263	<0.00020	0.0104	0.00259	0.0036	<0.00040
	07-Jun-12	0.107	-	0.0397	<0.010	<0.30	14.5	0.0027	<0.010	7.23	<0.0010	838	1.83	<0.0020	<0.0010	<0.0010	<0.0020	0.0171	<0.0010	0.0157	0.0026	<0.020	<0.0040
	01-Nov-12	0.107	<0.000020	0.0397	0.0046	<0.030	13.9	0.00297	0.0022	9.72	<0.00010	621	1.59	<0.00020	<0.00010	<0.00010	<0.00020	0.0163	0.00018	0.0185	0.00092	<0.0020	<0.00040
GWQ 25-6N63C	*03-Aug-10*	5.94	<0.000050	0.00256	0.0210	0.039	14.6	0.00358	0.0330	12.1	<0.00010	998	5.48	<0.00050	<0.00010	-	0.00430	0.0230	<0.00020	0.139	0.0147	0.0109	0.00182
GWQ 25-6N63D	*03-Aug-10*	2.75	<0.000050	0.00514	0.0118	0.038	12.4	0.00788	0.0410	10.3	<0.00010	1100	5.46	<0.00050	<0.00010	-	0.00551	0.0240	<0.00020	0.126	0.0133	0.0185	0.00159
GWQ 25-6N63E	*03-Aug-10*	1.74	<0.000050	0.00527	0.0102	<0.020	12.0	0.00816	0.0278	10.2	<0.00010	1130	5.28	<0.00050	<0.00010	-	0.00260	0.0259	<0.00020	0.133	0.0120	0.0097	0.00123
	06-Jun-11	2.47	<0.000050	0.00099	0.0156	<0.10	10.7	0.00570	0.0015	7.33	<0.00010	570	3.80	<0.00020	<0.00010	<0.00010	0.00028	0.0237	<0.00020	0.0624	0.00728	0.0181	<0.00040
	20-Oct-11	1.99	<0.000050	0.00241	0.0075	<0.10	12.8	0.00605	0.0027	10.4	<0.00010	944	5.30	<0.00020	<0.00010	<0.00010	<0.00020	0.0144	<0.00020	0.110	0.00616	0.0132	0.00079
	06-Jun-12	2.12	<0.000020	0.0019	<0.0010	<0.30	11.7	0.0053	<0.010	12.6	<0.0010	924	4.93	<0.0020	<0.0010	<0.0010	<0.0020	0.0643	<0.0010	0.108	<0.0020	<0.020	<0.0040
	23-Oct-12	1.96	<0.000020	0.00202	0.0141	<0.030	12.5	0.00537	<0.0010	16.1	<0.00010	806	5	<0.00020	<0.00010	<0.00010	0.00047	0.0465	<0.00010	0.0955	0.00425	<0.0020	0.0007
GWQ 25-6N63F	*03-Aug-10*	0.718	<0.000050	0.00187	0.00631	<0.020	11.6	0.00642	0.0079	10.4	<0.00010	580	3.79	<0.00050	<0.00010	-	<0.00030	0.0132	<0.00020	0.0161	0.0082	0.0076	<0.00040
	06-Jun-11	0.340	<0.000050	0.00104	0.0113	<0.10	9.83	0.00551	0.0015	10.1	<0.00010	521	3.94	<0.00020	<0.00010	<0.00010	<0.00020	0.0188	<0.00020	0.0138	0.00532	0.0093	<0.00040
	20-Oct-11	0.405	<0.000050	0.00120	0.0029	<0.10	12.0	0.00551	0.0012	10.0	<0.00010	618	4.02	<0.00020	<0.00010	<0.00010	<0.00020	0.00826	<0.00020	0.0125	0.00292	0.0113	<0.00040
	06-Jun-12	0.39	<0.000020	<0.0010	<0.010	<0.30	10.8	0.0046	<0.010	11.2	<0.0010	603	3.73	<0.0020	<0.0010	<0.0010	<0.0020	0.0313	<0.0010	0.0137	<0.0020	<0.020	<0.0040
	23-Oct-12	1.33	<0.000020	0.00113	0.0241	1.57	17.2	0.0237	0.001	126	0.00014	587	4.34	<0.00020	0.00014	0.0162	0.00032	1.89	0.00018	0.0163	0.0278	0.0194	0.018
GWQ 25-6N67D	*26-Aug-10*	3.01	<0.000050	0.00274	0.0146	<0.10	12.7	0.00704	0.0203	10.3	<0.00010	553	4.01	<0.00020	<0.00010	<0.00010	<0.00020	0.0159	<0.0010	0.0830	0.00621	0.0120	0.00150
GWQ 25-6N67E	*26-Aug-10*	1.31	<0.000050	0.00239	0.00926	<0.10	10.5	0.00646	0.0152	9.78	<0.00010	436	3.47	<0.00020	<0.00010	<0.00010	<0.00020	0.0126	<0.0010	0.0546	0.00469	0.0066	0.00085
	09-Jun-11	1.24	<0.000050	0.00113	0.0062	<0.10	11.7	0.00610	0.0027	9.59	<0.00010	368	3.25	<0.00020	<0.00010	<0.00010	<0.00020	0.0252	<0.00020	0.0396	0.00277	0.0114	0.00064
	24-Oct-11	1.53	<0.000050	0.00403	0.0114	<0.10	9.47	0.00676	0.0171	9.50	<0.00010	577	3.69	<0.00020	<0.00010	<0.00010	<0.00020	0.00532	<0.00020	0.0806	0.00509	0.0229	0.00276
	06-Jun-12	1.73	<0.000020	0.0021	<0.010	<0.30	10.2	0.0059	<0.010	11.6	<0.0010	512	3.61	<0.0020	<0.0010	<0.0010	<0.0020	0.0434	<00010	0.0558	<0.0020	<0.020	<0.0040
	22-Oct-12	1.39	<0.000010	0.00191	0.0091	<0.030	10.4	0.00556	0.0016	12.5	<0.00010	480	3.59	<0.00020	<0.00010	<0.00010	<0.00020	0.0371	<0.00010	0.0517	0.00294	<0.0020	0.00105
GWQ 25-6N67F	*26-Aug-10*	0.260	<0.000050	0.00129	0.00815	<0.10	10.6	0.00477	0.0018	10.9	<0.00010	310	2.76	<0.00020	<0.00010	<0.00010	<0.00020	0.00810	<0.0010	0.0231	0.00412	0.0061	<0.00040
	08-Jun-11	0.196	<0.000050	0.00086	0.0032	<0.10	11.0	0.00433	0.0020	10.4	<0.00010	285	2.81	<0.00020	<0.00010	<0.00010	<0.00020	0.0162	<0.00020	0.0201	0.00355	0.0068	<0.00040
	24-Oct-11	0.177	<0.000050	0.00081	0.0055	<0.10	9.39	0.00355	0.0029	10.8	<0.00010	296	2.87	<0.00020	<0.00010	<0.00010	<0.00020	0.0114	<0.00020	0.0221	0.00274	0.0056	<0.00040
Duplicate 25-101	*24-Oct-11*	0.178	<0.000050	0.00082	0.0069	<0.10	9.23	0.00364	0.0032	11.4	<0.00010	309	2.89	<0.00020	<0.00010	<0.00010	<0.00020	0.0131	<0.00020	0.0223	0.00321	0.0052	<0.00040
	06-Jun-12	0.156	<0.000020	<0.0010	<0.010	<0.30	8.77	0.0035	<0.010	11.9	<0.0010	290	2.66	<0.0020	<0.0010	<0.0010	<0.0020	0.0299	<0.0010	0.0219	<0.0020	<0.020	<0.0040
	22-Oct-12	0.141	<0.000020	0.00078	0.0041	<0.030	9.15	0.00344	<0.0010	13.8	<0.00010	330	2.76	<0.00020	<0.00010	<0.00010	<0.00020	0.0244	<0.00010	0.0216	0.00244	<0.0020	<0.00040
GWQ 25-W04	*30-Nov-09*	0.0327	0	0.00671	0.00251	<0.020	24.4	0.0121	0.0064	2.38	<0.00010	-	2.29	<0.00050	<0.00010	-	<0.00030	0.00214	0.00298	<0.00010	<0.0010	0.0176	<0.00040
	04-Aug-10	0.0864	<0.000050	0.00578	<0.00020	<0.10	27.2	0.0129	<0.0010	1.98	<0.00010	1190	2.52	<0.00020	<0.00010	<0.00010	<0.00020	0.00033	0.0011	<0.00010	<0.00020	0.0025	<0.00040
	06-Jun-11	0.0531	<0.000050	0.00436	<0.0010	<0.10	25.9	0.0142	0.0018	1.61	<0.00010	1100	2.69	<0.00020	<0.00010	<0.00010	<0.00020	0.00854	0.00211	<0.00010	<0.00020	0.0101	<0.00040
	18-Oct-11	0.0593	<0.000050	0.00959	<0.0010	<0.10	26.2	0.0126	<0.0010	1.47	<0.00010	1180	2.56	<0.00020	<0.00010	<0.00010	<0.00020	0.00432	0.00203	<0.00010	0.00061	0.0055	<0.00040
	31-May-12	0.0636	<0.000020	0.00733	<0.0010	<0.030	26.2	0.0122	<0.0010	1.1	<0.00010	-	2.51	<0.00020	<0.00010	<0.00010	<0.00020	0.0136	0.00151	<0.00010	0.00191	<0.0020	<0.00040
	24-Oct-12	0.0485	<0.000020	0.00765	<0.0010	<0.030	29.6	0.0117	<0.0010	0.992	<0.00010	1260	2.46	<0.00020	<0.00010	<0.00010	<0.00020	0.0135	0.00057	<0.00010	0.00027	<0.0020	<0.00040
GWQ 25-W05	*24-Nov-09*	0.0288	0	0.00217	0.00521	<0.020	30.3	0.0126	0.0049	4.28	<0.00010	1100	3.34	<0.00050	<0.00010	-	<0.00030	0.00409	<0.00020	0.00042	<0.0010	0.0316	<0.00040
	05-Aug-10	0.0242	<0.000050	0.00246	0.00640	<0.10	34.7	0.0152	0.0082	5.87	<0.00010	1310	4.06	0.00031	<0.00010	<0.00010	<0.00020	0.00751	<0.0010	0.00055	0.00086	0.0307	<0.00040
	06-Jun-11	0.0417	<0.000050	0.00263	0.0042	<0.10	30.8	0.0155	0.0018	5.24	<0.00010	1220	4.21	0.00027	<0.00010	<0.00010	<0.00020	0.0123	<0.00020	0.00066	0.00045	0.0645	<0.00040
	18-Oct-11	0.0341	<0.000050	0.00242	0.0038	<0.10	31.4	0.0139	<0.0010	5.07	<0.00010	1260	4.06	<0.00020	<0.00010	<0.00010	<0.00020	0.00612	<0.00020	0.00056	0.00067	0.0530	<0.00040
	31-May-12	0.0239	<0.000020	0.00221	0.0015	<0.030	30.5	0.0132	0.0013	5.66	<0.00010	-	3.77	<0.00020	<0.00010	<0.00010	<0.00020	0.0176	<0.00010	0.00053	0.00114	0.0451	<0.00040
	24-Oct-12	0.0296	<0.000020	0.00262	0.0024	<0.030	37.1	0.0133	<0.0010	5.95	<0.00010	1320	4.11	<0.00020	<0.00010	<0.00010	<0.00020	0.0216	<0.00010	0.00051	0.00047	0.0341	<0.00040
GWQ 25-W06	*26-Nov-09*	0.0350	0	0.00461	0.00586	<0.020	44.6	0.0240	0.0070	5.32	<0.00010	1670	4.99	<0.00050	<0.00010	-	<0.00030	0.0123	<0.00020	0.00055	<0.0010	0.0061	0.00045
	06-Aug-10	0.0324	<0.000050	0.00410	<0.00020	<0.020	42.4	0.0222	<0.0010	4.94	<0.00010	1660	4.60	<0.00050	<0.00010	-	<0.00030	0.00640	<0.00020	0.00053	<0.0010	0.0062	<0.00040
	08-Jun-11	0.0334	<0.000050	0.00423	<0.0010	<0.10	53.6	0.0257	0.0040	4.12	<0.00010	1590	4.56	0.00029	<0.00010	<0.00010	<0.00020	0.0127	<0.00020	0.00042	<0.00020	0.0101	<0.00040
	08-Jun-11	0.0294	<0.000050	0.00416	<0.0010	<0.10	41.1	0.0204	0.0049	4.10	<0.00010	1640	4.66	<0.00020	<0.00010	<0.00010	<0.00020	0.00251	<0.00020	0.00045	<0.00020	0.0064	<0.00040
	17-Oct-11	0.0294	<0.000050	0.00416	<0.0010	<0.10	41.1	0.0204	0.0049	4.1	<0.00010	1640	4.66	<0.00020	<0.00010	<0.00010	<0.00020	0.00251	<0.00020	0.00045	<0.00020	0.0064	<0.00040
	04-Jun-12	0.0341	<0.000020	0.004	<0.010	<0.30	46.5	0.0221	<0.010	5.76	<0.0010	-	5.21	<0.0020	<0.0010	<0.0010	<0.0020	0.0282	<0.0010	<0.0010	<0.0020	<0.020	<0.0040
GWQ 25-W07	*27-Nov-09*	0.00818	0	0.00304	0.00364	<0.020	27.5	0.0141	0.0023	3.39	<0.00010	955	2.58	<0.00050	<0.00010	-	<0.00030	0.00269	<0.00020	<0.00010	<0.0010	<0.0050	<0.00040
	05-Aug-10	0.00844	<0.000050	0.00365	0.00401	<0.10	29.9	0.0145	0.0074	5.12	<0.00010	1050	3.18	0.00028	<0.00010	<0.00010	<0.00020	0.00561	<0.0010	<0.00010	0.00063	0.0039	<0.00040
	08-Jun-11	0.00945	<0.000050	0.00381	<0.0010	<0.10	34.4	0.0180	0.0027	4.39	<0.00010	995	3.10	<0.00020	<0.00010	<0.00010	<0.00020	0.00824	<0.00020	<0.00010	<0.00020	0.0071	<0.00040
MOE Standards [1]																							
Table 3 (Non-potable groundwater condition)		-	(0.0028) 0.00029	9.2	0.49	-	-	-	0.063		0.0015	2300	-	-	0.51	-	-	-	-	0.42	0.25	1.1	-
Other Standards - For Reference Only																							
Health Canada Drinking Water [2]		0.05 (AO)	0.001 (MAC)	-	-	-	-	-	0.01 (MAC)	-	-	200 (AO)	-	-	-	-	-	-	-	0.02 (MAC)	-	5 (AO)	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	(0.001) 0.00029	0.07	0.1	-	-	-	0.01		0.0015	490	-	-	0.002	-	-	-	-	0.02	0.0062	1.1	-

TABLE G-2
METALS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																				
		Manganese (Mn)-Dissolved	Mercury (Hg)-Dissolved	Molybdenum (Mo)-Dissolved	Nickel (Ni)-Dissolved	Phosphorus (P)-Dissolved	Potassium (K)-Dissolved	Rubidium (Rb)-Dissolved	Selenium (Se)-Dissolved	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved	Strontium (Sr)-Dissolved	Tellurium (Te)-Dissolved	Thallium (Tl)-Dissolved	Thorium (Th)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Tungsten (W)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn)-Dissolved	Zirconium (Zr)-Dissolved
Duplicate 25-100	*08-Jun-11*	0.00950	<0.000050	0.00378	<0.0010	<0.10	35.0	0.0179	0.0027	4.19	<0.00010	959	3.04	<0.00020	<0.00010	<0.00010	<0.00020	0.00809	<0.00020	<0.00010	<0.00020	0.0049	<0.00040
	19-Oct-11	0.0103	<0.000050	0.00365	<0.0010	<0.10	28.4	0.0150	0.0070	4.76	<0.00010	899	3.49	<0.00020	<0.00010	<0.00010	<0.00020	0.00655	<0.00020	<0.00010	0.00130	0.0043	<0.00040
Duplicate 25-100	*19-Oct-11*	0.0102	<0.000050	0.00376	0.0018	<0.10	27.1	0.0150	0.0058	4.63	<0.00010	1060	3.21	<0.00020	<0.00010	<0.00010	<0.00020	0.00738	<0.00020	<0.00010	0.00085	0.0021	<0.00040
	05-Jun-12	0.0101	<0.000020	0.00408	0.001	<0.030	31	0.0158	0.0013	6.48	<0.00010	-	3.41	0.00025	<0.00010	<0.00010	<0.00020	0.0205	<0.00010	0.0001	<0.00020	<0.0020	<0.00040
Duplicate 25-100	*05-Jun-12*	0.00998	<0.000020	0.00391	<0.0010	<0.030	31.2	0.0154	<0.0010	5.96	<0.00010	-	3.41	<0.00020	<0.00010	<0.00010	0.00056	0.0212	<0.00010	<0.00010	<0.00020	<0.0020	<0.00040
GWQ 25-W08	*27-Nov-09*	0.0229	0	0.00217	0.00405	<0.020	30.4	0.0122	<0.0010	2.98	<0.00010	1330	2.89	<0.00050	<0.00010	-	<0.00030	0.00241	<0.00020	0.00078	<0.0010	<0.0050	<0.00040
	05-Aug-10	0.0278	<0.000050	0.00305	0.00669	<0.10	34.6	0.0141	0.0097	5.30	<0.00010	1350	3.88	0.00040	<0.00010	<0.00010	<0.00020	0.00813	<0.0010	0.00089	0.00120	0.0039	<0.00040
	06-Jun-11	0.0292	<0.000050	0.00272	0.0015	<0.10	37.2	0.0134	0.0077	5.35	<0.00010	1380	3.49	0.00028	<0.00010	<0.00010	<0.00020	0.00543	<0.00020	0.00085	<0.00020	0.0025	<0.00040
	18-Oct-11	0.0302	<0.000050	0.00297	0.0100	<0.10	33.0	0.0147	<0.0010	4.85	<0.00010	1390	4.04	<0.00020	<0.00010	<0.00010	<0.00020	0.00602	<0.00020	0.00074	0.00109	0.0184	<0.00040
	31-May-12	0.0294	<0.000020	0.0027	<0.010	<0.30	31.7	0.0148	<0.010	5.32	<0.0010	-	3.88	<0.0020	<0.0010	<0.0010	<0.0020	0.0184	<0.0010	<0.0010	<0.0020	<0.020	<0.0040
	24-Oct-12	0.0272	<0.000020	0.00286	<0.0010	<0.030	37.2	0.0137	0.0012	5.29	<0.00010	1390	4.16	<0.00020	<0.00010	<0.00010	<0.00020	0.0193	<000010	0.00064	<0.00020	<0.0020	<0.00040
Duplicate 25-101	*24-Oct-12*	0.0287	<0.000020	0.00308	0.0024	<0.030	39.3	0.0143	0.0025	6.01	<0.00010	1440	4.35	<0.00020	<0.00010	<0.00010	<0.00020	0.0218	<0.00010	0.00074	<0.00020	<0.0020	<0.00040
GWQ 25-W09	*27-Nov-09*	0.0169	0	0.00301	0.00429	<0.020	36.3	0.0154	<0.0010	3.40	<0.00010	1550	4.02	<0.00050	<0.00010	-	<0.00030	0.00058	<0.00020	0.00115	<0.0010	<0.0050	<0.00040
	03-Aug-10	0.0227	<0.000050	0.00409	<0.00020	<0.020	37.7	0.0190	0.0094	5.32	<0.00010	1820	4.42	<0.00050	0.00010	-	<0.00030	0.00771	<0.00020	0.00098	0.0026	0.0057	<0.00040
	06-Jun-11	0.0238	<0.000050	0.00398	0.0048	<0.10		0.0198	0.0013	4.52	<0.00010	1480	4.50	0.00028	<0.00010	<0.00010	<0.00020	0.0141	<0.00020	0.00107	<0.00020	0.0090	<0.00040
	17-Oct-11	0.0198	<0.000050	0.00383	<0.0010	<0.10	37.2	0.0165	0.0044	4.41	<0.00010	1550	4.27	0.00025	<0.00010	<0.00010	<0.00020	0.00275	<0.00020	0.00110	0.00139	0.0073	<0.00040
	31-May-12	0.022	<0.000020	0.0037	0.0016	<0.030	37.5	0.0167	<0.0010	5.52	<0.00010	-	4.33	<0.00020	<0.00010	<0.00010	<0.00020	0.0185	<0.00010	0.00098	0.00102	0.0022	<0.00040
	24-Oct-12	0.0188	<0.000020	0.00424	<0.0010	<0.030	35.2	0.0186	<0.0010	4.39	<0.00010	1510	4.26	<0.00020	<0.00010	-	<0.00020	0.0154	<0.00010	0.00085	<0.00020	<0.0020	<0.00040
GWQ 25-W10	*27-Nov-09*	0.0107	0	0.00284	0.00435	<0.020	35.6	0.0163	<0.0010	2.75	<0.00010	1470	3.33	<0.00050	<0.00010	<0.00010	<0.00030	0.00141	<0.00020	0.00097	<0.0010	<0.0050	<0.00040
	03-Aug-10	0.0143	<0.000050	0.00438	0.00242	<0.020	35.2	0.0207	0.0117	4.18	<0.00010	1470	3.92	<0.00050	<0.00010	-	<0.00030	0.00820	0.00054	0.00119	0.0025	0.0077	<0.00040
	06-Jun-11	0.0168	<0.000050	0.00416	0.0059	<0.10	35.6	0.0218	0.0020	3.97	<0.00010	1360	4.13	0.00031	<0.00010	<0.00010	<0.00020	0.0147	<0.00020	0.00108	0.00025	0.0069	<0.00040
	17-Oct-11	0.0157	<0.000050	0.00405	<0.0010	<0.10	35.6	0.0180	0.0039	3.77	<0.00010	1410	3.89	<0.00020	<0.00010	<0.00010	<0.00020	0.00190	<0.00020	0.00107	0.00063	0.0086	<0.00040
	31-May-12	0.0155	<0.000020	0.0035	<0.010	<0.30	35.8	0.0185	<0.010	4.91	<0.0010	1480	4.05	<0.0020	<0.0010	<0.0010	<0.0020	0.0166	<0.0010	<0.0010	<0.0020	<0.020	<0.0040
GWQ 25-W11	*27-Nov-09*	0.00105	0	0.00923	0.00347	<0.020	29.9	0.0170	0.0014	3.13	<0.00010	1340	2.66	<0.00050	<0.00010	-	<0.00030	0.00193	0.00053	0.00033	<0.0010	<0.0050	<0.00040
	03-Aug-10	0.00035	<0.000050	0.0206	<0.00020	<0.020	34.6	0.0286	0.0125	2.31	<0.00010	1380	3.13	<0.00050	<0.00010	-	<0.00030	0.00651	0.00259	<0.00010	0.0012	<0.0050	<0.00040
	06-Jun-11	0.0243	<0.000050	0.00836	<0.0010	<0.10	39.5	0.0161	0.0088	6.41	<0.00010	1390	3.47	0.00027	<0.00010	<0.00010	<0.00020	0.00428	0.00055	0.00041	<0.00020	0.0026	<0.00040
	17-Oct-11	0.0228	<0.000050	0.00941	<0.0010	<0.10	36.1	0.0178	0.0040	4.44	<0.00010	1380	3.40	<0.00020	<0.00010	<0.00010	<0.00020	0.00152	0.00093	0.00032	<0.00020	0.0047	<0.00040
	31-May-12	0.0306	<0.000020	0.00712	<0.0010	<0.030	34.8	0.018	0.0017	4.94	<0.00010	-	3.57	<0.00020	<0.00010	<0.00010	<0.00020	0.0182	0.00025	0.00043	0.00123	<0.0020	<0.00040
GWQ 25-W12	*26-Aug-10*	0.0198	<0.000050	0.00344	0.00338	<0.10	34.2	0.0167	0.0047	7.29	<0.00010	1370	3.87	<0.00020	<0.00010	<0.00010	<0.00020	0.00605	<0.0010	0.00141	<0.00020	0.0029	<0.00040
	08-Jun-11	0.0500	<0.000050	0.00320	<0.0010	<0.10	40.1	0.0171	0.0036	4.64	<0.00010	1310	4.01	0.00025	<0.00010	<0.00010	<0.00020	0.0113	0.00024	0.00177	<0.00020	0.0050	<0.00040
	19-Oct-11	0.0232	<0.000050	0.00308	0.0024	<0.10	32.2	0.0146	0.0076	4.68	<0.00010	1230	4.07	0.00027	<0.00010	<0.00010	<0.00020	0.00851	<0.00020	0.00129	0.00167	0.0038	<0.00040
	04-Jun-12	0.0222	<0.000020	0.0032	<0.010	<0.30	38.3	0.0161	<0.010	5.91	<0.0010	-	4.51	<0.0020	<0.0020	<0.0010	<0.0020	0.031	<0.0010	0.0014	<0.0020	<0.020	<0.0040
	22-Oct-12	0.0183	<0.000020	0.00262	<0.0010	<0.030	35.3	0.0145	<0.0010	5.07	<0.00010	1540	4.13	<0.00020	<0.00010	<0.00010	<0.00020	0.0168	<0.00010	0.00107	0.00201	<0.0020	<0.00040
MOE Standards [1]																							
Table 3 (Non-potable groundwater condition)		-	(0.0028) 0.00029	9.2	0.49	-	-	-	0.063		0.0015	2300	-	-	0.51	-	-	-	-	0.42	0.25	1.1	-
Other Standards - For Reference Only																							
Health Canada Drinking Water [2]		0.05 (AO)	0.001 (MAC)	-	-	-	-	-	0.01 (MAC)	-	-	200 (AO)	-	-	-	-	-	-	-	0.02 (MAC)	-	5 (AO)	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	(0.001) 0.00029	0.07	0.1	-	-	-	0.01		0.0015	490	-	-	0.002	-	-	-	-	0.02	0.0062	1.1	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants.
4. Units to be confirmed by the COW.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-3
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																					
		1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Hexanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform
Units		*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
GWQ 25-4N34A	24-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-4N34B	24-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	19-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-4N34C	24-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<200	<200	<5.0	<5.0	<5.0	<10	<5.0	<5.0	<5.0	<10	<5.0
GWQ 25-4N34D	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	19-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-4N34DR	29-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-5N62C	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-5N62D	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	09-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	20-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-5N62E	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	20-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N57B	25-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N57C	25-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	18-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N57D	25-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	18-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	13-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	20-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	0.52
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N57DR	29-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N57E	18-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N57F	18-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	13-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	20-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	29-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N58C	04-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N58D	04-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	09-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N58E	04-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N58F	04-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	09-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N59C	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N59D	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	09-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	17-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N59E	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N59F	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	09-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	25-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
MOE Standards [1]																								
Table 3 (Non-potable groundwater condition)		(28) 3.3	(6,700) 640	(15) 3.2	(30) 4.7	(3,100) 320	(17) 1.6	-	(9,600) 4,600	(12) 1.6	(140) 16	9600	(67) 8	-	130,000	(430) 44	85,000	(770) 380	(56) 5.6	-	(8.4) 0.79	630	-	(22) 2.4
Other Standards - For Reference Only																								
Health Canada Drinking Water [2]		-	-	-	-	-	14 (MAC)	-	200 (MAC) / 3 (AO)	5	-	-	5 (MAC) / 1 (AO)	-	-	5 (MAC)	-	-	-	-	2 (MAC)	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		1.1	200	1	(5) 4.7	5	(14) 1.6	-	3	(5) 1.6	5	59	1	-	2700	5	16	25	0.89	-	(5) 0.79	30	-	(22) 2.4

TABLE G-3
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																					
		1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Hexanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform
Units		*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
GWQ 25-6N60C	06-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N60D	06-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	13-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N60DR	29-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	1.35
GWQ 25-6N60E	06-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	13-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	07-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	29-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N63C	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N63D	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N63E	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	20-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N63F	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	20-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N67D	26-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<4.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-6N67E	26-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<4.0	<0.50	<0.50	<0.50	<1.0	<0.50
	09-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	20-Oct-11	<0.50	0.72	<0.50	<0.50	2.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	43.3	0.66	<1.0	<0.50	5.65	<0.50	3.7	3910
	06-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	2.18	<0.50	<1.0	<0.50	0.55	<0.50	<1.0	918
	22-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	1.09	<0.50	<1.0	<0.50	1.04	<0.50	<1.0	832
GWQ 25-6N67F	26-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	08-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	19-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	0.73	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	10.2
Duplicate 101	19-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	0.75	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	9.73
	06-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	8.47
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	1.27	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	43.1
GWQ 25-W04	04-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	3.87	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	18-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	31-May-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	1.46	<0.50	<0.50	<1.0	<0.50
	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<0.50	1.43	<0.50	<0.50	<1.0	<0.50
GWQ 25-W05	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	0.59	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	18-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	31-May-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-W06	06-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	08-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	17-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	04-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	22-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-W07	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	08-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
Duplicate 100	08-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	19-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
Duplicate 100	19-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	05-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
Duplicate 100	05-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	22-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
MOE Standards [1]																								
Table 3 (Non-potable groundwater condition)		(28) 3.3	(6,700) 640	(15) 3.2	(30) 4.7	(3,100) 320	(17) 1.6	-	(9,600) 4,600	(12) 1.6	(140) 16	9600	(67) 8	-	130,000	(430) 44	85,000	(770) 380	(56) 5.6	-	(8.4) 0.79	630	-	(22) 2.4
Other Standards - For Reference Only																								
Health Canada Drinking Water [2]		-	-	-	-	-	14 (MAC)	-	200 (MAC) / 3 (AO)	5	-	-	5 (MAC) / 1 (AO)	-	-	5 (MAC)	-	-	-	-	2 (MAC)	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		1.1	200	1	(5) 4.7	5	(14) 1.6	-	3	(5) 1.6	5	59	1	-	2700	5	16	25	0.89	-	(5) 0.79	30	-	(22) 2.4

TABLE G-3
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																					
		1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Hexanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform
Units		*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
GWQ 25-W08	05-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	18-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	31-May-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
Duplicate 101	24-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-W09	27-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	17-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	31-May-12	<0.50	0.5	<0.50	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	>1.0	<0.50	<0.50	<0.50	<1.0	2.6
	23-Oct-12	<0.50	0.5	<0.50	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	>1.0	<0.50	<0.50	<0.50	<1.0	2.6
GWQ 25-W10	27-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	17-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	31-May-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-W11	27-Nov-09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	03-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	06-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	17-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	31-May-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	23-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
GWQ 25-W12	26-Aug-10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<3.0	<0.50	<0.50	<0.50	<1.0	<0.50
	08-Jun-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	19-Oct-11	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	04-Jun-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
	22-Oct-12	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50
MOE Standards [1]																								
Table 3 (Non-potable groundwater condition)		(28) 3.3	(6,700) 640	(15) 3.2	(30) 4.7	(3,100) 320	(17) 1.6	-	(9,600) 4,600	(12) 1.6	(140) 16	9600	(67) 8	-	130,000	(430) 44	85,000	(770) 380	(56) 5.6	-	(8.4) 0.79	630	-	(22) 2.4
Other Standards - For Reference Only																								
Health Canada Drinking Water [2]		-	-	-	-	-	14 (MAC)	-	200 (MAC) / 3 (AO)	5	-	-	5 (MAC) / 1 (AO)	-	-	5 (MAC)	-	-	-	-	2 (MAC)	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		1.1	200	1	(5) 4.7	5	(14) 1.6	-	3	(5) 1.6	5	59	1	-	2700	5	16	25	0.89	-	(5) 0.79	30	-	(22) 2.4

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. Expressed as a running average. The guideline is based on the risk associated with chloroform, the trihalomethane most often present and in greatest concentration in drinking water.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-3
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Chloromethane	cis-1,2-Dichloroethylene	cis-1,3-Dichloropropene	Dibromochloromethane	Dichlorodifluoromethane	Dichloromethane	Ethyl Benzene	m+p-Xylenes	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	MTBE	o-Xylene	Styrene	Tetrachloroethylene	Toluene	trans-1,2-Dichloroethylene	trans-1,3-Dichloropropene	Trichloroethylene	Trichlorofluoromethane	Trihalomethanes (total)	Vinyl chloride	Xylenes (Total)
Units		*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
GWQ 25-4N34A	24-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-4N34B	24-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	19-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-4N34C	24-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<10	<5.0	<5.0	<5.0	<10	<5.0	<5.0	<10	<200	<200	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<10	<5.0	<11
GWQ 25-4N34D	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	19-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<0.50
GWQ 25-4N34DR	29-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-5N62C	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-5N62D	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	09-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	20-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-5N62E	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	20-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	0.69	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N57B	25-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N57C	25-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	18-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N57D	25-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	18-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	13-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	20-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N57DR	29-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N57E	18-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N57F	18-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	13-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	20-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	29-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N58C	04-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N58D	04-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	09-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N58E	04-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N58F	04-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	09-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N59C	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N59D	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	09-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	17-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N59E	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N59F	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	09-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	25-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
MOE Standards [1]																							
Table 3 (Non-potable groundwater condition)		-	(17) 1.6	-	82,000	-	-	2,300	-	(1,500,000) 470,000	(580,000) 140,000	(1,400) 190	300	(9,100) 1,300	(17) 1.6	18,000	(17) 1.6	-	(17) 1.6	2,500	-	(1.7) 0.5	4,200
Other Standards - For Reference Only																							
Health Canada Drinking Water [2]		-		-	-	-	50 (MAC)	2.4 (AO)	300 (AO) (4)	-	-	15 (AO)	-	-	30 (MAC)	24 (AO)	-	-	5 (MAC)	-	100 (MAC) [3]	2 (MAC)	300 (AO)
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	(17) 1.6	-	25	-		2.4	-	1,800	640	15	-	5.4	(17) 1.6	24	(17) 1.6	-	(5) 1.6	150	-	(1.7) 0.5	300

TABLE G-3
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Chloromethane	cis-1,2-Dichloroethylene	cis-1,3-Dichloropropene	Dibromochloromethane	Dichlorodifluoromethane	Dichloromethane	Ethyl Benzene	m+p-Xylenes	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	MTBE	o-Xylene	Styrene	Tetrachloroethylene	Toluene	trans-1,2-Dichloroethylene	trans-1,3-Dichloropropene	Trichloroethylene	Trichlorofluoromethane	Trihalomethanes (total)	Vinyl chloride	Xylenes (Total)
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GWQ 25-6N60C	06-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N60D	06-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	13-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N60DR	29-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N60E	06-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	13-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	07-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	29-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N63C	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N63D	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N63E	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	20-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	0.66	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N63F	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	0.52	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	20-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N67D	26-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-6N67E	26-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	09-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	20-Oct-11	10.1	<0.50	<0.50	5.06	<1.0	6.67	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	3910	<0.50	<1.5
	06-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	4.69	0.65	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	920	<0.50	<1.5
	22-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	5.8	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	864	<0.50	<1.5
GWQ 25-6N67F	26-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	08-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	19-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	10.9	<0.50	<1.5
Duplicate 101	19-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	10.5	<0.50	<1.5
	06-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	8.5	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	44	<0.50	<1.5
GWQ 25-W04	04-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	18-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	31-May-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-W05	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	18-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	31-May-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-W06	06-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	08-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	17-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	04-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	22-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-W07	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	08-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
Duplicate 100	08-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	19-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
Duplicate 100	19-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	05-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	>0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
Duplicate 100	05-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	>0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	22-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
MOE Standards [1]																							
Table 3 (Non-potable groundwater condition)		-	(17) 1.6	-	82,000	-	-	2,300	-	(1,500,000) 470,000	(580,000) 140,000	(1,400) 190	300	(9,100) 1,300	(17) 1.6	18,000	(17) 1.6	-	(17) 1.6	2,500	-	(1.7) 0.5	4,200
Other Standards - For Reference Only																							
Health Canada Drinking Water [2]		-		-	-	-	50 (MAC)	2.4 (AO)	300 (AO) (4)	-	-	15 (AO)	-	-	30 (MAC)	24 (AO)	-	-	5 (MAC)	-	100 (MAC) [3]	2 (MAC)	300 (AO)
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	(17) 1.6	-	25	-		2.4	-	1,800	640	15	-	5.4	(17) 1.6	24	(17) 1.6	-	(5) 1.6	150	-	(1.7) 0.5	300

TABLE G-3
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Chloromethane	cis-1,2-Dichloroethylene	cis-1,3-Dichloropropene	Dibromochloromethane	Dichlorodifluoromethane	Dichloromethane	Ethyl Benzene	m+p-Xylenes	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	MTBE	o-Xylene	Styrene	Tetrachloroethylene	Toluene	trans-1,2-Dichloroethylene	trans-1,3-Dichloropropene	Trichloroethylene	Trichlorofluoromethane	Trihalomethanes (total)	Vinyl chloride	Xylenes (Total)
Units		*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
GWQ 25-W08	05-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	18-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	31-May-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
Duplicate 101	24-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-W09	27-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	17-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	31-May-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	2.6	M0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	2.6	M0.50	<1.5
GWQ 25-W10	27-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	1.60	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	17-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	31-May-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	0.55	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-W11	27-Nov-09	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	1.68	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	03-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	06-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	17-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	31-May-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	23-Oct-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
GWQ 25-W12	26-Aug-10	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	08-Jun-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	19-Oct-11	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	04-Jun-12	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
	22-Oct-12	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5
MOE Standards [1]																							
Table 3 (Non-potable groundwater condition)		-	(17) 1.6	-	82,000	-	-	2,300	-	(1,500,000) 470,000	(580,000) 140,000	(1,400) 190	300	(9,100) 1,300	(17) 1.6	18,000	(17) 1.6	-	(17) 1.6	2,500	-	(1.7) 0.5	4,200
Other Standards - For Reference Only																							
Health Canada Drinking Water [2]		-		-	-	-	50 (MAC)	2.4 (AO)	300 (AO) (4)	-	-	15 (AO)	-	-	30 (MAC)	24 (AO)	-	-	5 (MAC)	-	100 (MAC) [3]	2 (MAC)	300 (AO)
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	(17) 1.6	-	25	-		2.4	-	1,800	640	15	-	5.4	(17) 1.6	24	(17) 1.6	-	(5) 1.6	150	-	(1.7) 0.5	300

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. Expressed as a running average. The guideline is based on the risk associated with chloroform, the trihalomethane most often present and in greatest concentration in drinking water.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-4
POLYNUCLEAR AROMATIC HYDROCARBONS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																				
		1-Methyl Naphthalene	2-Methyl Naphthalene	Acenaphthene	Acenaphthylene	Acridine	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b&j)fluoranthene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(ah)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3 cd) pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
GWQ 25-4N34	24-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	0.000014	0.000014	0.000038	<0.000010	0.000019	<0.000010	0.000063	<0.000010	0.000048	0.000019	0.000014	0.000058	<0.000050
GWQ 25-4N34B	19-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	06-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	29-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-4N34C	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	0.000019	0.0000076	0.000016	-	<0.000020	<0.000010	<0.000020	<0.0000050	0.000020	<0.000020	<0.000010	<0.000050	<0.000050	0.000014	<0.000020
GWQ 25-4N34D	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	0.000016	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.00050	<0.000050	<0.000010	<0.000020
	19-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	0.000011	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-4N34DR	29-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-5N62D	09-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	20-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	06-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	23-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-5N62E	06-Jun-11	0.000044	0.000082	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000109	<0.000050	0.000011	<0.000020
	20-Oct-11	<0.000020	0.000027	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	06-Jun-12	<0.000020	0.000025	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	0.000013	<0.000020
	23-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N57	25-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	0.000039	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000025	<0.000010	0.000142	<0.000010	<0.000010	0.000083	0.000074	0.000083	<0.000050
GWQ 25-6N57D	13-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	20-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	07-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N57DR	29-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N57F	13-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	20-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	0.000010	<0.000020
	07-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	0.000010	<0.000020
	01-Nov-12	<0.000020	0.000028	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	0.000010	<0.000020
GWQ 25-6N58D	09-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000030	<0.000010	<0.000010	<0.0000050	0.000012	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	07-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N58F	09-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	0.000017	<0.000020
	24-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	0.000012	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	0.000014	<0.000020
	07-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N59D	09-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	0.0000056	0.000025	-	<0.000020	<0.000010	<0.000020	<0.0000050	0.000022	<0.000020	<0.000010	<0.000050	<0.000050	0.000022	<0.000020
	07-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000020	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000020	<0.000020
	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000020	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000020	<0.000020
GWQ 25-6N59F	09-Jun-11	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	24-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	0.000016	0.0000149	0.000027	-	<0.000020	0.000014	0.000025	0.0000100	<0.000020	<0.000020	0.000010	<0.000050	<0.000050	0.000028	<0.000020
	07-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000020	<0.000020
	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000020	<0.000020
GWQ 25-6N60D	13-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	07-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N60DR	29-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000052	<0.000050	<0.000010	<0.000020
GWQ 25-6N60E	13-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-11	0.000025	0.000049	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000085	<0.000050	0.000026	<0.000020
	06-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	23-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N63 E	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000030	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	20-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	06-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	29-Oct-12	0.000048	0.000078	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000116	<0.000050	<0.000010	<0.000020
GWQ 25-6N63 F	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	0.000013	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000056	<0.000050	<0.000010	<0.000020
	20-Oct-11	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000020	<0.000020	0.000017	0.000052	-	<0.000040	<0.000020	0.000045	<0.000010	0.000049	<0.000040	<0.000040	<0.00010	<0.00010	0.000043	<0.000040
	06-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000020	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	23-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.000010	<0.000010	-	<0.000020	<0.000020	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-6N67D	26-Aug-10	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000050
GWQ 25-6N67E	26-Aug-10	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000050
	09-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	06-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	22-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
MOE Standards [1]																						
Table 3 (Non-potable groundwater condition)		1.8[3]	1.8[3]	(1.7) 0.6	0.0018	-	0.0024	0.0047	0.00081	-	0.00075	0.0002	0.0004	0.001	0.00052	0.13	0.4	0.0002	(6.4) 1.4	0.58	0.068	-
Other Standards - For Reference Only																						
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	0.00001	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		0.0032[3]	0.0032[3]	0.0041	0.0010	-	0.0024	0.001	0.00001	-	0.0001	0.0002	0.0001	0.0001	0.0002	0.00041	0.12	0.0002	-	0.001	0.0041	-

TABLE G-4
POLYNUCLEAR AROMATIC HYDROCARBONS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																			
		1-Methyl Naphthalene	2-Methyl Naphthalene	Acenaphthene	Acenaphthylene	Acridine	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b&j)fluoranthene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Chrysene	Dibenzo(ah)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3 cd) pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
GWQ 25-6N67F	26-Aug-10	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000050
	08-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	19-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
Duplicate 101	19-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	06-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	22-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W04	30-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000050	<0.000010	<0.000050
	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	18-Oct-11	<0.000020	0.000021	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	31-May-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W05	24-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050
	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000030	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	18-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	31-May-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000010	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W06	26-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050
	08-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000030	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	17-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	04-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	22-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W07	27-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	<0.000010	<0.000050
	08-Jun-11	<0.000020	0.000023	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
Duplicate 100	08-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000030	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	19-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
Duplicate 100	19-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	05-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
Dupliate 100	05-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	22-Oct-12	0.000027	0.0000058	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000151	<0.000050	<0.000010	<0.000020
GWQ 25-W08	27-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	<0.000010	<0.000050
	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	18-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	01-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
Duplicate 101	24-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W09	27-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050
	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	17-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	31-May-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	23-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W10	27-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050
	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	0.000013	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000056	<0.000050	<0.000010	<0.000020
	17-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	01-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	23-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W11	27-Nov-09	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000015	<0.000010	<0.000010	<0.000050
	06-Jun-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000030	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	17-Oct-11	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	31-May-12	<0.000020	0.000026	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	23-Oct-12	<0.000020	0.000026	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
GWQ 25-W12	26-Aug-10	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000050
	08-Jun-11	0.000027	0.000027	0.000027	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	0.000059	<0.000050	<0.000010	<0.000020
	19-Oct-11	<0.000020	0.000024	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	04-Jun-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
	22-Oct-12	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	-	<0.000020	<0.000010	<0.000020	<0.0000050	<0.000020	<0.000020	<0.000010	<0.000050	<0.000050	<0.000010	<0.000020
MOE Standards [1]																						
Table 3 (Non-potable groundwater condition)		1.8[3]	1.8[3]	(1.7) 0.6	0.0018	-	0.0024	0.0047	0.00081	-	0.00075	0.0002	0.0004	0.001	0.00052	0.13	0.4	0.0002	(6.4) 1.4	0.58	0.068	-
Other Standards - For Reference Only																						
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	0.00001	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		0.0032[3]	0.0032[3]	0.0041	0.0010	-	0.0024	0.001	0.00001	-	0.0001	0.0002	0.0001	0.0001	0.0002	0.00041	0.12	0.0002	-	0.001	0.0041	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. The methyl naphthalene standards are applicable to both 1-methyl naphthallene and 2-methyl naphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-6
PESTICIDES IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																
		Lindane	Heptachlor	Heptachlor epoxide	Oxychlordane	gamma-Chlordane	alpha-Chlordane	Aldrin	Dieldrin	p,p-DDE	p,p-DDD	p,p-DDT	o,p-DDT	Methoxychlor	Aldrin + Dieldrin	DDT + metabolites	Heptachlor + Heptachlor Epoxide	Chlordane (Total)
Units		*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
GWQ 25-4N34B	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	19-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-4N34C	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-4N34D	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	19-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-4N34DR	29-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-5N62C	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-5N62D	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	09-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	20-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-5N62E	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	20-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N57C	18-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N57D	18-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	13-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	20-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	07-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.13	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.129	<0.40	<0.20	<0.30
GWQ 25-6N57DR	29-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N57E	18-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N57F	18-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	13-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	20-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	07-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.032	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	29-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.032	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N58C	04-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N58D	04-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	09-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	7-un-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N58E	04-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N58F	04-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	09-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	07-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.028	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.028	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N59C	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N59D	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	09-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	07-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.043	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.042	<0.40	<0.20	<0.30
	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
MOE Standards [1]																		
Table 3 (Non-potable groundwater condition)		1.2	2.5	0.048	-	-	-	8.5	0.75	20	45	-	-	6.5	-	2.8	-	28
Other Standards - For Reference Only																		
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		1.2	1.5	0.048	-	-	-	0.35	0.35	10	10	-	-	6.5	-	2.8	-	7

TABLE G-6
PESTICIDES IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																
		Lindane	Heptachlor	Heptachlor epoxide	Oxychlordane	gamma-Chlordane	alpha-Chlordane	Aldrin	Dieldrin	p,p-DDE	p,p-DDD	p,p-DDT	o,p-DDT	Methoxychlor	Aldrin + Dieldrin	DDT + metabolites	Heptachlor + Heptachlor Epoxide	Chlordane (Total)
GWQ 25-6N59E	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	09-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N59F	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	09-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	07-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.022	<0.022	<0.10	<0.10	<0.10	<0.10	<0.10	<0.043	<0.40	<0.20	<0.30
	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N60D	06-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	13-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	07-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N60DR	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N60E	06-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	13-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	07-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.030	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	29-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.030	<0.060	<0.10	<0.10	<0.10	<0.10	<0.10	<0.060	<0.40	<0.20	<0.30
GWQ 25-6N63C	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N63D	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N63E	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	20-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N63F	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	20-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N67D	26-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N67E	26-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	09-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	22-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-6N67F	26-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	08-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	19-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
Duplicate 101	19-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	22-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W04	04-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	18-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	31-May-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W05	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	18-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	31-May-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
MOE Standards [1]																		
Table 3 (Non-potable groundwater condition)		1	2.5	0.048	-	-	-	8.5		20	45	-	-	6.5	-	2.8	-	28
Other Standards - For Reference Only																		
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		1.2	1.5	0.048	-	-	-	0.35	0.35	10	10	-	-	6.5	-	2.8	-	7

TABLE G-6
PESTICIDES IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																
		Lindane	Heptachlor	Heptachlor epoxide	Oxychlordane	gamma-Chlordane	alpha-Chlordane	Aldrin	Dieldrin	p,p-DDE	p,p-DDD	p,p-DDT	o,p-DDT	Methoxychlor	Aldrin + Dieldrin	DDT + metabolites	Heptachlor + Heptachlor Epoxide	Chlordane (Total)
GWQ 25-W06	06-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	08-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	17-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	04-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	22-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W07	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	08-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
Duplicate 100	08-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.12	<0.040	<0.40	<0.20	<0.30
	19-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
Duplicate 100	19-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	05-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
Duplicate 100	05-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	22-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W08	05-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	18-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	01-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
Duplicate 101	24-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W09	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	17-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	31-May-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W10	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	17-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	01-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W11	03-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	06-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.20
	17-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	31-May-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	23-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
GWQ 25-W12	26-Aug-10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	08-Jun-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.11	<0.040	<0.40	<0.20	<0.30
	19-Oct-11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	04-Jun-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
	22-Oct-12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30
MOE Standards [1]																		
Table 3 (Non-potable groundwater condition)		1	2.5	0.048	-	-	-	8.5		20	45	-	-	6.5	-	2.8	-	28
Other Standards - For Reference Only																		
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		1.2	1.5	0.048	-	-	-	0.35	0.35	10	10	-	-	6.5	-	2.8	-	7

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-7
DIOXINS FURANS IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter																														
		2378 TeCDD	12378 PeCDD	123478 HxCDD	123678 HxCDD	123789 HxCDD	1234678 HpCDD	OCDD	Total TCDDs	Total PeCDD	Total HxCDD	Total HpCDD	Total PCDDs	2378 TeCDF	12378 PeCDF	23478 PeCDF	123478 HxCDF	123678 HxCDF	123789 HxCDF	234678 HxCDF	1234678 HpCDF	1234789 HpCDF	OCDF	Total TCDF	Total PeCDF	Total HxCDF	Total HpCDF	Total PCDFs	Total TEQ (ND=0) (WHO Calc)	Total TEQ (ND=0.5DL) (WHO Calc)	Total TEQ (ND=DL) (WHO Calc)
Units		*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*
W09	*03-Aug-10*	<1.0	<0.80	<0.60	8.71	8.76	8.71	19.2	<1.0	<0.80	20.7	9.06	48.9	<0.90	<0.40	4.75	6.12	7.27	7.22	10.6	9.24	8.3	15.0	<0.90	5.08	37.2	17.6	74.9	6.57	7.55	8.53
W11	*03-Aug-10*	<0.70	<0.50	<0.30	<0.30	<0.30	<0.40	3.96	<0.70	<0.50	<0.30	<0.40	3.96	<0.60	<0.30	<0.30	<0.20	<0.10	<0.20	<0.20	<0.40	<0.50	<0.80	<0.60	<0.30	<0.20	<0.50	<0.80	0	0.77	1.53
W12	*26-Aug-10*	<0.50	<0.20	<0.20	<0.20	<0.20	<0.30	3.00	<0.50	<0.20	1.27	1.94	6.21	<0.30	<0.20	<0.20	<0.10	<0.10	<0.20	<0.10	<0.40	<0.50	<0.40	<0.30	<0.20	<0.20	<0.50	<0.50	0	0.46	0.92
MOE Standards [1]																																
Table 3 (Non-potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(23,000) 14,000	(23,000) 14,000	(23,000) 14,000
Other Standards - For Reference Only																																
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	15	15

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE G-8
NONYLPHENOLS & ETHOXYLATES IN GROUNDWATER
BRADY ROAD LANDFILL

Sample No.	Date	Parameter								
		Nonylphenols	Nonylphenol Monoethoxylates	Nonylphenol Diethoxylates	Nonylphenol Triethoxylates	t-Octylphenol	t-Octylphenol Monoethoxylate	t-Octylphenol Diethoxylate	t-Octylphenol Triethoxylate	TOTAL TEQ (CCME)
Units		*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
GWQ 25-W09	*03-Aug-10*	<0.10	<0.50	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	0.0
GWQ 25-W11	*03-Aug-10*	12.7	<0.50	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	13.0
GWQ 25-W12	*26-Aug-10*	0.20	<0.50	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	0.20
MOE Standards [1]										
Table 3 (Non-potable groundwater condition)		-	-	-	-	-	-	-	-	-
Other Standards - For Reference Only [3]										
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	-	-	-	-	-	-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
3. Canadian Water Quality Guidelines for the Protection of Aquatic Life nonylphenol and its ethoxlates guideline value 1 µg/L.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

APPENDIX H

LEACHATE

DRAFT

TABLE H-1
INORGANICS IN LEACHATE (NEWPCC)
BRADY ROAD LANDFILL

Sample No.	Date	Parameter [1]																	
		Alkalinity as Bicarbonate	Total Hardness	Hardness as Ca	Total Alkalinity	pH	Total Dissolved Solids	Total Organic Carbon	Total Solids	Turbidity	Specific Conductance at 25°C	Total Kjeldahl Nitrogen	Total Phosphorus	Nitrate + Nitrite Nitrogen	Total Ammonia	Chloride	Sulfate	Total Coliforms	E.coli
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*units*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*MPN/100mL*	*MPN/100mL*
LQ 25-MH3	19-Oct-10	5680	3010	717	5680	7.18	8430	677	9020	594	15100	787	3.3	<0.003	674	-	-	-	-
LQ 25-MH8	19-Oct-10	4760	2000	517	4760	7.12	5180	230	5490	30.5	11400	698	4.2	<0.003	556	-	-	-	-
LQ 25-MH13	19-Oct-10	640	711	372	640	6.71	862	11	896	33.6	1410	5	0.5	<0.003	0.594	-	-	-	-
LQ 25-MH24	19-Oct-10	5880	2470	609	5880	7.43	6420	335	6850	34.4	13700	849	6.0	<0.003	710	-	-	-	-
LQ 25-MH27	19-Oct-10	3920	2460	449	3920	6.99	5640	202	5820	304	10900	422	2.6	<0.003	396	-	-	-	-
LQ 25-MH31	19-Oct-10	4960	2120	442	4960	7.23	6120	326	6520	35.2	13100	761	4.1	0.967	651	-	-	-	-
LQ 25-MH33	19-Oct-10	6400	2780	609	6400	7.13	7350	438	8050	38.4	16100	975	6.3	<0.003	822	-	-	-	-
LQ 25-MH34	19-Oct-10	640	736	300	640	7.20	1380	35	1510	38.6	2390	31	0.4	<0.003	24.92	-	-	-	-
LQ 25-MH31	18-Jul-11	4950	2190	436	4950	7.09	7200	462	7230	20.5	12300	639	3.4	9.56	564	1780	24.7	-	-
LQ 25-MH33	18-Jul-11	6440	2680	587	6440	7.11	7990	571	8020	106	14600	935	5.5	<0.003	798	-	-	-	-
LQ 25-MH3	18-Jul-11	6550	3330	928	6550	7.04	10700	1250	10900	495	15200	886	3.2	<0.003	672	-	-	-	-
LQ 25-MH8	18-Jul-11	3810	2010	518	3810	7.49	6490	763	6520	42.2	9070	375	1.9	<0.003	314	-	-	-	-
LQ 25-MH32	18-Jul-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1850	61.4	-	-
LQ 25-MH34	18-Jul-11	4150	3040	551	4150	6.86	9100	494	9260	159	14100	555	2.3	<0.003	445	-	-	-	-
LQ 25-MH27	19-Jul-11	3470	2090	393	3470	7.58	5280	NR	5520	251	9250	367	NR	<0.003	305	-	-	-	-
LQ 25-MH24	20-Jul-11	6610	2250	501	6610	7.41	7520	655	7910	82.5	14100	883	6.1	<0.003	771	-	-	-	-
LQ 25-MH13	20-Jul-11	3760	3330	915	3760	6.98	5900	422	6150	240	8680	253	1.7	<0.003	244	-	-	-	-
LQ 25-MH31	31-Jul-12	5180	2480	381	5180	7.77	8110	"-"	8260	54	13100	568	3.8	3.63	479	1870	22.2	46000	2300
LQ 25-MH33	31-Jul-12	7230	2470	2470	7230	7.61	8430	"-"	8510	47	15600	1047	6.8	0.099	905	1710	20.2	9	<3
LQ 25-MH3	31-Jul-12	5650	2610	503	5650	7.65	7590	"-"	7610	54.7	12900	689	3.3	<0.003	611	1680	37.4	46000	230
LQ 25-MH8	31-Jul-12	2990	2520	966	2990	7.56	4570	"-"	4610	88.6	6020	145	1.14	<0.003	126	606	16	9300	93
LQ 25-MH34	31-Jul-12	4430	2930	364	4430	7.65	9260	"-"	9310	261	15000	573	2.26	0.023	495	2970	5.2	29	<3
LQ 25-MH27	31-Jul-12	3980	2450	448	3980	7.48	6000	"-"	6090	334	10200	428	2.3	0.101	386	1540	6.7	2300	<3
LQ 25-MH24	31-Jul-12	7120	2580	507	7120	7.63	8480	"-"	8370	121	14600	935	6.5	<0.003	795	1440	22.7	7500	9
LQ 25-MH13	31-Jul-12	5320	3280	692	5320	7.4	8140	"-"	8210	88.1	11700	448	3	0.013	371	1420	44.6	43	9
MOE Standards [1]																			
Table 3 (Non-potable groundwater condition)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	2300	-	-	-
Other Standards - For Reference Only																			
Health Canada Drinking Water [2]		-	-	-	-	6.5-8.5 (AO)	500 (AO)	-	-	0.3/1.0/.01 (3)	-	-	-	10 mg/L	-	≤250 (AO) (6)	500 (AO)	None Detectable per 100 mL (MAC)	None Detectable per 100 mL (MAC)
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	790	-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. Analysis by City of Winnipeg North End Water Pollution Control Center.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-2
INORGANICS IN LEACHATE (ALS LABORATORY)
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter [1]								
			Alkalinity as Bicarbonate	Alkalinity Hydroxide	Alkalinity Carbonate	Total Alkalinity	Dissolved Organic Carbon	Total Dissolved Carbon	Disolved Inorganic Carbon	Cyanide Total	Total Ammonia
Units			*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
LQ 25-MH24	25-Sep-09	L823490	-	-	-	-	-	-	-	0.023	-
LQ 25-MH13	25-Sep-09	L823490	-	-	-	-	-	-	-	-	-
LQ 25-MH27	25-Sep-09	L823490	-	-	-	-	-	-	-	-	-
LQ 25-MH8	25-Sep-09	L823490	-	-	-	-	-	-	-	-	-
LQ 25-MH3	25-Sep-09	L823490	-	-	-	-	-	-	-	-	-
LQ 25-MH33	25-Sep-12	L823490	-	-	-	-	-	-	-	-	-
LQ 25-MH31	25-Sep-12	L823490	-	-	-	-	-	-	-	-	-
LQ 25-MH3	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH8	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH13	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH24	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH27	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH31	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH33	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH34	19-Oct-10	L944746	-	-	-	-	-	-	-	-	-
LQ 25-MH31	18-Jul-11	L1032603	-	-	-	-	-	-	-	0.0133	-
LQ 25-MH33	18-Jul-11	L1032603	-	-	-	-	-	-	-	0.0114	-
LQ 25-MH3	18-Jul-11	L1032603	-	-	-	-	-	-	-	0.0739	-
LQ 25-MH8	18-Jul-11	L1032603	-	-	-	-	-	-	-	0.0156	-
LQ 25-MH34	18-Jul-11	L1032603	-	-	-	-	-	-	-	0.0115	-
LQ 25-MH27	19-Jul-11	L1033282	-	-	-	-	-	-	-	-	-
LQ 25-MH24	20-Jul-11	L1033882	-	-	-	-	-	-	-	0.0092	-
LQ 25-MH13	20-Jul-11	L1033882	-	-	-	-	-	-	-	0.005	-
LQ 25-MH31	31-Jul-12	L1187205/ L1187206	6360	<6.8	<12	5210	430	965	535	0.0305	545
LQ 25-MH33	31-Jul-12	L1187205/ L1187207	8960	<6.8	<12	7340	510	1570	1060	0.0174	1010
LQ 25-MH3	31-Jul-12	L1187205/ L1187208	6900	<6.8	<12	5660	363	1170	810	<0.02	569
LQ 25-MH8	31-Jul-12	L1187205/ L1187209	3840	<6.8	<12	3150	240	509	268	<0.02	125
LQ 25-MH34	31-Jul-12	L1187205/ L1187210	5430	<6.8	<12	4450	364	978	614	<0.02	504
LQ 25-MH27	31-Jul-12	L1187205/ L1187211	4890	<6.8	<12	4010	219	644	425	<0.02	377
LQ 25-MH24	31-Jul-12	L1187205/ L1187212	8610	<6.8	<12	7060	523	1740	1220	<0.02	807
LQ 25-MH13	31-Jul-12	L1187205/ L1187213	6570	<6.8	<12	5390	410	911	502	<0.020	381
MOE Standards [1]											
Table 3 (Non-potable groundwater condition)			-	-	-	-	-	-	-	-	-
Other Standards - For Reference Only											
Health Canada Drinking Water [2]			-	-	-	-	-	-	-	0.2 (MAC)	-
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	-	-	30-500 (OG)	5 (AO)	-	-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. Laboratory analysis by ALS.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-3
METALS IN LEACHATE (DISSOLVED)
BRADY ROAD LANDFILL

Sample No.	Date	Work Order #	Parameter [1]																	
			Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Cesium (Cs)	Chromium (Cr)	Chromium, Hexavalent	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)
Units			*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
LQ 25-MH3	16-Apr-10	L877975	0.0656	0.0013	0.00686	0.382	<0.0010	<0.00030	3.29	0.000019	130	0.00015	0.0321		0.0110	0.00299	13.6	0.00021	210	0.348	0.000169
LQ 25-MH8	16-Apr-10	L877975	0.0949	0.0029	0.0184	0.512	<0.0010	<0.00030	5.30	0.000023	210	0.00027	0.0890	<0.010	0.0268	0.00197	4.26	0.00029	389	0.336	<0.000050
LQ 25-MH13	16-Apr-10	L877975	0.0055	<0.0010	0.00607	0.134	<0.0010	<0.00030	0.145	0.000012	97.3	<0.00010	0.0079	<0.010	0.00350	0.00198	7.99	0.00015	57.8	0.900	<0.000040
LQ 25-MH24	16-Apr-10	L877975	0.0902	0.0024	0.0156	0.457	<0.0010	<0.00030	6.63	0.000030	224	0.00032	0.0707	<0.010	0.0253	0.00236	0.541	0.00027	453	0.546	<0.000050
LQ 25-MH27	16-Apr-10	L877975	0.0335	0.0020	0.0152	0.362	<0.0010	<0.00030	3.08	0.000026	142	0.00012	0.0521	<0.010	0.0209	0.00210	18.9	0.00096	491	0.156	<0.000050
LQ 25-MH31	16-Apr-10	L877975	0.0408	0.0017	0.0170	0.531	<0.0010	<0.00030	5.66	0.000014	166	0.00036	0.106	<0.010	0.0278	0.00270	3.20	0.00128	470	0.191	<0.000050
LQ 25-MH33	16-Apr-10	L877975	0.0432	0.0020	0.0193	0.586	<0.0010	<0.00030	6.42	0.000013	208	0.00032	0.223	<0.010	0.0397	0.00246	4.48	0.00038	474	0.279	<0.000050
LQ 25-MH34	16-Apr-10	L877975	0.0099	<0.0010	0.00288	0.105	<0.0010	<0.00030	0.248	<0.000010	116	<0.00010	0.0051	<0.010	0.00119	0.00202	2.88	<0.00010	72.8	0.487	<0.000050
LQ 25-MH31	18-Jul-11	L1032613	0.378	0.00169	0.0191	0.628	<0.00020	<0.00020	5.16	0.000082	183	0.0004	0.0709	-	0.0319	0.00471	5.98	0.00303	475	0.189	<0.000050
LQ 25-MH32	18-Jul-11	L1032613	0.102	0.00135	0.011	0.317	<0.00020	<0.00020	3.02	0.000155	133	0.00022	0.0316	-	0.0201	0.00315	8.26	0.00743	293	0.17	0.000087
LQ 25-MH3	18-Jul-11	L1032613	0.0675	0.00412	0.0146	0.175	<0.00020	<0.00020	8.13	<0.000010	331	0.00032	0.254	-	0.018	0.00152	59.2	<0.000090	603	1.94	<0.000050
LQ 25-MH8	18-Jul-11	L1032613	0.221	0.00171	0.055	0.444	<0.00020	<0.00020	13.1	<0.000010	199	<0.00010	0.175	-	0.0171	0.00257	0.73	0.000424	376	0.248	<0.000050
LQ 25-MH34	18-Jul-11	L1032613	0.0461	0.00333	0.0176	2.32	<0.00020	<0.00020	2.43	<0.000010	193	<0.00010	0.226	-	0.0139	0.00186	16.2	0.000632	577	0.371	<0.000050
LQ 25-MH33	18-Jul-11	L1032613	0.282	0.00117	0.0148	0.16	<0.00020	<0.00020	6.19	<0.000010	200	<0.00010	0.0917	-	0.0197	0.00088	3.35	0.000243	506	0.206	<0.000050
LQ 25-MH27	19-Jul-11	L1033276	0.0254	0.00126	0.0156	0.257	<0.00020	<0.00020	1.79	<0.000010	156	<0.00010	0.238	-	0.0154	0.00123	7.07	0.000092	420	0.232	<0.000050
LQ 25-MH24	20-Jul-11	L1033873	0.068	0.00181	0.0309	0.35	0.00026	<0.00020	11	0.000023	210	0.00025	0.212	-	0.0216	0.00147	2.22	0.000454	478	0.279	<0.000050
LQ 25-MH13	20-Jul-11	L1033873	0.0748	0..00270	0.0134	0.515	<0.00020	<0.00020	4.48	0.0000015	319	<0.00010	0.13	-	0.0082	0.00193	4.91	0.000149	506	1.03	<0.000050
LQ 25-MH31	31-Jul-12	L1187205	<0.20	<0.020	0.021	0.556	<0.020	<0.020	6.2	<0.0010	149	<0.010	<0.20	<0.010	0.039	<0.020	<10	<0.0090	469	0.124	<0.00020
LQ 25-MH33	31-Jul-12	L1187205	<0.20	<0.020	<0.020	0.551	<0.020	<0.020	5.7	<0.0010	198	<0.010	<0.20	<0.010	0.043	<0.020	<10	<0.0090	432	0.236	<0.00020
LQ 25-MH3	31-Jul-12	L1187205	<0.20	<0.020	<0.020	0.558	<0.020	<0.020	6.8	<0.0010	198	<0.010	<0.20	<0.010	0.022	<0.020	<10	0.0097	462	0.219	<0.00020
LQ 25-MH8	31-Jul-12	L1187205	<0.20	<0.020	<0.020	1.15	<0.020	<0.020	4.3	<0.0010	385	<0.010	<0.20	<0.010	<0.020	<0.020	<10	<0.0090	341	1.21	<0.00020
LQ 25-MH34	31-Jul-12	L1187205	<0.2	<0.020	<0.020	1.04	<0.020	<0.020	2.6	<0.0010	149	<0.010	<0.20	<0.010	<0.020	<0.020	26	0.0555	579	0.17	<0.00020
LQ 25-MH27	31-Jul-12	L1187205	<0.20	<0.020	<0.020	0.531	<0.020	<0.020	3	<0.0010	170	<0.010	<0.20	<0.010	<0.020	<0.020	29	<0.0090	443	0.168	<0.00020
LQ 25-MH24	31-Jul-12	L1187205	0.29	<0.020	<0.020	0.474	<0.020	<0.020	7.9	<0.0010	208	<0.010	<0.20	<0.010	0.035	<0.020	<10	0.0121	471	0.388	<0.00020
LQ 25-MH13	31-Jul-12	L1187205	<0.20	<0.020	<0.020	0.623	<0.020	<0.020	4.7	<0.0010	278	<0.010	<0.20	<0.010	<0.020	<0.020	<10	<0.0090	576	0.465	<0.00020
MOE Standards [1]																					
Table 3 (Non-potable groundwater condition)			-	20	1.9	29	0.067	-	45	0.0027	-	-	0.81	0.14	0.066	0.087	-	0.025	-	-	(0.0028) 0.00029
Other Standards - For Reference Only																					
Health Canada Drinking Water [2]			0.1- 0.2 (3) (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	-	5.0 (MAC)	0.005 (MAC)	-	-	0.05 (MAC)	-	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	0.05 (AO)	0.001 (MAC)
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	0.006	0.025	1	0.004	-	5	0.0027	-	-	0.05	0.025	0.0038	0.087	-	0.01	-	-	(0.001) 0.00029

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. This is an operational guidance value, designed to apply only to drinking water treatment plant using aluminum-based coagulants.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-3
METALS IN LEACHATE (DISSOLVED)
BRADY ROAD LANDFILL

Sample No.	Date	Parameter [1]																		
		Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Rubidium (Rb)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)-Dissolved	Strontium (Sr)	Tellurium (Te)	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)
Units		*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
LQ 25-MH3	*16-Apr-10*	0.00244	0.113	0.688	131	0.0392	0.0059	9.10	0.00011	484	1.75	<0.00050	<0.00010	0.00309	0.00927	0.00171	0.00553	0.0073	0.0082	0.0159
LQ 25-MH8	*16-Apr-10*	0.00310	0.132	4.35	436	0.143	0.0083	20.3	0.00032	1010	4.22	<0.00050	<0.00010	0.00884	0.0473	0.00452	<0.00010	0.0154	0.0086	0.0473
LQ 25-MH13	*16-Apr-10*	0.00032	0.00864	0.076	13.5	0.00378	<0.0010	7.92	<0.00010	40.1	0.489	<0.00050	<0.00010	<0.00030	0.00162	<0.00020	0.00363	0.0026	0.0072	0.00148
LQ 25-MH24	*16-Apr-10*	0.00321	0.185	4.99	476	0.163	0.0117	22.8	0.00016	1130	6.16	<0.00050	<0.00010	0.00819	0.0269	0.00437	0.00027	0.0122	0.0101	0.0250
LQ 25-MH27	*16-Apr-10*	0.00466	0.110	0.491	315	0.0814	0.0197	17.4	0.00012	1270	3.28	<0.00050	<0.00010	0.0121	0.0105	0.00459	0.00073	0.0055	0.108	0.0101
LQ 25-MH31	*16-Apr-10*	0.00456	0.118	2.44	426	0.137	0.0137	22.4	<0.00010	1250	5.46	<0.00050	<0.00010	0.0105	0.0252	0.00508	0.00042	0.0190	0.0138	0.0212
LQ 25-MH33	*16-Apr-10*	0.00529	0.244	8.30	803	0.214	0.0155	23.0	0.00020	1510	5.22	<0.00050	<0.00010	0.0208	0.0373	0.00727	0.00014	0.0541	0.0105	0.0462
LQ 25-MH34	*16-Apr-10*	0.00029	0.00573	<0.020	44.9	0.0389	0.0015	6.19	<0.00010	73.2	0.806	<0.00050	<0.00010	<0.00030	0.00083	<0.00020	0.00171	0.0013	0.0079	0.00068
LQ 25-MH31	*18-Jul-11*	0.00689	0.116	3.41	434	0.155	0.0217	19.5	0.00038	1340	5.41	0.00031	<0.00010	0.0126	0.0578	0.003	0.00064	0.0138	0.0312	0.0308
LQ 25-MH32	*18-Jul-11*	0.00324	0.122	3.66	371	0.127	0.0096	11.4	0.00026	814	2.87	<0.00020	<0.00010	0.0153	0.0344	0.0021	0.00018	0.00715	0.0569	0.0263
LQ 25-MH3	*18-Jul-11*	0.00365	0.165	0.58	522	0.182	0.0041	19.5	0.00011	1560	5.2	<0.00020	<0.00010	0.00609	0.0159	0.00369	0.00031	0.0445	0	0.0224
LQ 25-MH8	*18-Jul-11*	0.00268	0.0656	1.9	263	0.048	0.0054	30	<0.00010	1010	10.1	<0.00020	<0.00010	0.00164	0.0465	0.00348	0.00068	0.0446	0.0194	0.0188
LQ 25-MH34	*18-Jul-11*	0.00333	0.0914	0.83	258	0.0694	0.0094	16.6	<0.00010	1590	5.15	0.00024	<0.00010	0.0102	0.0158	0.00404	<0.00010	0.0397	0.0072	0.0118
LQ 25-MH33	*18-Jul-11*	0.00301	0.13	2.07	595	0.115	0.0028	22.4	0.00012	1440	4.64	<0.00020	<0.00010	0.00951	0.0225	0.00346	0.00012	0.0231	0.0067	0.0261
LQ 25-MH27	*19-Jul-11*	0.00295	0.0761	0.54	241	0.0502	0.0161	17.7	<0.00010	948	2.84	<0.00020	<0.00010	0.00336	0.00336	0.00304	<0.00010	0.058	0.0051	0.00479
LQ 25-MH24	*20-Jul-11*	0.00345	0.137	6.05	566	0.13	0.0056	31.2	0.00014	1370	5.24	0.0002	<0.00010	0.00903	0.0325	0.00475	<0.00010	0.0537	0.0105	0.0225
LQ 25-MH13	*20-Jul-11*	0.00134	0.0976	2.74	264	0.0698	0.0052	20.3	0.00015	831	3.32	<0.00020	<0.00010	0.00278	0.2253	0.00131	0.00105	0.0365	0.0061	0.0232
LQ 25-MH31	*31-Jul-12*	<0.010	0.15	<3.0	499	0.136	<0.10	31.4	<0.010	1420	4.41	<0.020	<0.010	<0.020	<0.050	<0.010	<0.010	<0.020	<0.20	<0.040
LQ 25-MH33	*31-Jul-12*	<0.010	0.27	5.7	732	0.197	<0.10	40.5	<0.010	1350	4.64	<0.020	<0.010	<0.020	<0.050	<0.010	<0.010	<0.020	<0.20	0.044
LQ 25-MH3	*31-Jul-12*	<0.010	0.21	<3.0	462	0.16	<0.10	33	<0.010	1270	4.53	<0.020	<0.010	<0.020	<0.050	<0.010	<0.010	<0.020	<0.20	<0.040
LQ 25-MH8	*31-Jul-12*	<0.010	<0.10	<3.0	108	0.024	<0.10	40.5	<0.010	523	4.29	<0.020	<0.010	<0.020	<0.050	<0.010	<0.010	<0.020	<0.20	<0.040
LQ 25-MH34	*31-Jul-12*	<0.010	0.12	<3.0	314	0.069	<0.10	27.6	<0.010	1770	3.91	<0.020	<0.010	0.032	<0.050	<0.010	<0.010	<0.020	<0.20	<0.040
LQ 25-MH27	*31-Jul-12*	<0.010	<0.10	<3.0	256	0.06	<0.10	28.2	<0.010	1010	3.63	<0.020	<0.010	<0.020	<0.050	<0.010	<0.010	<0.020	<0.20	<0.040
LQ 25-MH24	*31-Jul-12*	<0.010	0.23	5.5	591	0.179	<0.10	46.4	<0.010	1360	5.37	<0.020	<0.010	<0.020	<0.050	<0.010	<0.010	<0.020	<0.20	<0.040
LQ 25-MH13	*31-Jul-12*	<0.010	0.18	<3.0	425	0.116	<0.10	33.2	<0.010	1170	4.19	<0.020	<0.010	<0.020	<0.050	<0.010	<0.010	<0.020	<0.20	<0.040
MOE Standards [1]																				
Table 3 (Non-potable ground water condition)		9.2	0.49	-	-	-	0.063		0.0015	2300	-	-	0.51	-	-	-	0.42	0.25	1.1	-
Other Standards - For Reference Only																				
Health Canada Drinking Water [2]		-	-	-	-	-	0.01 (MAC)	-	-	200 (AO)	-	-	-	-	-	-	0.02 (MAC)	-	5 (AO)	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		0.07	0.1	-	-	-	0.01	-	0.0015	490	-	-	0.002	-	-	-	0.02	0.0062	1.1	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. This is an operational guidance value, designed to apply only to drinking water treatment plant using aluminum-based coagulants.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-4
METALS IN LEACHATE (TOTAL)
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter (mg/L)																	
			Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Cesium (Cs)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)
LQ 25-MH24	25-Sep-09	L823490	0.15	<0.050	0.017	0.4	<0.010	<0.010	6.83	<0.0010	186	-	0.042	0.0218	<0.010	4.67	0.016	398	0.369	0.000042
LQ 25-MH13	25-Sep-09	L823490	<0.10	<0.050	0.014	0.14	<0.010	<0.010	<0.50	<0.0010	103	-	<0.010	<0.0050	<0.010	10.1	<0.010	56.6	1.36	<0.00040
LQ 25-MH27	25-Sep-09	L823490	0.3	<0.050	0.013	0.48	<0.010	<0.010	3.05	<0.0010	130	-	0.026	0.0159	<0.010	24.7	0.034	401	0.168	<0.00040
LQ 25-MH8	25-Sep-09	L823490	0.29	<0.050	<0.010	0.26	<0.010	<0.010	0.68	<0.0010	159	-	<0.010	<0.0050	<0.010	8.18	<0.010	91.6	0.796	<0.00040
LQ 25-MH3	25-Sep-09	L823490	0.15	<0.050	<0.010	0.38	<0.010	<0.010	5.83	<0.0010	240	-	0.079	0.0084	<0.010	25.5	<0.010	303	0.597	<0.00040
LQ 25-MH33	25-Sep-09	L823490	0.14	<0.050	0.017	0.56	<0.010	<0.010	6.46	<0.0010	179	-	0.055	0.0337	<0.010	6.62	<0.010	400	0.251	<0.00040
LQ 25-MH31	25-Sep-09	L823490	0.58	<0.050	0.016	0.47	<0.010	<0.010	5.26	<0.0010	150	-	0.043	0.02	<0.010	6.97	<0.010	386	0.273	<0.00040
LQ 25-MH3	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH8	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH13	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH24	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH27	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH31	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH33	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH34	19-Oct-10	L944746-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH31	18-Jul-11	*L1032603*	0.378	0.00169	0.0191	0.628	<0.00020	<0.00020	5.16	0.000082	183	0.0004	0.0709	0.0319	0.00471	5.98	0.00303	475	0.189	<0.000050
LQ 25-MH33	18-Jul-11	*L1032603*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH3	18-Jul-11	*L1032603*	0.0931	0.00431	0.011	0.29	<0.00020	<0.00020	5.41	0.000437	271	0.00037	0.0682	0.0195	0.00586	72.5	0.00271	436	1.65	<0.000050
LQ 25-MH8	18-Jul-11	*L1032603*	0.961	0.00089	0.042	0.648	0.00024	<0.00020	12.1	0.000093	224	0.00012	0.0874	0.0269	0.012	2.76	0.00317	381	0.357	<0.000050
LQ 25-MH34	18-Jul-11	*L1032603*	0.244	0.00381	0.0198	2.9	<0.00020	<0.00020	2.55	0.000423	226	<0.00010	0.117	0.0173	0.00521	29	0.0507	629	0.00428	<0.000050
LQ 25-MH27	19-Jul-11	*L1033282*	0.113	0.00334	0.00868	0.476	<0.00020	<0.00020	2.66	0.000219	158	<0.00010	0.0302	0.0171	0.00309	31.7	0.0221	408	0.219	<0.000050
LQ 25-MH24	20-Jul-11	*L1033882*	0.271	0.00339	0.0161	0.385	0.0005	<0.00020	5.78	0.000205	170	0.00033	0.0531	0.0263	0.00387	2.71	0.00945	374	0.29	<0.000050
LQ 25-MH13	20-Jul-11	*L1033882*	1.1	0.00337	0.00946	0.565	<0.00020	<0.00020	2.7	0.000698	304	<0.00010	0.0281	0.00989	0.00596	13.3	0.0181	462	0.964	0.000053
LQ 25-MH32	18-Jul-11	*L1032603*	0.102	0.00135	0.011	0.317	<0.0002	<0.0002	3.02	0.000155	133	0.00022	0.0316	0.0201	0.00315	8.26	0.00743	293	0.17	0.000087
LQ 25-MH31	31-Jul-12	*L1187194*	1.18	0.0022	0.0219	0.571	<0.0020	<0.0020	6.97	0.00017	150	<0.010	0.069	0.0385	0.0132	4.9	0.00499	542	0.128	<0.00020
LQ 25-MH33	31-Jul-12	*L1187194*	0.132	0.002	0.0123	0.577	<0.0020	<0.020	6.27	0.00027	205	<0.0010	0.064	0.0404	0.0064	7.9	0.00888	492	0.22	<0.00020
LQ 25-MH3	31-Jul-12	*L1187194*	0.198	0.0034	0.0089	0.574	<0.0020	<0.0020	7.86	0.00035	195	<0.0010	0.109	0.0221	0.0126	7.4	0.00885	522	0.197	<0.00020
LQ 25-MH8	31-Jul-12	*L1187194*	0.084	<0.0020	0.0154	1.14	<0.0020	<0.0020	4.59	<0.00010	371	<0.0010	0.021	0.0066	0.004	<1.0	0.00119	370	1.12	<0.00020
LQ 25-MH34	31-Jul-12	*L1187194*	0.169	0.0034	0.0092	1.03	<0.0020	<0.0020	2.79	0.0004	142	<0.0010	0.12	0.0168	0.005	27.4	0.048	616	0.151	<0.00020
LQ 25-MH27	31-Jul-12	*L1187194*	0.075	<0.0020	0.005	0.49	<0.0020	<0.0020	3	0.00017	161	<0.0010	0.031	0.0176	0.0035	26.2	0.0172	476	0.151	<0.00020
LQ 25-MH24	31-Jul-12	*L1187194*	0.541	0.0032	0.0153	0.452	<0.0020	<0.0020	8.11	0.0004	206	<0.0010	0.059	0.0325	0.0059	4.4	0.0106	531	0.352	<0.00020
LQ 25-MH13	31-Jul-12	*L1187194*	0.279	0.0048	0.0097	0.639	<0.0020	<0.0020	4.85	0.00145	278	<0.0010	0.041	0.015	0.0073	7.2	0.0166	667	0.431	<0.00020
MOE Standards (1)																				
Table 3 (Non-potable groundwater condition)			-	20	1.9	29	0.067	-	45	0.0027	-	-	0.81	0.066	0.087	-	0.025	-	-	(0.0028) 0.00029
Other Standards - For Reference Only																				
Health Canada Drinking Water (2)			0.1- 0.2 (3) (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	-	5.0 (MAC)	0.005 (MAC)	-	-	0.05 (MAC)	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	0.05 (AO)	0.001 (MAC)
MOE Standards - Table 2 (Potable groundwater condition) (1)			-	0.006	0.025	1	0.004	-	5	0.0027	-	-	0.05	0.0038	0.087	-	0.01	-	-	(0.001) 0.00029

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. This is an operational guidance value, designed to apply only to drinking water treatment plant using aluminum-based coagulants.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-4
METALS IN LEACHATE (TOTAL)
BRADY ROAD LANDFILL

Sample No.	Date	Parameter (mg/L)																		
		Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Rubidium (Rb)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Tellurium (Te)	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)
LQ 25-MH24	25-Sep-09	<0.010	0.142	4.68	422	"-"	<0.050	19.4	<0.0010	1030	4.55	"-"	<0.0030	0.016	0.031	<0.10	<0.050	<0.010	0.149	<0.040
LQ 25-MH13	25-Sep-09	<0.010	<0.020	<0.50	<10	"-"	<0.050	14.5	<0.0010	34.7	0.475	"-"	<0.0030	<0.010	<0.020	<0.10	<0.050	<0.010	<0.030	<0.040
LQ 25-MH27	25-Sep-09	<0.010	0.073	2.02	245	"-"	<0.050	15.3	<0.0010	940	2.8	"-"	<0.0030	0.019	<0.020	<0.10	<0.050	<0.010	0.091	<0.040
LQ 25-MH8	25-Sep-09	<0.010	<0.020	<0.50	10	"-"	<0.50	13.8	<0.0010	74.8	0.941	"-"	<0.0030	<0.010	<0.020	<0.10	<0.050	<0.010	0.079	<0.040
LQ 25-MH3	25-Sep-09	<0.010	0.07	1.49	230	"-"	<0.050	15.6	<0.0010	685	6.71	"-"	<0.0030	<0.010	<0.020	<0.10	<0.050	<0.010	0.073	<0.040
LQ 25-MH33	25-Sep-09	<0.010	0.197	6.54	679	"-"	<0.050	18.8	<0.0010	1180	4.01	"-"	<0.0030	0.027	0.033	<0.10	<0.050	<0.010	0.041	<0.040
LQ 25-MH31	25-Sep-09	<0.010	0.1	358	365	"-"	<0.050	16.7	<0.0010	924	4.61	"-"	<0.0030	0.013	0.053	<0.10	<0.050	<0.010	0.08	<0.040
LQ 25-MH3	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH8	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH13	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH24	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH27	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH31	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH33	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH34	19-Oct-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH31	18-Jul-11	0.00689	0.116	3.41	434	0.155	0.0217	19.5	0.00038	1340	5.41	0.00031	<0.00010	0.0126	0.0578	0.003	0.00064	0.0138	0.0312	0.0308
LQ 25-MH33	18-Jul-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ 25-MH3	18-Jul-11	0.00312	0.167	0.28	450	0.168	0.0125	17.3	<0.00010	1190	3.97	<0.00020	<0.00010	0.00251	0.00258	<0.0010	0.00018	0.00458	0.343	0.00643
LQ 25-MH8	18-Jul-11	0.00105	0.0105	1.87	302	0.0731	0.031	34.4	0.00013	1100	11.4	<0.00020	<0.00010	0.00142	0.0685	<0.0010	0.00117	0.0219	0.1	0.0186
LQ 25-MH34	18-Jul-11	0.00428	0.0999	2.35	297	0.0766	0.0341	17.1	0.00017	1730	5.27	0.00045	<0.00010	0.026	0.0376	0.0026	<0.00010	0.002	0.12	0.00985
LQ 25-MH27	19-Jul-11	0.00386	0.0726	2.15	241	0.0714	0.0205	17.1	<0.00010	915	3.88	<000020	<0.00010	0.018	0.0156	0.0023	0.00012	0.00251	0.0714	0.00642
LQ 25-MH24	20-Jul-11	0.00408	0.166	5.11	447	0.156	0.0092	19.4	0.00023	1120	5.4	0.00064	<0.00010	0.0184	0.0415	0.0051	0.00014	0.0104	0.0759	0.0241
LQ 25-MH13	20-Jul-11	0.00192	0.103	1.88	261	0.0743	0.006	20.6	0.00048	804	3.79	<0.00020	<0.00010	0.00916	0.0301	0.0017	0.00135	0.00944	0.189	0.023
LQ 25-MH32	18-Jul-11	0.00324	0.122	3.66	371	0.127	0.0096	11.4	0.00026	814	2.87	<0.00020	<0.00010	0.0153	0.0344	0.0344	0.00018	0.00715	0.0569	0.0263
LQ 25-MH31	31-Jul-12	0.0074	0.148	3.6	511	0.146	<0.0010	23.9	<0.0010	1580	4.78	<0.0020	<0.0010	0.0124	0.0645	0.0058	<0.0010	0.0228	0.049	0.035
LQ 25-MH33	31-Jul-12	0.00067	0.257	6.7	735	0.204	<0.010	22.5	<0.0010	1460	5	<0.0020	<0.0010	0.0277	0.0519	0.0064	<0.0010	0.0126	0.075	0.0467
LQ 25-MH3	31-Jul-12	0.0072	0.2	3.2	461	0.168	<0.010	19.6	<0.0010	1370	4.76	<0.0020	<0.0010	0.0131	0.0377	0.006	<0.0010	0.0111	0.09	0.0266
LQ 25-MH8	31-Jul-12	<0.0020	0.052	1.2	108	0.0239	<0.010	26.3	<0.0010	518	4.22	<0.0020	<0.0010	<0.0020	0.0272	0.0017	<0.0010	0.0113	<0.020	0.0159
LQ 25-MH34	31-Jul-12	0.0045	0.114	2.5	310	0.0706	<0.010	17.3	<0.0010	1900	3.96	<0.0020	<0.0010	0.0347	0.0183	0.0042	<0.0010	0.0051	0.109	0.0114
LQ 25-MH27	31-Jul-12	0.0042	0.079	2	252	0.0598	<0.010	18.2	<0.0010	1040	3.5	<0.0020	<0.0010	0.0151	0.0099	0.0033	<0.0010	0.0025	0.062	0.0054
LQ 25-MH24	31-Jul-12	0.006	0.217	6.5	574	0.182	<0.010	25.6	<0.0010	1390	5.55	<0.0020	<0.0010	0.0186	0.0584	0.0063	<0.0010	0.0128	0.13	0.0338
LQ 25-MH13	31-Jul-12	0.0032	0.174	2.9	426	0.12	<0.010	20.8	<0.0010	1220	4.26	<0.0020	<0.0010	0.0142	0.0419	0.0026	<0.0010	0.0128	0.207	0.0303
MOE Standards (1)																				
Table 3 (Non-potable groundwater condition)		9.2	0.49	-	-	-	0.063		0.0015	2300	-	-	0.51	-	-	-	0.42	0.25	1.1	-
Other Standards - For Reference Only																				
Health Canada Drinking Water (2)		-	-	-	-	-	0.01 (MAC)	-	-	200 (AO)	-	-	-	-	-	-	0.02 (MAC)	-	5 (AO)	-
MOE Standards - Table 2 (Potable groundwater condition) (1)		0.07	0.1	-	-	-	0.01		0.0015	490	-	-	0.002	-	-	-	0.02	0.0062	1.1	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. This is an operational guidance value, designed to apply only to drinking water treatment plant using aluminum-based coagulants.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-5
VOLATILE ORGANIC COMPOUNDS IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter (µg/L)																					
			1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene	1,2-Dibromoethane	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Hexanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane
LQ 25-MH24	25-Sep-09	L823490	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<0.010	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH13	25-Sep-09	L823490	<0.50	<0.50	<0.50	<0.50	<25	<0.50	<0.50	<0.50	0.6	<0.50	<0.50	2.41	<20	<20	0.88	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<1.0
LQ 25-MH27	25-Sep-09	L823490	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<25	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH8	25-Sep-09	L823490	<0.50	<25	<0.50	<50	<25	<0.50	<50	<0.50	4.42	<0.50	<0.50	1.3	<20	<1000	10.2	<0.50	<0.50	<1.0	11	<0.50	<0.50	<1.0	<0.50	<1.0
LQ 25-MH3	25-Sep-09	L823490	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<0.010	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH33	25-Sep-09	L823490	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<0.010	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH31	25-Sep-09	L823490	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<0.010	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH3	19-Apr-10	L944746	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.72	<20	300	1.06	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<1.0
LQ 25-MH8	19-Apr-10	L944746	<0.50	<0.50	<0.50	<0.50	1.65	<0.50	<0.50	<0.50	0.55	<0.50	<0.50	4.74	<20	410	0.55	<0.50	<0.50	<1.0	<0.50	<0.50	2.50	2.2	<0.50	<1.0
LQ 25-MH13	19-Apr-10	L944746	<0.50	1.02	<0.50	<0.50	18.0	<0.50	<0.50	<0.50	1.05	<0.50	<0.50	3.26	<20	510	0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<1.0
LQ 25-MH24	19-Apr-10	L944746	<2.5	<2.5	<2.5	<2.5	3.2	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	7.5	<100	290	4.0	<2.5	<2.5	<5.0	4.9	<2.5	<2.5	<5.0	<2.5	<5.0
LQ 25-MH27	19-Apr-10	L944746	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	2.6	<100	<100	10.0	<2.5	<2.5	<5.0	<2.5	<2.5	4.1	28.7	<2.5	<5.0
LQ 25-MH31	19-Apr-10	L944746	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	4.6	<100	<100	5.5	<2.5	<2.5	<5.0	<2.5	<2.5	7.4	<5.0	<2.5	<5.0
LQ 25-MH33	19-Apr-10	L944746	<2.5	<2.5	<2.5	<2.5	8.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	5.8	<100	<100	6.6	<2.5	<2.5	<5.0	<2.5	<2.5	7.9	25.5	<2.5	<5.0
LQ 25-MH34	19-Apr-10	L944746	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<20	<20	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<0.50	<1.0
LQ 25-MH3	19-Oct-10	L944746	<25	<25	<25	<25	29	<25	<25	<25	<25	<25	<25	<25	<1000	<25	<25	<25	<0.50	<25	<25	<25	<25	<50	<25	<50
LQ 25-MH8	19-Oct-10	L944746	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<25	<25	<25	<50	<25	<25	<25	<25	<50	<25	<50
LQ 25-MH13	19-Oct-10	L944746	"-"	<25	"-"	"-"	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<25	<25	<50	<50	<25	<25	<25	<50	<25	<25
LQ 25-MH24	19-Oct-12	L944746	"-"	"-"	"-"	"-"	"-"	"-"	"-"	"-"	"-"	<25	<25	<25	<1000	<1000	<25	<25	<50	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH27	19-Oct-10	L944746	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<25	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH31	19-Oct-10	L944746	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<25	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH33	19-Oct-10	L944746	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<25	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH34	19-Oct-10	L944746	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<1000	<1000	<25	<25	<25	<50	<25	<25	<25	<50	<25	<50
LQ 25-MH31	18-Jul-11	L1032603	<0.50	<0.50	<0.50	<0.50	0.84	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.03	<20	<20	3.23	<0.5	<0.5	<1.0	<0.5	<0.50	4.93	2.7	<0.50	<1.0
LQ 25-MH32	18-Jul-11	L1032603	<2.0	<2.0	<2.0	<2.0	5.8	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	6.2	<80	133	5.74	<2.0	<2.0	<4.0	<2.0	<2.0	7.1	12.6	<2.0	<4.0
LQ 25-MH3	18-Jul-11	L1032603	<20	32	<20	<20	57	<20	<20	<20	<20	<20	<20	<20	<800	5700	10.90	<20	<20	<20	<20	<20	<20	167	<20	<20
LQ 25-MH8	18-Jul-11	L1032603	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<20	37	<0.50	<0.5	<0.5	<1.0	0.53	<0.50	<0.50	<1.0	<0.50	<1.0
LQ 25-MH34	18-Jul-11	L1032603	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	4.6	<80	292	8.42	<2.0	<2.0	<4.0	<2.0	<2.0	<2.0	<4.0	<2.0	<4.0
LQ 25-MH27	19-Jul-11	L1033282	<0.50	0.59	<0.50	<0.50	2.02	<0.50	<0.50	0.76	<0.50	<0.50	<0.50	7.67	<20	<20	9.04	<0.5	<0.5	<0.5	<0.5	<0.5	8.03	25.3	<0.5	<1.0
LQ 25-MH24	20-Jul-11	L1033882	<0.50	<1.0	<0.50	<1.0	1.7	<1.0	<0.50	<1.0	<0.50	<0.50	<0.50	4.2	<20	98	2.25	<0.5	<0.5	<1.0	0.79	<0.5	1.03	<1.0	<0.5	<1.0
LQ 25-MH13	20-Jul-11	L1033882	<0.50	<20	<0.50	<0.50	16.5	<0.50	<0.50	<20	1.98	<0.50	<0.50	<20	<20	820	9.08	<0.50	<0.50	<1.0	0.79	<0.50	1.72	19.1	<0.50	<1.0
LQ 25-MH31	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	1.07	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.6	<20	<20	4.64	<0.50	<0.50	<0.50	<0.50	<0.50	5.32	3.3	<0.50	<1.0
LQ 25-MH33	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	11.6	<0.50	<0.50	<0.50	<0.50	<0.50	2.09	5.24	<20	28	5.31	<0.50	<0.50	<0.50	<0.50	<0.50	7.49	20.6	<0.50	<1.0
LQ 25-MH3	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	4.82	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.29	<20	49	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1.56	5.5	<0.50	<1.0
LQ 25-MH8	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	4.82	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	5.29	<20	49	7.85	<0.50	<0.50	<0.50	4.32	<0.50	0.61	<1.0	<0.50	<1.0
LQ 25-MH34	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	3.42	<0.50	<0.50	0.55	<0.50	<0.50	<0.50	6.03	<20	97	7.54	<0.50	<0.50	<0.50	<0.50	<0.50	0.63	6.9	<0.50	<1.0
LQ 25-MH27	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	1.22	<0.50	<0.50	0.59	<0.50	<0.50	<0.50	8.39	<20	24	10.10	<0.50	<0.50	<0.50	<0.50	<0.50	6.72	33	<0.50	<1.0
LQ 25-MH24	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	1.55	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.77	<20	230	2.24	<0.50	<0.50	<0.50	2.99	<0.50	1.22	<1.0	<0.50	<1.0
LQ 25-MH13	31-Jul-12	L1187194	<0.50	<0.50	<0.50	<0.50	7.52	<0.50	<0.50	0.96	<0.50	<0.50	<0.50	5.37	<20	1940	6.95	<0.50	<0.50	<0.50	1.04	<0.50	1.72	14.5	<0.50	1.8
MOE Standards [1]																										
Table 3 (Non-potable groundwater condition)			(28) 3.3	(6700) 640	(15) 3.2	(30) 4.7	(3100) 320	(17) 1.6	-	(9600) 4600	(12) 1.6	(140) 16	9600	(67) 8	-	130 000	(430) 44	85 000	(770) 380	(56) 5.6	-	(8.4) 0.79	630	-	(22) 2.4	-
Other Standards - For Reference Only																										
Health Canada Drinking Water [2]			-	-	-	-	-	14 (MAC)	-	200 (MAC) / 3 (AO)	5	-	-	5 (MAC)/1 (AO)	-	-	5 (MAC)	-	-	-	-	2 (MAC)	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]			1.1	200	1	(5) 4.7	5	(14) 1.6	-	3	(5) 1.6	5	59	1	-	2700	5	16	25	0.89	-	(5) 0.79	30	-	(22) 2.4	-

TABLE H-5
VOLATILE ORGANIC COMPOUNDS IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Parameter (µg/L)																								
		cis-1,2-Dichloroethylene	cis-1,3-Dichloropropene	Dibromochloromethane	Dichlorodifluoromethane	Dichloromethane	Ethyl Benzene	m+p-Xylenes	Methyl Ethyl Ketone	Methyl Isobutyl Ketone	MTBE	o-Xylene	Styrene	Tetrachloroethylene	Toluene	trans-1,2-Dichloroethylene	trans-1,3-Dichloropropene	Trichloroethylene	Trichlorofluoromethane	Trihalomethanes (total)	Vinyl chloride	Xylenes (Total)	F1 (C6-C10)	F1-BTEX	Total Hydrocarbons	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)
LQ 25-MH24	25-Sep-09	<25	<25	<25	<50	<25	0.071	0.179	<1000	<1000	<25	66	<25	<25	100	<25	<25	<25	<50	<100	<25	66	900	<200	<2500	440	550	<250
LQ 25-MH13	25-Sep-09	5.85	<0.50	<0.50	<50	<0.50	13.2	2.5	<20	<20	<0.50	1.54	<0.50	<0.50	4.03	<0.50	<0.50	4.96	<1.0	<2.0	2.66	2.66	<100	<100	<250	<100	<250	<250
LQ 25-MH27	25-Sep-09	<25	<25	<25	<50	<25	318	1140	<1000	<1000	<25	80	<25	<25	38	<25	<25	<25	<50	<100	<25	1220	1950	<200	2840	220	670	<250
LQ 25-MH8	25-Sep-09	16.5	<0.50	<0.50	3.5	0.8	29.7	56	<1000	65	<25	19	<0.50	<0.50	125	<0.50	<0.50	3.93	<1.0	<2.0	6.23	75	400	<100	22,300	<100	160	18,600
LQ 25-MH3	25-Sep-09	<25	<25	<25	<50	<25	122	355	<1000	<1000	<25	94	<25	<25	97	<25	<25	<25	<50	<100	<25	449	1140	<100	1880	250	490	<250
LQ 25-MH33	25-Sep-09	<25	<25	<25	<50	<25	168	364	<1000	<1000	<25	81	<25	<25	<25	<25	<25	<25	<50	<100	<25	445	810	<100	980	170	<250	<250
LQ 25-MH31	25-Sep-09	<25	<25	<25	<50	<25	40	161	<1000	<1000	<25	32	<25	<25	<25	<25	<25	<25	<50	<100	<25	193	430	<100	1030	210	39,000	<250
LQ 25-MH3	19-Apr-10	<0.50	<0.50	<0.50	<1.0	<0.50	24.8	80.2	49	<20	<0.50	21.5	<0.50	<0.50	5.37	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	102	-	-	-	-	-	-
LQ 25-MH8	19-Apr-10	<0.50	<0.50	<0.50	<1.0	2.97	8.26	80.8	510	<20	1.01	15.2	<0.50	<0.50	1.07	<0.50	<0.50	0.50	<1.0	<2.0	<0.50	96.0	-	-	-	-	-	-
LQ 25-MH13	19-Apr-10	4.51	<0.50	<0.50	<1.0	6.96	7.28	18.5	<20	<20	0.81	6.95	<0.50	3.95	14.5	<0.50	<0.50	9.26	<1.0	<2.0	2.02	25.5	-	-	-	-	-	-
LQ 25-MH24	19-Apr-10	<2.5	<2.5	<2.5	<5.0	<2.5	91.7	234	530	<100	<2.5	102	<2.5	<2.5	31.0	<2.5	<2.5	<2.5	<5.0	<10	<2.5	336	-	-	-	-	-	-
LQ 25-MH27	19-Apr-10	6.2	<2.5	<2.5	<5.0	<2.5	129	399	<100	<100	<2.5	49.9	<2.5	<2.5	17.6	<2.5	<2.5	<2.5	<5.0	<10	2.8	449	-	-	-	-	-	-
LQ 25-MH31	19-Apr-10	<2.5	<2.5	<2.5	<5.0	<2.5	41.1	117	<100	<100	<2.5	30.2	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<5.0	<10	<2.5	147	-	-	-	-	-	-
LQ 25-MH33	19-Apr-10	<2.5	<2.5	<2.5	<5.0	<2.5	116	223	<100	<100	<2.5	53.2	<2.5	<2.5	8.9	<2.5	<2.5	<2.5	<5.0	<10	<2.5	276	-	-	-	-	-	-
LQ 25-MH34	19-Apr-10	<0.50	<0.50	<0.50	<1.0	<0.50	0.86	<1.0	<20	<20	<0.50	0.81	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	<1.5	-	-	-	-	-	-
LQ 25-MH3	19-Oct-10	<25	<25	<25	<50	47	203	674	3100	<1000	<25	233	<25	<25	133	<25	<25	<25	<25	<25	<25	907	750	-	-	2,120	1,110	<250
LQ 25-MH8	19-Oct-10	<25	<25	<25	<50	<25	<25	72	<1000	<1000	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	72	240	-	-	1,410	1,440	340
LQ 25-MH13	19-Oct-10	<25	<25	<25	<50	<25	<25	<50	<1000	<1000	<25	<25	<25	<25	<25	<25	<25	<25	<50	<50	<25	<56	1,480	-	-	<250	<250	<250
LQ 25-MH24	19-Oct-12	<25	<25	<25	<50	<25	61	141	<1000	<1000	<25	56	<25	<25	31	<25	<25	<25	<50	<50	<25	197	240	-	-	2,230	1,370	310
LQ 25-MH27	19-Oct-10	<25	<25	<25	<50	<25	887	2860	<1000	<1000	<25	163	<25	<25	35	<25	<25	<25	<50	<50	<25	3,020	1,610	-	-	1,350	790	<250
LQ 25-MH31	19-Oct-10	<25	<25	<25	<50	<25	52	171	<1000	<1000	<25	40	<25	<25	<25	<25	<25	<25	<50	<50	<25	211	260	-	-	1,420	950	<250
LQ 25-MH33	19-Oct-10	<25	<25	<25	<50	<25	146	304	<1000	<1000	<25	73	<25	<25	<25	<25	<25	<25	<50	<50	<25	376	300	-	-	2,040	4,550	1,130
LQ 25-MH34	19-Oct-10	<25	<25	<25	<50	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<50	<50	<25	<56	150	-	-	<250	390	<250
LQ 25-MH31	18-Jul-11	<0.50	<0.50	<0.50	<1.0	<0.50	11.5	51.1	<20	<20	0.52	13	<0.50	<0.50	1.2	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	64.1	190	108	2,970	1,660	1,120	<250
LQ 25-MH32	18-Jul-11	<2.0	<2.0	<2.0	<4.0	<2.0	87.3	171	133	<80	<2.0	49.9	<2.0	<2.0	17.8	<2.0	<2.0	<2.0	<4.0	<4.0	<2.0	221	450	118	6,550	2,420	3,030	660
LQ 25-MH3	18-Jul-11	<20	<20	<20	<40	216	125	508	4900	<8000	<20	162	<20	<20	81.6	<20	<20	<20	<20	<40	<20	670	1,710	830	5,320	2,400	1,200	<250
LQ 25-MH8	18-Jul-11	<0.50	<0.50	<0.50	<1.0	0.5	0.81	10.7	<20	<20	<0.50	2.02	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	12.7	100	<100	8,050	3,270	3,570	1,110
LQ 25-MH34	18-Jul-11	<2.0	<2.0	<2.0	<4.0	35.1	75.1	160	293	<80	<2.0	33	<2.0	<2.0	38.2	<2.0	<2.0	<2.0	<4.0	<4.0	<2.0	193	450	132	3,310	2,040	820	<250
LQ 25-MH27	19-Jul-11	4.91	<0.50	<0.50	<2.0	<0.50	309	1020	<20	<20	0.61	44.4	<0.50	<0.50	9	<0.50	<0.50	<0.50	<1.0	<2.0	1.49	1,060	2,250	860	5,000	1,560	1,190	<250
LQ 25-MH24	20-Jul-11	<1.0	<0.5	<0.5	<0.5	<1.0	18	60	134	<20	<0.5	22.1	<0.5	<1.0	12.6	<0.5	<0.5	<1.0	<1.0	<2.0	1.74	82.1	250	163	7,330	3,320	2,940	800
LQ 25-MH13	20-Jul-11	6.35	<0.50	<0.50	<1.0	19.3	91	192	<800	102	3.09	59.7	<0.50	<20	194	<0.50	<0.50	3.56	<1.0	<2.0	4.1	252	560	<84	3,730	1,500	1,300	360
LQ 25-MH31	31-Jul-12	<0.50	<0.50	<0.50	<1.0	<0.50	94.7	209	<20	<20	<0.50	63.9	<0.50	<0.50	1.3	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	98.9	210	96	2,310	1,220	890	<250
LQ 25-MH33	31-Jul-12	<0.50	<0.50	<0.50	<1.0	0.65	94.7	209	<20	<20	0.71	63.9	<0.50	<0.50	8.7	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	273	520	142	3,170	1,790	860	<250
LQ 25-MH3	31-Jul-12	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	3.54	44	<20	1.69	3.17	<0.50	<0.50	3.5	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	6.7	130	120	2,390	1,510	750	<250
LQ 25-MH8	31-Jul-12	9.39	<0.50	<0.50	<1.0	2.38	42.1	65.7	10100	<1600	1.74	21.1	<0.50	<0.50	141	<0.50	<0.50	7.57	<1.0	<2.0	2.75	86.8	640	359	7,090	1,480	4,390	590
LQ 25-MH34	31-Jul-12	<0.50	<0.50	<0.50	<1.0	1.39	97.3	166	123	<20	<0.50	34	<0.50	<0.50	11.7	<0.50	<0.50	<0.50	<1.0	<2.0	<0.50	200	410	90	2,710	1,800	500	<250
LQ 25-MH27	31-Jul-12	3.84	<0.50	<0.50	<1.0	<0.50	420	1650	<20	<20	<0.50	54.5	<0.50	<0.50	3.8	<0.50	<0.50	<0.50	<1.0	<2.0	1.92	1,700	2,250	<340	3,840	1,160	430	<250
LQ 25-MH24	31-Jul-12	<0.50	<0.50	<0.50	<1.0	<0.50	27.6	74.7	350	<20	1.46	30.7	<0.50	<0.50	6	<0.50	<0.50	<0.50	<1.0	<2.0	1.08	105	360	224	3,380	1,930	1,090	<250
LQ 25-MH13	31-Jul-12	1.4	<0.50	<0.50	<1.0	15.9	129	265	2050	91	2.45	101	<0.50	<0.50	85.3	0.52	<0.50	<0.50	<1.0	<2.0	2.99	366	740	160	3,170	1,670	760	<250
MOE Standards [1]																												
Table 3 (Non-potable groundwater condition)		(17) 1.6	-	82 000	-	-	2300	-	(1 500 000) 470 000	(580 000) 140 000	(1400) 190	-	(9100) 1300	(17) 1.6	18 000	(17) 1.6	-	(17) 1.6	2500	-	(1.7) 0.5	4200	-	-	-	-	-	-
Other Standards - For Reference Only																												
Health Canada Drinking Water [2]		-	-	-	-	50 (MAC)	24 (AO)	300 (AO) (4)	-	-	15 (AO)	-	-	30 (MAC)	24 (AO)	-	-	5 (MAC)	-	100 (MAC) (5)	2 (MAC)	300 (AO)	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		(17) 1.6	-	25	-	-	2.4	-	1800	640	15	-	5.4	(17) 1.6	24	(17) 1.6	-	(5) 1.6	150	-	(1.7) 0.5	300	-	-	-	-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
   - ( ) - Standard in bracket applies to medium and fine textured soils.
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition
- Units to be confirmed by the City of Winnipeg

TABLE H-6
POLYNUCLEAR AROMATIC HYDROCARBONS IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter (mg/L)																		
			1-Methyl Naphthalene	2-Methyl Naphthalene	Acenaphthene	Acenaphthylene	Acridine	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b&j)fluoranthene	Benzo(b) fluoranthene	Benzo(ghi) perylene	Benzo(k)fluoranthene	Fluoranthene	Fluorene	Indeno(1,2,3 cd)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	B(a) Total Potency Equivalent
LQ 25-MH3	16-Apr-10	L877975	0.00081	0.00105	0.00119	<0.000050	<0.00025	0.000570	0.000234	<0.000050	<0.000050	0.000054	<0.000050	<0.000050	0.000991	0.000613	<0.000050	0.00129	0.00222	0.000694	<0.00025	-
LQ 25-MH8	16-Apr-10	L877975	0.00131	0.00214	0.00234	<0.000010	<0.00020	0.000881	0.000322	0.000275	0.000235	0.000235	0.000064	0.000088	0.00132	0.00191	0.000058	0.0105	0.00310	0.000997	<0.000050	-
LQ 25-MH13	16-Apr-10	L877975	0.00106	<0.000050	0.00338	0.000026	0.000094	0.000162	0.000231	0.000033	0.000035	0.000035	<0.000010	0.000017	0.00159	0.00129	<0.000010	<0.000010	0.000020	0.00129	<0.000050	-
LQ 25-MH24	16-Apr-10	L877975	0.00127	0.00170	0.000933	<0.000050	0.00033	0.000720	0.000273	0.000061	0.000150	0.000160	<0.000050	0.000050	0.00155	0.00138	<0.000050	0.0123	0.00355	0.000864	<0.00025	-
LQ 25-MH27	16-Apr-10	L877975	0.0196	0.0241	<0.00010	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0188	<0.00010	<0.00010	<0.00050	-
LQ 25-MH31	16-Apr-10	L877975	0.00101	0.00140	0.000984	<0.000010	<0.000050	0.000223	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000135	0.000917	<0.000010	0.00926	0.000996	0.000093	<0.000050	-
LQ 25-MH33	16-Apr-10	L877975	0.00177	0.00240	0.00156	<0.000010	0.000297	0.000574	0.000032	0.000016	0.000023	0.000025	<0.000010	<0.000010	0.00103	0.00129	<0.000010	0.0121	0.00273	0.000614	<0.000050	-
LQ 25-MH34	16-Apr-10	L877975	0.00142	0.00229	0.000737	0.000063	0.000111	0.00055	0.000175	0.0000959	0.000103	-	0.000027	0.0000043	0.000483	0.00136	0.00004	0.015	0.00278	0.000368	0.000056	-
LQ 25-MH31	18-Jul-11	L1032613	0.00116	0.00169	0.00117	<0.000020	0.000129	0.0004	0.000141	0.0000135	0.000019	-	0.00002	<0.000020	0.000942	0.000826	<0.000010	0.00705	0.002	0.000398	0.000049	-
LQ 25-MH33	18-Jul-11	L1032613	0.00286	0.00514	0.00244	0.000028	0.00037	0.00063	0.000299	0.0000808	0.000179	-	0.000039	0.00005	0.00111	0.00151	0.000071	0.0149	0.0029	0.000998	<0.000020	-
LQ 25-MH3	18-Jul-11	L1032613	0.00225	0.00322	0.0011	<0.000020	<0.00020	0.00012	0.00003	0.000012	0.000018	-	<0.000020	0.00001	0.0002	0.000706	0.00001	0.00845	0.0008	0.000191	0.000171	-
LQ 25-MH8	18-Jul-11	L1032613	0.00029	0.000443	0.000549	<0.000020	0.000079	0.00036	0.000215	0.0000559	0.000101	-	0.000028	0.000042	0.00118	0.000351	0.000043	0.00155	0.00157	0.000818	0.000317	-
LQ 25-MH27	18-Jul-11	L1033276	0.00165	0.00263	0.000504	<0.000020	0.000085	0.000084	0.000211	0.0000274	0.000446	-	0.000187	0.000166	0.000606	0.00076	0.000205	0.0127	0.00106	0.000435	0.000076	-
LQ 25-MH24	20-Jul-11	L1033873	0.000459	0.000741	0.00382	<0.000020	0.00062	0.000115	0.000019	0.0000142	0.000019	-	<0.000020	<0.000010	0.000304	0.000551	0.000011	0.0069	0.000847	0.000112	<0.000020	-
LQ 25-MH13	20-Jul-11	L1033873	0.00271	0.00565	0.0026	<0.000020	0.000126	0.000417	0.000043	0.0000253	0.000046	-	<0.000020	0.000015	0.000526	0.00243	0.000018	0.00854	0.00249	0.000265	0.00002	-
LQ 25-MH31	31-Jul-12	L1187205	0.00091	0.0014	<0.00085	<0.00020	0.00026	<0.00050	0.00015	<0.000050	<0.00010	-	<0.00040	<0.00010	0.00097	0.00094	<0.00020	0.00768	0.00199	0.00068	<0.00020	0.00011
LQ 25-MH33	31-Jul-12	L1187205	0.00228	0.00406	0.00244	<0.00020	0.0003	0.00082	0.00012	<0.000050	<0.00010	-	<0.00040	<0.00010	0.00118	0.00146	<0.00020	0.0122	0.00328	0.00079	<0.00020	0.00011
LQ 25-MH3	31-Jul-12	L1187205	0.00222	0.00312	0.00161	<0.00020	0.00016	<0.00050	<0.00010	<0.000050	<0.00010	-	<0.00040	<0.00010	0.00044	0.00107	<0.00020	0.00787	0.00161	0.00034	<0.00020	<0.00010
LQ 25-MH8	31-Jul-12	L1187205	0.00403	0.00537	0.0108	0.00024	0.00028	0.00472	0.00642	0.00593	0.00824	-	0.00258	0.00226	0.0191	0.00401	0.0036	0.0199	0.0229	0.014	0.00038	0.0086
LQ 25-MH34	31-Jul-12	L1187205	0.001	0.00161	0.00063	<0.00020	0.00031	<0.00050	0.0002	0.000157	0.00019	-	<0.00040	<0.00010	0.00059	0.00081	<0.00020	0.012	0.00153	0.00047	<0.00020	0.00026
LQ 25-MH27	31-Jul-12	L1187205	0.00161	0.00239	0.00062	<0.00020	0.00019	<0.00050	<0.00010	0.00007	<0.00010	-	<0.00040	<0.00010	0.00034	0.0007	<0.00020	0.0117	0.00116	0.00026	<0.00020	0.00015
LQ 25-MH24	31-Jul-12	L1187205	0.00064	0.00115	0.00071	<0.00020	0.00037	<0.00050	<0.00010	<0.000050	<0.00010	-	<0.00040	<0.00010	0.00021	0.00064	<0.00020	0.00861	0.00101	0.00017	<0.00020	<0.00010
LQ 25-MH13	31-Jul-12	L1187205	0.00253	0.00466	0.00241	<0.00020	0.00029	<0.00050	<0.00010	<0.000050	<0.00010	-	<0.00040	<0.00010	0.00034	0.00157	<0.00020	0.0097	0.00158	0.00028	<0.00020	<0.00010
MOE Standards (1)																						
Table 3 (Non-potable groundwater condition)			1.8(3)	1.8(3)	(1.7) 0.6	0.0018	-	0.0024	0.0047	0.00081	-	0.00075	0.0002	0.0004	0.13	0.4	0.0002	(6.4) 1.4	0.58	0.068	-	-
Other Standards - For Reference Only																						
Health Canada Drinking Water (2)			-	-	-	-	-	-	-	0.00001 (MAC)	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) (1)			0.0032(3)	0.0032(3)	0.0041	0.0010	-	0.0024	0.001	0.00001	-	0.0001	0.0002	0.0001	0.00041	0.12	0.0002	-	0.001	0.0041	-	-

Notes:
"-" = No Data
NS = No Sample because not enough sample
NA - Not Applicable
EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence.

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
3. The methyl naphthalene standards are applicable to both 1-methyl naphthallene and 2-methyl naphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-7
POLYCHLORINATED BIPHENYLS (PCBs) IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter (mg/L)									
			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs
LQ 25-MH24	25-Sep-09	L823490-2	<0.20	<0.20	<1.30	<1.30	<0.20	<0.20	<0.20	<0.20	<0.20	<0.130
LQ 25-MH13	25-Sep-09	L823490-2	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
LQ 25-MH27	25-Sep-09	L823490-2	<0.020	<0.020	<0.020	1.01	<0.020	<0.020	<0.020	<0.020	<0.020	1.14
LQ 25-MH8	25-Sep-09	L823490-2	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.050
LQ 25-MH3	25-Sep-09	L823490-2	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020	<0.020	<0.020	<0.020	<0.040
LQ 25-MH33	25-Sep-09	L823490-2	<0.020	<0.020	<0.020	2.02	<0.020	<0.020	<0.020	<0.020	<0.020	2.02
LQ 25-MH31	25-Sep-09	L823490-2	<0.020	<0.020	<0.020	<0.60	<0.020	<0.020	<0.020	<0.020	<0.020	<0.60
LQ 25-MH3	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
LQ 25-MH8	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
LQ 25-MH13	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
LQ 25-MH24	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	0.00031	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00031
LQ 25-MH27	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	0.00093	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00093
LQ 25-MH31	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
LQ 25-MH33	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	0.00048	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00048
LQ 25-MH34	16-Apr-10	L877975	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
LQ 25-MH3	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
LQ 25-MH8	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
LQ 25-MH13	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
LQ 25-MH24	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
LQ 25-MH27	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	0.00053	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00053
LQ 25-MH31	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
LQ 25-MH33	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	<0.00050	0.00076	<0.00050	<0.00050	<0.00050	<0.00050	0.00076
LQ 25-MH34	19-Oct-10	L944746	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
LQ 25-MH31	18-Jul-11	L1032603	<0.00020	<0.00020	<0.00020	0.00031	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
LQ 25-MH32	18-Jul-11	L1032603	<0.00020	<0.00020	<0.00020	0.00365	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
LQ 25-MH3	18-Jul-11	L1032603	<0.00020	<0.00020	<0.00020	0.0008	<0.00020	0.00029	<0.00020	<0.00020	<0.00020	<0.0002
LQ 25-MH8	18-Jul-11	L1032603	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
LQ 25-MH34	18-Jul-11	L1032603	<0.00020	<0.00020	<0.00020	0.00083	<0.00020	0.00022	<0.00020	<0.00020	<0.00020	0.00083
LQ 25-MH27	19-Jul-11	L1033282	<0.00020	<0.00020	<0.00020	0.00057	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00057
LQ 25-MH24	20-Jul-11	L1033882	<0.00015	<0.00015	<0.00015	0.00055	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015	0.00055
LQ 25-MH13	20-Jul-11	L1033882	<0.00015	<0.00015	<0.00015	0.00034	<0.00015	<0.00015	<0.00015	<0.00015	<0.00015	0.00034
LQ 25-MH31	31-Jul-12	L1187194	<0.00010	<0.00010	<0.00010	0.00024	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00030
LQ 25-MH33	31-Jul-12	L1187194	<0.00010	<0.00010	<0.00010	0.00081	<0.00010	0.00041	<0.00010	<0.00010	<0.00010	0.00122
LQ 25-MH3	31-Jul-12	L1187194	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00030
LQ 25-MH8	31-Jul-12	L1187194	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00030
LQ 25-MH34	31-Jul-12	L1187194	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00030
LQ 25-MH27	31-Jul-12	L1187194	<0.00010	<0.00010	<0.00010	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00030
LQ 25-MH24	31-Jul-12	L1187194	<0.00010	<0.00010	<0.00010	0.00039	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00039
LQ 25-MH13	31-Jul-12	L1187194	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60
MOE Standards [1]												
Table 3 (Non-potable groundwater condition)			-	-	-	-	-	-	-	-	-	(0.015) 0.0078
Other Standards - For Reference Only												
Health Canada Drinking Water [2]			-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	-	-	-	-	-	-	-	-	0.003

Notes:
"-" = No Data
NS = No Sample because not enough sample
NA - Not Applicable
EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence.

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-8
EPA 8270 BASE/NEUTRAL EXTRACTABLES IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter (mg/L)																						
			1,2,4,5-Tetrachloro-benzene	1,2,4-Trichloro-benzene	1,2-Dichloro-benzene	1,2-Diphenyl-hydrazine	1,3,5-Trinitro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,4-Naphtho-quinone	1-Chloro-naphthalene	1-Methyl-naphthalene	1-Naphthylamine	2,4-Dinitrotoluene	2,6-Dinitro-toluene	2-Acetyl-amino-fluorene	2-Chloro-naphthalene	2-Methyl-naphthalene	2-Naphthyl-amine	2-Nitroaniline	2-Picoline	3,3'-Dichloro-benzidine	3-Methyl-cholanthrene	3-Nitroaniline	4,4'-DDD	4,4'-DDE	4,4'-DDT
LQ 25-MH3	16-Apr-10	L877975	<0.0010	<0.0010	<0.0010	<0.020	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.020	<0.0010	<0.0010	<0.010	<0.0010	0.0024	<0.020	<0.0020	<0.0050	<0.020	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050
LQ 25-MH8	16-Apr-10	L877975	<0.0010	<0.0010	<0.0010	<0.020	<0.010	<0.0010	0.0042	<0.0010	<0.0010	0.0019	<0.020	<0.0010	<0.0010	<0.010	<0.0010	0.0031	<0.020	<0.0020	<0.0050	<0.020	<0.010	<0.0020	<0.0050	<0.0050	<0.0050
LQ 25-MH13	16-Apr-10	L877975	<0.0010	<0.0010	<0.0010	<0.020	<0.010	<0.0010	0.0015	<0.0010	<0.0010	<0.0010	<0.020	<0.0010	<0.0010	<0.010	<0.0010	<0.0010	<0.020	<0.0020	<0.0050	<0.020	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050
LQ 25-MH24	16-Apr-10	L877975	<0.0010	<0.0010	<0.0010	<0.020	<0.010	<0.0010	0.0046	<0.0010	<0.0010	0.0014	<0.020	<0.0010	<0.0010	<0.010	<0.0010	0.0027	<0.020	<0.0020	<0.0050	<0.020	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050
LQ 25-MH27	16-Apr-10	L877975	<0.010	<0.010	<0.010	<0.20	<0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.20	<0.010	<0.010	<1.0	<0.010	<0.010	<0.20	<0.020	<0.050	<2.0	<0.50	<0.020	<0.50	<0.50	<0.50
LQ 25-MH31	16-Apr-10	L877975	<0.0010	<0.0010	<0.0010	<0.020	<0.010	<0.0010	0.0038	<0.0010	<0.0010	0.0019	<0.020	<0.0010	<0.0010	<0.010	<0.0010	0.0025	<0.020	<0.0020	<0.0050	<0.020	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050
LQ 25-MH33	16-Apr-10	L877975	<0.0010	<0.0010	<0.0010	<0.020	<0.010	0.0018	0.0042	<0.0010	<0.0010	0.0028	<0.020	<0.0010	<0.0010	<0.010	<0.0010	0.0058	<0.020	<0.0020	<0.0050	<0.020	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050
LQ 25-MH34	16-Apr-10	L877975	<0.0010	<0.0010	<0.0010	<0.020	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	0.0033	<0.020	<0.0010	<0.0010	<0.010	<0.0010	0.0011	<0.020	<0.0020	<0.0050	<0.020	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050
MOE Standards [1]																											
Table 3 (Non-potable groundwater condition)		-	(0.850) 0.180	(9.6) 4.6	-	-	9.6	(0.067) 0.008	-	-	$1.8^{(3)}$	-	2.9	2.9	-	-	$1.8^{(3)}$	-	-	-	0.64	-	-	0.045	0.020	0.028
Other Standards - For Reference Only																											
Health Canada Drinking Water [2]		-	-	-	0.2 (MAC)/0.003 (AO)	-	-	-	0.005 (MAC)/0.001 (AO)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	-	0.070	0.003	-	-	0.059	0.001	-	-	$0.0032^{(3)}$	-	0.005	0.005	-	-	$0.0032^{(3)}$	-	-	-	0.0005	-	-	0.010	0.010	0.0028

Sample No.	Date	Parameter (mg/L)																							
		4-Amino-biphenyl	4-Bromophenyl-phenyl ether	4-Chloroaniline	4-Chlorophenyl-phenyl ether	4-Nitroaniline	4-Nitroquinoline-1-oxide	5-Nitro-o-toluidine	7,12-Dimethylbenz(a)anthracene	Acenaphthene	Acenaphthylene	Acetophenone	Aldrin	Alpha-BHC	alpha-Endosulfan	Aniline	Anthracene	Aramite	Benzidine	Benzo(a)-anthracene	Benzo(a) pyrene	Benzo(b&j) fluoranthene	Benzo(ghi) perylene	Benzo(k) fluoranthene	Benzyl alcohol	Beta-BHC	beta-Endosulfan
LQ 25-MH3	16-Apr-10	<0.010	<0.0010	<0.0050	<0.0010	<0.010	<0.0020	<0.010	<0.0050	0.0019	<0.0010	<0.0050	<0.0010	<0.0010	<0.0050	<0.010	<0.0010	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050
LQ 25-MH8	16-Apr-10	<0.010	<0.0010	<0.050	<0.0010	<0.010	<0.0020	<0.010	<0.0050	0.0024	<0.0010	0.0019	<0.010	<0.0010	<0.0050	<0.010	0.0014	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050
LQ 25-MH13	16-Apr-10	<0.010	<0.0010	<0.0050	<0.0010	<0.010	<0.0020	<0.010	<0.0050	0.0029	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.010	<0.0010	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0050
LQ 25-MH24	16-Apr-10	<0.010	<0.0010	<0.050	<0.0010	<0.010	<0.0020	<0.010	<0.0050	0.0010	<0.0010	<0.010	<0.010	<0.0010	<0.0050	<0.10	<0.0010	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050
LQ 25-MH27	16-Apr-10	<0.10	<0.010	<0.050	<0.010	<0.10	<0.020	<0.10	<0.50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.50	<0.10	<0.010	<2.0	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.010	<0.50
LQ 25-MH31	16-Apr-10	<0.010	<0.0010	<0.050	<0.0010	<0.010	<0.0020	<0.010	<0.0050	0.0012	<0.0010	<0.010	<0.0010	<0.0010	<0.0050	<0.010	<0.0010	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.0050
LQ 25-MH33	16-Apr-10	<0.0020	<0.0010	<0.0050	<0.0010	<0.010	<0.0020	<0.010	<0.0050	0.0019	<0.0010	<0.010	<0.0010	<0.0010	<0.0050	<0.010	<0.0010	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.050
LQ 25-MH34	16-Apr-10	<0.010	<0.0010	<0.0050	<0.0010	<0.010	<0.0020	<0.10	<0.0050	0.0124	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.010	0.0074	<0.020	<0.020	0.0068	0.0059	0.0060	0.0042	0.0047	<0.010	<0.0010	<0.0050
MOE Standards [1]																											
Table 3 (Non-potable groundwater condition)		-	-	0.4	-	-	-	-	-	(1.7) 0.6	0.0018	-	0.0085	-	-	-	0.0024	-	-	0.0047	0.00081	0.00075	0.0002	0.0004	-	-	-
Other Standards - For Reference Only																											
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	-	0.01	-	-	-	-	-	0.0041	0.001	-	0.0035	-	-	-	0.0024	-	-	0.001	0.00001	0.0001	0.0002	0.0001	-	-	-

Sample No.	Date	Parameter (mg/L)																							
		Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butylbenzyl phthalate	Chlorobenzilate	Chrysene	Delta-BHC	Di-n-butyl phthalate	Di-n-octyl phthalate	Diallate	Dibenzo(a,h) anthracene	Dibenzofuran	Dieldrin	Diethyl phthalate	Dimethyl phthalate	Diphenylamine	Disulfoton	Endrin	Endrin aldehyde	Famphur	Fluoranthene	Fluorene	Gamma-BHC	Heptachlor	Heptachlor Epoxide
LQ 25-MH3	16-Apr-10	<0.0010	<0.0010	<0.0010	<0.0030	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	0.0014	<0.0050	0.0024	0.0021	<0.0010	<0.0010	<0.010	<0.020	<0.010	0.0014	0.0015	<0.0010	<0.010	<0.0050
LQ 25-MH8	16-Apr-10	<0.0010	<0.0010	<0.010	0.0089	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	0.0019	<0.050	0.0044	<0.0010	<0.0010	<0.0010	<0.10	<0.20	<0.010	0.0023	0.0023	<0.0010	<0.10	<0.0050
LQ 25-MH13	16-Apr-10	<0.0010	<0.0010	<0.0010	<0.0030	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	0.0016	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.020	<0.010	0.0022	<0.0010	<0.0010	<0.010	<0.0050
LQ 25-MH24	16-Apr-10	<0.010	<0.0010	<0.010	0.0079	<0.010	<0.010	<0.0010	<0.0010	0.0011	<0.0010	<0.0020	<0.0010	0.0014	<0.050	0.0177	<0.0010	<0.0010	<0.0010	<0.10	<0.20	<0.010	<0.0010	0.0015	<0.0010	<0.10	<0.0050
LQ 25-MH27	16-Apr-10	<0.010	<0.010	<0.010	<0.30	<0.10	<0.10	<0.10	<0.010	<0.010	<0.10	<0.020	<0.10	<0.010	<0.50	<0.010	<0.010	<0.010	<0.010	<1.0	<2.0	<1.0	<0.010	<0.010	<0.010	<0.10	<0.050
LQ 25-MH31	16-Apr-10	<0.0010	<0.0010	<0.010	0.0032	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	<0.0010	<0.050	0.0028	<0.0010	<0.0010	<0.0010	<0.10	<0.20	<0.010	<0.0010	0.0012	<0.0010	<0.10	<0.0050
LQ 25-MH33	16-Apr-10	<0.0010	<0.0010	<0.010	0.0037	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.0010	0.0015	<0.050	0.0096	<0.0010	<0.0010	<0.0010	<0.10	<0.20	<0.010	0.0013	0.0014	<0.0010	<0.010	<0.0050
LQ 25-MH34	16-Apr-10	<0.0010	<0.0010	<0.0010	<0.0030	<0.0010	<0.010	0.0076	<0.0010	<0.0010	<0.0010	<0.0020	0.0016	0.0161	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.010	<0.020	<0.010	0.0203	0.0177	<0.0010	<0.010	<0.0050
MOE Standards [1]																											
Table 3 (Non-potable groundwater		-	300	20	0.14	-	-	0.001	-	-	-	-	0.00052	-	0.00075	0.038	0.038	-	-	0.00048	-	-	0.13	0.4	0.0012	0.0025	0.000048
Other Standards - For Reference Only																											
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	0.005	0.12	0.01	-	-	0.0001	-	-	-	-	0.0002	-	0.00035	0.038	0.038	-	-	0.00048	-	-	0.00041	0.12	0.0012	0.0015	0.000048

TABLE H-8
EPA 8270 BASE/NEUTRAL EXTRACTABLES IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Parameter (mg/L)																								
		Hexachloro-benzene	Hexachloro-butadiene	Hexachloro-cyclopentadiene	Hexachloro-ethane	Hexachloro-propene	Indeno (1,2,3-cd) pyrene	Isodrin	Iso-phorone	Isosafrole	Kepone	Metha-pyrilene	Methoxychlor	Methyl parathion	N-Nitrosodi-n-butylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiethyl-amine	N-Nitrosodi-methyl-amine	N-Nitroso-diphenyl-amine	N-Nitroso-methyl-ethylamine	N-Nitroso-morpholine	N-Nitro-sopiperidine	N-Nitro-sopyrrolidine	Naphthalene	Nitro-benzene	O,O,O-Triethyl-phosphoro-thioate	Parathion
LQ 25-MH3	16-Apr-10	<0.0010	<0.0010	<0.010	<0.0020	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.020	<0.020	<0.020	<0.020	<0.010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	0.0022	<0.020	<0.0020	<0.020
LQ 25-MH8	16-Apr-10	<0.0010	<0.0010	<0.010	<0.0020	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.020	<0.020	<0.020	<0.020	<0.010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.010	<0.0010	<0.0010	0.0120	<0.010	<0.0020	<0.020
LQ 25-MH13	16-Apr-10	<0.0010	<0.0010	<0.010	<0.0020	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.020	<0.020	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0020	<0.020
LQ 25-MH24	16-Apr-10	<0.0010	<0.0010	<0.010	<0.0020	<0.0010	<0.0010	<0.050	<0.0010	<0.0010	<0.020	<0.20	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	0.0154	<0.010	<0.0020	<0.020
LQ 25-MH27	16-Apr-10	<0.010	<0.010	<0.10	<0.020	<0.010	<0.10	<0.050	<0.010	<0.010	<2.0	<0.20	<2.0	<0.20	<0.010	<0.010	<0.010	<0.10	<0.010	<0.10	<0.010	<0.010	<0.010	0.012	<0.010	<0.020	<0.20
LQ 25-MH31	16-Apr-10	<0.0010	<0.0010	<0.010	<0.0020	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.020	<0.020	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	0.0091	<0.010	<0.0020	<0.020
LQ 25-MH33	16-Apr-10	<0.0010	<0.0010	<0.010	<0.0020	<0.0010	<0.0010	<0.0050	<0.0010	<0.0010	<0.020	<0.020	<0.020	<0.020	<0.010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	0.0179	<0.010	<0.0020	<0.020
LQ 25-MH34	16-Apr-10	<0.0010	<0.0010	<0.010	<0.0020	<0.0010	0.0049	<0.0050	<0.0010	<0.0010	<0.020	<0.020	<0.020	<0.020	<0.0010	<0.0010	<0.0010	<0.010	<0.0010	<0.010	<0.0010	<0.0010	<0.0010	0.0047	<0.0010	<0.0020	<0.020
MOE Standards [1]																											
Table 3 (Non-potable groundwater condition)		0.0031	(0.0045) 0.00044	-	(0.2) 0.094	-	0.0002	-	-	-	-	-	0.0065	-	-	-	-	-	-	-	-	-	-	(6.4) 1.4	-	-	-
Other Standards - For Reference Only																											
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		0.001	(0.0006) 0.00044	-	0.0021	-	0.0002	-	-	-	-	-	0.0065	-	-	-	-	-	-	-	-	-	-	0.011	-	-	-

Sample No.	Date	Parameter (mg/L)																
		Pentachloro-benzene	Pentachloroethane	Pentachloro-nitrobenzene	Perylene	Phenacetin	Phenanthrene	Phorate	Pronamide	Pyrene	Pyridine	Safrole	Sulfotepp	Thionazin	a,a-Dimethyl-phenethyl-amine	m-Dinitrobenzene	o-Toluidine	p-(Dimethylamino)-azobenzene
LQ 25-MH3	16-Apr-10	<0.0010	<0.0050	<0.0020	<0.0010	<0.0020	0.0032	<0.010	<0.0010	0.0013	<0.010	<0.0020	<0.010	<0.020	<0.020	<0.0020	<0.0050	<0.0050
LQ 25-MH8	16-Apr-10	<0.0010	<0.0050	<0.0020	<0.0010	<0.0020	0.0058	<0.010	<0.0010	0.0016	<0.010	<0.0020	<0.010	<0.020	<0.020	<0.0020	<0.0050	<0.0050
LQ 25-MH13	16-Apr-10	<0.0010	<0.0050	<0.0020	<0.0010	<0.0020	<0.0010	<0.010	<0.0010	0.0014	<0.010	<0.0020	<0.010	<0.020	<0.020	<0.0020	<0.0050	<0.0050
LQ 25-MH24	16-Apr-10	<0.0010	<0.0050	<0.0020	<0.0010	<0.0020	0.0033	<0.10	<0.0010	<0.0010	<0.010	<0.0020	<0.010	<0.020	<0.020	<0.0020	<0.0050	<0.050
LQ 25-MH27	16-Apr-10	<0.010	<0.050	<0.020	<0.10	<0.020	<0.010	<0.10	<0.010	<0.010	<0.10	<0.020	<0.10	<0.20	<0.20	<0.020	<0.050	<0.50
LQ 25-MH31	16-Apr-10	<0.0010	<0.0050	<0.0020	<0.0010	<0.0020	0.0013	<0.010	<0.0010	<0.0010	<0.010	<0.0020	<0.010	<0.020	<0.020	<0.0020	<0.0050	<0.0050
LQ 25-MH33	16-Apr-10	<5.0	<0.0050	<0.0020	<0.0010	<0.0020	0.0036	<0.010	<0.0010	<0.0010	<0.010	<0.0020	<0.010	<0.020	<0.020	<0.0020	<0.0050	<0.050
LQ 25-MH34	16-Apr-10	<0.0010	<0.0050	<0.0020	0.0018	<0.0020	0.0233	<0.010	<0.0010	0.0162	<0.010	<0.0020	<0.010	<0.020	<0.020	<0.0020	<0.0050	<0.0050
MOE Standards [1]																		
Table 3 (Non-potable groundwater condition)		-	-	-	-	-	0.58	-	-	0.068	-	-	-	-	-	-	-	-
Other Standards - For Reference Only																		
Health Canada Drinking Water [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]		-	-	-	-	-	0.001	-	-	0.0041	-	-	-	-	-	-	-	-

Notes:
"-" = No Data
NS = No Sample because not enough sample

NA - Not Applicable

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. The methyl naphthalene standards are applicable to both 1-methyl naphthallene and 2-methyl naphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-9
PESTICIDES & HERBICIDES IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter																								
			Lindane	Heptachlor	Heptachlor epoxide	Oxychlordane	gamma-Chlordane	alpha-Chlordane	Aldrin	Dieldrin	p,p-DDE	p,p-DDD	p,p-DDT	o,p-DDT	Methoxychlor	Aldrin + Dieldrin	DDT + metabolites	Heptachlor + Heptachlor Epoxide	Chlordane (Total)	2,4,5-TP	MCPA	Mecoprop	2,4,5-T	2,4-D	Bromoxynil	Dicamba	Dinoseb	Picloram
Units			*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
LQ 25-MH24	25-Sep-09	L823490	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	-	-	-	-	*<5.0*	*<5.0*	*131*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*
LQ 25-MH13	25-Sep-09	L823490	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<1.50*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	*<0.010*	-	-	-	-	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*
LQ 25-MH27	25-Sep-09	L823490	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	-	-	-	-	*<5.0*	*<5.0*	*68*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*
LQ 25-MH8	25-Sep-09	L823490	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	-	-	-	-	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*
LQ 25-MH3	25-Sep-09	L823490	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	-	-	-	-	*<5.0*	*<5.0*	*120*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*
LQ 25-MH33	25-Sep-09	L823490	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	-	-	-	-	*<5.0*	*<5.0*	*117*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*
LQ 25-MH31	25-Sep-09	L823490	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	*<0.10*	-	-	-	-	*<5.0*	*<5.0*	*156*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*	*<5.0*
LQ 25-MH3	16-Apr-10	L877975	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<0.20	<1.0	<1.0	<1.0	<1.0	<1.0	4.19	<4.0	<2.0	<3.0	<5.0	<5.0	25.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH8	16-Apr-10	L877975	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<40.0	<0.20	<1.0	<1.0	<1.0	<1.0	<1.0	39.8	<4.0	<2.0	<3.0	<5.0	<5.0	63.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH13	16-Apr-10	L877975	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
LQ 25-MH24	16-Apr-10	L877975	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<46.0	<0.20	<1.0	<1.0	<1.0	<1.0	<1.0	45.7	<4.0	<2.0	<3.0	<5.0	<5.0	166	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH27	16-Apr-10	L877975	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<4.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	4.34	<4.0	<2.0	<3.0	<5.0	<5.0	40.6	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH31	16-Apr-10	L877975	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<24.0	<0.20	<1.0	<1.0	<1.0	<1.0	<1.0	23.0	<4.0	<2.0	<3.0	<5.0	<5.0	110	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH33	16-Apr-10	L877975	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<4.20	<0.20	<1.0	<1.0	<1.0	<1.0	<1.0	4.12	<4.0	<2.0	<3.0	<5.0	<5.0	93.5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH34	16-Apr-10	L877975	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.040	<0.40	<0.20	<0.30	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH3	19-Oct-10	L944746	<1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<2.0	-	<5.0	14.2	66	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH8	19-Oct-10	L944746	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<2.0	-	<5.0	<5.0	76.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH13	19-Oct-10	L944746	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.40	<0.20	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH24	19-Oct-10	L944746	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5	<4.0	<2.0	-	<5.0	<5.0	122	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH27	19-Oct-10	L944746	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<2.0	-	<5.0	<5.0	56.7	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH31	19-Oct-10	L944746	<1.0	<1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<1.2	-	<5.0	<5.0	78.7	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH33	19-Oct-10	L944746	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<2.0	-	<5.0	<5.0	82.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH34	19-Oct-10	L944746	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.40	<0.20	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25 MH31	18-Jul-11	L1032603	-	<0.10	<0.10	Yes	<0.10	<0.10	<1.20	<0.15	<0.10	<0.10	<0.10	<0.10	Yes	Yes	Yes	<0.10	<0.20	<5.0	<5.0	166	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH32	18-Jul-11	L1032603	-	<0.10	<0.10	<0.15	<0.10	<0.10	<1.30	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.30	<0.40	<0.20	<0.20	<5.0	<5.0	193	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH3	18-Jul-11	L1032603	-	<0.10	<0.10	<0.10	<0.10	<0.10	<1.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.20	<0.40	<0.20	<0.20	<5.0	19.9	115	<5.0	<12.0	<5.0	5.4	<5.0	<5.0
LQ 25-MH8	18-Jul-11	L1032603	-	<0.10	<0.10	<0.10	<0.10	<0.10	<1.40	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.40	<0.10	<0.10	<0.30	<5.0	<5.0	193	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH34	18-Jul-11	L1032603	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.30	<0.30	<0.40	<5.0	<5.0	73.7	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH27	19-Jul-11	L1033282	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.40	<0.20	<0.30	<5.0	<5.0	60.4	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH24	20-Jul-11	L1033882	-	<0.10	<0.10	<0.30	<0.10	<0.10	<1.30	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.30	<0.40	<0.20	<0.30	<5.0	<5.0	238	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LQ 25-MH13	20-Jul-11	L1033882	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.40	<0.20	<0.30	<5.0	<5.0	72.9	<5.0	<0.9	<5.0	<5.0	<5.0	<5.0
LQ 25-MH31	31-Jul-12	L1187194	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<2.0	<4.0	<50	<50	86	<50	<50	<50	<50	<50	<50
LQ 25-MH33	31-Jul-12	L1187194	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<1.0	<3.0	<50	<50	126	<50	<50	<50	<50	<50	<50
LQ 25-MH3	31-Jul-12	L1187194	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<1.0	<3.0	<50	<50	128	<50	<50	<50	<50	<50	<50
LQ 25-MH8	31-Jul-12	L1187194	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<1.0	<3.0	<50	<50	50	<50	<50	<50	<50	<50	<50
LQ 25-MH34	31-Jul-12	L1187194	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<1.0	<3.0	<50	<50	74	<50	<50	<50	<50	<50	<50
LQ 25-MH27	31-Jul-12	L1187194	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<1.0	<3.0	<50	<50	60	<50	<50	<50	<50	<50	<50
LQ 25-MH24	31-Jul-12	L1187194	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<4.0	<1.0	<3.0	<50	<50	115	<50	<50	<50	<50	<50	<50
LQ 25-MH13	31-Jul-12	L1187194	-	<1.0	<1.0	<7.16	<1.0	<1.0	<7.44	<2.17	<1.0	<1.0	<1.0	<1.0	<1.0	<9.6	<4.0	<1.0	<7.2	<50	<50	123	<50	<50	<50	<50	<50	<50
MOE Standards [1]																												
Table 3 (Non-potable groundwater condition)			1.2	2.5	0.048	-	-	-	8.5	0.75	20	45	-	-	6.5	-	2.8	-	28	-	-	-	-	-	-	-	-	-
Other Standards - For Reference Only																												
Health Canada Drinking Water [2]			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	100	5	120	-	190
MOE Standards - Table 2 (Potable groundwater condition) [1]			1.2	1.5	0.048	-	-	-	0.35	0.35	10	10	-	-	6.5	-	2.8	-	7	-	-	-	-	-	-	-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-10
DIOXINS & FURANS IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter														
			2378 TeCDD	12378 PeCDD	123478 HxCDD	123678 HxCDD	123789 HxCDD	1234678 HpCDD	OCDD	Total TCDDs	Total PeCDD	Total HxCDD	Total HpCDD	Total PCDDs	2378 TeCDF	12378 PeCDF	23478 PeCDF
Units			*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*
LQ 25-MH3	16-Apr-10	L877975	<1.0	<1.0	<1.0	<2.0	<1.0	16.1	129	<1.0	<1.0	<2.0	17.0	146	<1.0	<0.70	<0.60
LQ 25-MH8	16-Apr-10	L877975	<2.0	<1.0	<1.0	<1.0	<1.0	57.1	419	<2.0	<1.0	<1.0	129	549	<1.0	<0.70	<0.60
LQ 25-MH13	16-Apr-10	L877975	<1.0	<0.70	<0.50	<0.70	<0.60	<0.70	<1.0	<1.0	<0.70	<0.70	<0.70	<1.0	<1.0	<0.50	<0.40
LQ 25-MH24	16-Apr-10	L877975	<0.80	<0.80	<1.0	<1.0	<1.0	68.9	773	<0.80	<0.80	10.0	148	931	<0.70	<0.40	<0.40
LQ 25-MH27	16-Apr-10	L877975	<3.0	<2.0	<3.0	<3.0	<3.0	153	1400	<3.0	<2.0	50.8	350	1800	<3.0	<1.0	<1.0
LQ 25-MH31	16-Apr-10	L877975	<2.0	<0.80	<0.50	<0.70	<0.60	33.9	285	<2.0	<0.80	<0.70	67.1	352	<1.0	<0.60	<0.50
LQ 25-MH33	16-Apr-10	L877975	<1.0	<0.70	<0.50	<0.60	<0.50	14.5	205	<1.0	<0.70	3.32	33.3	241	<1.0	<0.50	<0.40
LQ 25-MH34	16-Apr-10	L877975	<0.30	<0.20	<0.10	<0.20	<0.20	5.78	17.5	<0.30	<0.20	<0.20	10.0	27.5	<0.30	<0.10	<0.10
MOE Standards [1]																	
Table 3 (Non-potable groundwater condition)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Standards - For Reference Only																	
Health Canada Drinking Water [2]			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample No.	Date	Work Order	Parameter													
			123478 HxCDF	123678 HxCDF	123789 HxCDF	234678 HxCDF	1234678 HpCDF	1234789 HpCDF	OCDF	Total TCDF	Total PeCDF	Total HxCDF	Total HpCDF	Total PCDFs	Total TEQ (ND=0) (WHO Calc)	Total TEQ (ND=0.5DL) (WHO Calc)	Total TEQ (ND=DL) (WHO Calc)
Units			*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*	*pg/L*
LQ 25-MH3	*16-Apr-10*	*L877975*	<0.60	<0.60	<0.70	<0.60	<1.0	<2.0	<3.0	<1.0	<0.70	<0.70	<2.0	<3.0	0.2	1.69	3.18
LQ 25-MH8	*16-Apr-10*	*L877975*	<0.70	<0.70	<0.90	<0.80	10.7	<2.0	26.8	<1.0	<0.70	<0.90	14.1	40.9	0.81	2.78	4.74
LQ 25-MH13	*16-Apr-10*	*L877975*	<0.40	<0.40	<0.60	<0.40	<2.0	<2.0	<2.0	<1.0	<0.50	<0.60	<2.0	<2.0	0	1.17	2.34
LQ 25-MH24	*16-Apr-10*	*L877975*	<0.80	<0.80	<1.0	<0.80	11.4	<2.0	51.7	<0.70	<0.40	<1.0	47.1	98.8	1.05	2.28	3.51
LQ 25-MH27	*16-Apr-10*	*L877975*	<2.0	<2.0	<3.0	<2.0	27.4	<3.0	137	<3.0	<1.0	35.7	27.4	200	2.26	5.99	9.72
LQ 25-MH31	*16-Apr-10*	*L877975*	<0.30	<0.20	<0.30	<0.30	5.04	<0.60	21.2	<1.0	<0.60	3.01	12.4	36.7	0.48	2.16	3.84
LQ 25-MH33	*16-Apr-10*	*L877975*	2.51	2.10	<0.30	1.31	<0.70	<1.0	15.6	<1.0	<0.50	8.71	<1.0	24.3	0.8	1.87	2.95
LQ 25-MH34	*16-Apr-10*	*L877975*	<0.10	<0.10	<0.10	<0.10	<0.30	<0.40	<0.30	<0.30	<0.10	0.48	<0.40	0.48	0.06	0.39	0.72
MOE Standards [1]																	
Table 3 (Non-potable groundwater condition)			-	-	-	-	-	-	-	-	-	-	-	-	(23,000) 14,000	(23,000) 14,000	(23,000) 14,000
Other Standards - For Reference Only																	
Health Canada Drinking Water [2]			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	-	-	-	-	-	-	-	-	-	-	-	15	15	15

Notes:
"-" = No Data
EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence.

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-11
NONYLPHENOLS & ETHOXYLATES IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter								
			Nonylphenols	Nonylphenol Monoethoxylates	Nonylphenol Diethoxylates	Nonylphenol Triethoxylates	t-Octylphenol	t-Octylphenol Monoethoxylate	t-Octylphenol Diethoxylate	t-Octylphenol Triethoxylate	TOTAL TEQ (CCME)
Units			*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*	*µg/L*
LQ 25-MH3	16-Apr-10	L877975	2.26	0.96	1.3	<2.0	0.054	<0.10	<0.20	<0.50	3.4
LQ 25-MH8	16-Apr-10	L877975	22.0	6.64	13.2	4.6	0.774	<0.10	<0.20	<0.50	35.
LQ 25-MH13	16-Apr-10	L877975	1.51	0.65	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	1.8
LQ 25-MH24	16-Apr-10	L877975	13.6	6.30	23.4	3.4	0.455	<0.10	<0.20	<0.50	31.
LQ 25-MH27	16-Apr-10	L877975	0.99	<0.50	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	0.99
LQ 25-MH31	16-Apr-10	L877975	0.80	<0.50	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	0.80
LQ 25-MH33	16-Apr-10	L877975	0.31	<0.50	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	0.31
LQ 25-MH34	16-Apr-10	L877975	0.78	<0.50	<1.2	<2.0	<0.020	<0.10	<0.20	<0.50	0.78
MOE Standards [1]											
Table 3 (Non-potable groundwater condition)			-	-	-	-	-	-	-	-	-
Other Standards - For Reference Only [3]											
Health Canada Drinking Water [2]			-	-	-	-	-	-	-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	-	-	-	-	-	-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective
3. Canadian Water Quality Guidelines for the Protection of Aquatic Life nonylphenol and its ethoxylates guideline value 1 µg/L.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-12
TOXAPHENE IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date		Parameter
		Work Order	Toxaphene (µg/L)
LQ 25-MH3	*19-Oct-10*	*L944746*	-
LQ 25-MH8	*19-Oct-10*	*L944746*	-
LQ 25-MH13	*19-Oct-10*	*L944746*	-
LQ 25-MH24	*19-Oct-10*	*L944746*	-
LQ 25-MH27	*19-Oct-10*	*L944746*	-
LQ 25-MH31	*19-Oct-10*	*L944746*	-
LQ 25-MH33	*19-Oct-10*	*L944746*	-
LQ 25-MH34	*19-Oct-10*	*L944746*	-
LQ 25-MH31	*18-Jul-11*	*L1032603*	<15
LQ 25-MH32	*18-Jul-11*	*L1032603*	<15
LQ 25-MH3	*18-Jul-11*	*L1032603*	<15
LQ 25-MH8	*18-Jul-11*	*L1032603*	<30
LQ 25-MH34	*18-Jul-11*	*L1032603*	<15
LQ 25-MH27	*19-Jul-11*	*L1033282*	<10
LQ 25-MH24	*20-Jul-11*	*L1033882*	<15
LQ 25-MH13	*20-Jul-11*	*L1033882*	<5
LQ 25-MH31	*31-Jul-12*	*L1187194*	<1.5
LQ 25-MH33	*31-Jul-12*	*L1187194*	<1.5
LQ 25-MH3	*31-Jul-12*	*L1187194*	<1.5
LQ 25-MH8	*31-Jul-12*	*L1187194*	<1.5
LQ 25-MH34	*31-Jul-12*	*L1187194*	<1.5
LQ 25-MH27	*31-Jul-12*	*L1187194*	<1.5
LQ 25-MH24	*31-Jul-12*	*L1187194*	<1.5
LQ 25-MH13	*31-Jul-12*	*L1187194*	<1.5
MOE Standards [1]			
Table 3 (Non-potable groundwater condition)			-
Other Standards - For Reference Only [3]			
Health Canada Drinking Water [2]			-
MOE Standards - Table 2 (Potable groundwater condition) [1]			-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objec - Exceedance of MOE Criteria
3. USEPA drinking water standard for toxaphene maximum contaminated level 3 µg/L.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition
- Units to be confirmed by the City of Winnipeg

TABLE H-13
PHENOLS IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter
			Phenols (4AAP) mg/L
LQ 25-MH3	19-Oct-10	L944746	-
LQ 25-MH8	19-Oct-10	L944746	-
LQ 25-MH13	19-Oct-10	L944746	-
LQ 25-MH24	19-Oct-10	L944746	-
LQ 25-MH27	19-Oct-10	L944746	-
LQ 25-MH31	19-Oct-10	L944746	-
LQ 25-MH33	19-Oct-10	L944746	-
LQ 25-MH34	19-Oct-10	L944746	-
LQ 25-MH31	18-Jul-11	L1032603	0.031
LQ 25-MH32	18-Jul-11	L1032603	0.065
LQ 25-MH3	18-Jul-11	L1032603	1.22
LQ 25-MH8	18-Jul-11	L1032603	0.02
LQ 25-MH34	18-Jul-11	L1032603	0.099
LQ 25-MH27	19-Jul-11	L1033282	0.034
LQ 25-MH24	20-Jul-11	L1033882	0.107
LQ 25-MH13	20-Jul-11	L1033882	0.353
LQ 25-MH31	31-Jul-12	L1187194	<0.025
LQ 25-MH33	31-Jul-12	L1187194	0.087
LQ 25-MH3	31-Jul-12	L1187194	0.098
LQ 25-MH8	31-Jul-12	L1187194	0.047
LQ 25-MH34	31-Jul-12	L1187194	0.086
LQ 25-MH27	31-Jul-12	L1187194	0.05
LQ 25-MH24	31-Jul-12	L1187194	0.139
LQ 25-MH13	31-Jul-12	L1187194	0.618
MOE Standards [1]			
Table 3 (Non-potable groundwater condition)			12
Other Standards - For Reference Only			
Health Canada Drinking Water [2]			-
MOE Standards - Table 2 (Potable groundwater condition) [1]			0.89

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-14
SPECIATED OIL AND GREASE IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter (mg/L)		
			Animal/Veg Oil & Grease	Oil and Grease, Total	Mineral Oil and Grease
LQ 25-MH3	19-Oct-10		-	-	-
LQ 25-MH8	19-Oct-10		-	-	-
LQ 25-MH13	19-Oct-10		-	-	-
LQ 25-MH24	19-Oct-10		-	-	-
LQ 25-MH27	19-Oct-10		-	-	-
LQ 25-MH31	19-Oct-10		-	-	-
LQ 25-MH33	19-Oct-10		-	-	-
LQ 25-MH34	19-Oct-10		-	-	-
LQ 25-MH31	18-Jul-11	L1032603	-	-	-
LQ 25-MH33	18-Jul-11	L1032603	-	-	-
LQ 25-MH3	18-Jul-11	L1032603	-	-	-
LQ 25-MH8	18-Jul-11	L1032603	-	-	-
LQ 25-MH34	18-Jul-11	L1032603	-	-	-
LQ 25-MH27	19-Jul-11	L1033282	-	-	-
LQ 25-MH24	20-Jul-11	L1033882	-	-	-
LQ 25-MH13	20-Jul-11	L1033882	-	-	-
LQ 25-MH31	31-Jul-12	L1187194	<3.0	<6.0	<3.0
LQ 25-MH33	31-Jul-12	L1187194	4.8	<6.0	<3.0
LQ 25-MH3	31-Jul-12	L1187194	3.7	<6.0	<3.0
LQ 25-MH8	31-Jul-12	L1187194	<3.0	<6.0	4.8
LQ 25-MH34	31-Jul-12	L1187194	<3.0	<6.0	<3.0
LQ 25-MH27	31-Jul-12	L1187194	<3.0	<6.0	<3.0
LQ 25-MH24	31-Jul-12	L1187194	5.2	<8.0	<4.0
LQ 25-MH13	31-Jul-12	L1187194	<3.0	<6.0	<3.0
MOE Standards [1]					
Table 3 (Non-potable groundwater condition)			-	-	
Other Standards - For Reference Only					
Health Canada Drinking Water [2]			-	-	-
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	-	-

Notes:
"-" = No Data

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use
   Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   MAC - Maximum Acceptable Concentration
   AO - Aesthetic Objective

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

TABLE H-15
GROSS ALPHA, BETA RADIO CHEMISTRY IN LEACHATE
BRADY ROAD LANDFILL

Sample No.	Date	Work Order	Parameter	
			Gross alpha	Gross beta
Units			*Bq/L*	*Bq/L*
LQ 25-MH3	16-Apr-10	L877975	<1.9	4.6
LQ 25-MH8	16-Apr-10	L877975	<4	14
LQ 25-MH13	16-Apr-10	L877975	<0.31	0.36
LQ 25-MH24	16-Apr-10	L877975	<0.04	0.15
LQ 25-MH27	16-Apr-10	L877975	<4.4	7.5
LQ 25-MH31	16-Apr-10	L877975	<4.4	15
LQ 25-MH33	16-Apr-10	L877975	<5	24
LQ 25-MH34	16-Apr-10	L877975	<0.65	1.6
MOE Standards [1]				
Table 3 (Non-potable groundwater condition)			-	-
Other Standards - For Reference Only				
Health Canada Drinking Water [2]			0.5	1.0
MOE Standards - Table 2 (Potable groundwater condition) [1]			-	-

Notes:
"-" = No Data
NS = No Sample because not enough sample
NA - Not Applicable

1. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property)
   Table 2 - Full Depth Generic Site Condition Standards in a Potable Ground Water Condition - Use as Reference Only
   Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated August 2012.
   Screening levels. If screening levels are exceeded, then concentrations of specific radionucleides should be analysed.

- Exceedance of MOE Criteria for Table 3 Non-Potable Groundwater Condition

APPENDIX I

LANDFILL OPERATING PROCEDURES

DRAFT

APPENDIX J

SILT FENCE REFERENCE

DRAFT

EPA United States Environmental Protection Agency

Stormwater Best Management Practice

Silt Fences

Permits for Clean Water NPDES

Minimum Measure

Construction Site Stormwater Runoff Control

Subcategory

Sediment Control

Purpose and Description

The purpose of a silt fence is to retain the soil on disturbed land (Figure 1), such as a construction site, until the activities disturbing the land are sufficiently completed to allow revegetation and permanent soil stabilization to begin. Keeping the soil on a construction site, rather than letting it be washed off into natural water bodies (e.g., streams, rivers, ponds, lakes, estuaries) prevents the degradation of aquatic habitats and siltation of harbor channels. And not letting soil wash off onto roads, which readily transport it to storm sewers, avoids having sewers clogged with sediment. The cost of installing silt fences on a watershed's construction sites is considerably less than the costs associated with losing aquatic species, dredging navigation channels, and cleaning sediment out of municipal storm sewers.



Figure 1. *Silt fence retaining sediment*

A silt fence is a temporary sediment barrier made of porous fabric. It's held up by wooden or metal posts driven into the ground, so it's inexpensive and relatively easy to remove. The fabric ponds sediment-laden stormwater runoff, causing sediment to be retained by the settling processes. A single 100 foot (ft) run of silt fence may hold 50 tons of sediment in place. Most construction sites today do have silt fences. But many do not work effectively because they are not well designed, installed, or maintained. The focus of this fact sheet is—how to make silt fences work.

Design

The three principal aspects of silt fence design are: proper placement of fencing, adequate amount of fencing, and appropriate materials.

Proper Placement of Fencing

Placement is important because where a fence starts, runs, and ends is critical to its effectiveness. Improper placement can make the fence a complete waste of money. Analyze the construction site's contours to determine the proper placement. Segment the site into manageable sediment storage areas for using multiple silt fence runs. The drainage area above any fence should usually not exceed a quarter of an acre. Water flowing over the top of a fence during a normal rainfall indicates the drainage area is too large. An equation for calculating the maximum drainage area length above a silt fence, measured perpendicular to the fence, is given in Fifield, 2011. Avoid long runs of silt fence because they concentrate the water in a small area where it will easily overflow the fence. The lowest point of the fence in Figure 4 is indicated by a red arrow. Water is directed to this low point by both long runs of fence on either side of the arrow. Most of the water overflows the fence at this low point and little sediment is trapped for such a long fence.



Figure 2. *Create manageable sediment storage areas*



Figure 3. *Water should not flow over the filter fabric during a normal rainfall*



Figure 4. *Avoid long runs of silt fence*

Use J-hooks as shown in Figures 5 and 6, which have ends turning up the slope to break up long fence runs and provide multiple storage areas that work like mini-retention areas. If the fence doesn't create a ponding condition, it will not work well. The silt fence in Figure 7 doesn't pond water or retain sediment. Stormwater will run around the fence carrying sediment to the street, which will transport the water and its sediment load to the storm sewer inlet.



Figure 5. *Use J-hook fences to break up long fence runs*

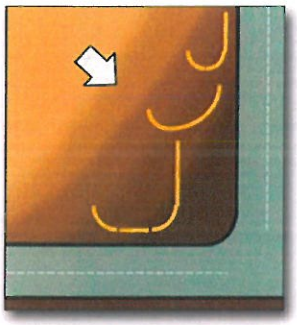


Figure 6. *J-hook silt fences provide multiple storage areas*



Figure 7. *This silt fence doesn't work*

Water flowing around the ends of a silt fence will cause additional erosion and defeat its purpose. The bottom of each end of the fence should be higher than the top of the middle of the fence (Figure 8). This insures that during an unusually heavy rain, water will flow over the top rather than around either end of the fence. Only fine suspended material will spill over the top, which is not as harmful as having erosion at the ends. When there is a long steep slope, install one fence near the head of the slope to reduce the volume and velocity of water flowing down the slope, and another fence 6–10 ft from the toe of the slope to create a sediment storage area near the bottom. A common misconception is that you only have to worry about water running off steep slopes. However, steep slopes may have a relatively small water collection area. The total drainage area of a gentle slope, if large (Figure 10), can be more important than its slope in determining sediment loss. A silt fence should not be placed in a channel with continuous flow (channels in Figures 8 and 9 don't have a continuous flow), nor across a narrow or steep-sided channel. But when necessary a silt fence can be placed parallel to the channel to retain sediment before it enters the watercourse.



Figure 8. *Proper installation, bottom of both ends are above the top of the middle*



Figure 9. *Poor installation, water can flow around the ends causing additional erosion*



Figure 10. *Gentle slopes may require a silt fence*

Paved streets are major conduits of stormwater and silt, and they drain to storm sewer inlets. The best solution is to retain as much sediment as possible before it reaches paved surfaces. Install a silt fence at the inlet side of a storm sewer or culvert, rather than at the discharge where there is greater velocity and less storage area. Streets cut in the grade, but not yet paved, are also prime erosion conduits. If the streets are not going to be paved right away, they need a containment barrier such as a silt fence. Finally as a construction site's dynamics change, the silt fence layout should be adjusted when necessary to maintain its effectiveness.

Designers and contractors should also consider diverting sediment-laden runoff water to a sediment detention pond. If the site can provide a large enough area, this is usually the most effective and economical best management practice for retaining sediments. Silt fences are needed when there is insufficient space for a detention pond or when roads and other structures are in the way.

Adequate Amount of Fencing

The amount of fencing means the total linear length of the silt fencing runs on the construction site. A reasonable rule-of-thumb for the proper amount of silt fence is—100 ft of silt fence per 10,000 square foot (sq ft) of disturbed area. Soil type, slope, slope length, rainfall, and site configuration are all important elements in determining the adequate silt fence protection for a site, and to what extent it fits the 100 ft per 10,000 sq ft rule-of-thumb. If the amount of fencing provides the volume of runoff storage needed, then over-flowing the silt fence runs will be minimized. This is the basic test; if fences are over-flowing after a moderate rainfall event, the amount of fencing probably needs to be increased to avoid undercutting, washouts, and fence failures.

Appropriate Materials

There are different types of porous fabrics available, e.g., woven, non-woven, mono-filament, but all types tend to clog rapidly and don't provide lasting filtration. The support posts and installation method are more important than the fabric type for overall sediment retention. However, a lightweight fabric tends to tear where it is attached to the posts. Posts must hold the fabric up and support the horizontal load of retained water and sediment. Hardwood posts (2″ x 2″) are potentially strong enough to support the loads, but are difficult to drive into the ground more than 6–8″. To hold 2 ft of sediment and water, the posts should be driven 2 ft into the ground. Steel posts are best because they can be driven into compacted soil to a depth of 2 ft. The support posts should be spaced 3–4 ft apart where water may run over the top of the fence, 5 ft in most other areas, and 6–7 ft where there isn't a considerable horizontal load. Improper post depth and spacing is often the cause of sagging fabric and falling posts. Some authorities believe a more robust wire or chain link supported silt fence is needed to withstand heavy rain events. However, this may double the cost of a silt fence installation and entails disposing of more material in a landfill when the fence is removed. Installing silt fencing having five interacting features: (1) proper placement based on the site's contours, (2) adequate amount of fencing without long runs, (3) heavy porous filter fabric, (4) metal posts with proper depth and spacing, and (5) tight soil compaction on both sides of the silt fence will usually obviate the need for wire or chain link reinforced fencing. Prefabricated silt fences, e.g., fabric attached to wooden posts in a 100 ft package, doesn't provide for posting after the ground is compacted or allow variable post spacing.



Figure 11. *Chain link supported silt fence*

Silt Fence Installation

Two commonly used approaches for installing silt fences are the static slicing method and the trenching method.

Static Slicing Method

The static slicing machine pulls a narrow blade through the ground to create a slit 12″ deep, and simultaneously inserts the silt fence fabric into this slit behind the blade. The blade is designed to slightly disrupt soil upward next to the slit and to minimize horizontal compaction, thereby creating an optimum condition for compacting the soil vertically on both sides of the fabric. Compaction is achieved by rolling a tractor wheel along both sides of the slit in the ground 2 to 4 times to achieve nearly the same or greater compaction as the original undisturbed soil. This vertical compaction reduces the air spaces between soil particles, which minimizes infiltration. Without this compaction infiltration can saturate the soil, and water may find a pathway under the fence. When a silt fence is holding back several tons of accumulated water and sediment, it needs to be supported by posts that are driven 2 ft into well-compacted soil. Driving in the posts and attaching the fabric to them completes the installation.



Figure 12. *Static slicing machine*



Figure 13. *Tractor wheel compacting the soil*

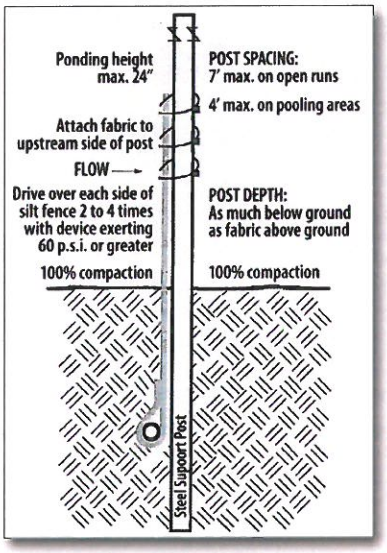


Figure 14. *Silt fence installation using the static slicing method*

Trenching Method

Trenching machines have been used for over twenty-five years to dig a trench for burying part of the filter fabric underground. Usually the trench is about 6″ wide with a 6″ excavation. Its walls are often more curved than vertical, so they don't provide as much support for the posts and fabric. Turning the trencher is necessary to maneuver around obstacles, follow terrain contours or property lines, and install upturns or J-hooks. But trenchers



Figure 15. *Trenchers make a wider excavation at turns*



Figure 16. *Poor compaction has resulted in infiltration and water flowing under this silt fence causing retained sediment washout*

can't turn without making a wider excavation, and this results in poorer soil compaction, which allows infiltration along the underground portion of the fence. This infiltration leads to water seeking pathways under the fence, which causes subsequent soil erosion and retained sediment washout under the fence. The white line on the fence in Figure 16 and red arrow both mark the previous sediment level before the washout. Post setting and fabric installation often precede compaction, which make effective compaction more difficult to achieve. EPA supported an independent technology evaluation (ASCE 2001), which compared three progressively better variations of the trenching method with the static slicing method. The static slicing method performed better than the two lower performance levels of the trenching method, and was as good or better than the trenching method's highest performance level. The best trenching method typically required nearly triple the time and effort to achieve results comparable to the static slicing method.

Proper Attachment

Regardless of the installation method, proper attachment of the fabric to the posts is critical to combining the strength of the fabric and support posts into a unified structure. It must be able to support 24″ of sediment and water. For steel posts use three plastic ties per post (50 lb test strength), located in the top 8″ of the fabric, with each tie hung on a post nipple, placed diagonally to attach as many vertical and horizontal threads as possible. For wooden posts use several staples per post, with a wood lath to overlay the fabric.

Perimeter Silt Fences

When silt fences are placed around the perimeter of a stock pile or a construction site, the conventional silt fence design and materials discussed previously may not be sufficient.

Stock pile example. A stock pile of dirt and large rocks is shown in Figures 17 and 18 with a silt fence protecting a portion of its perimeter. Rocks that roll down the pile would likely damage a conventional silt fence. The bottom of the porous fabric is held firmly against both the ground and base of precast concrete, highway, barriers by light-colored stones. An alternative installation would be having the concrete barriers rest directly on the bottom edge of the filter fabric, which would extend under the barriers about 10″, so the barriers' weight will press the fabric against the ground to prevent washout. Water passing through the silt fence (red arrow in Figure 18) flows to a storm sewer culvert inlet, which is surrounded by a fabric silt fence (yellow arrows in Figures 17 and 18) that reduces the runoff's velocity and allows settling before the water is discharged to a creek.



Figure 17. *Back of silt fence on part of the stock pile's perimeter*



Figure 18. *Front of silt fence on part of stock pile's perimeter*

Bridge abutment example. During the construction of a bridge over a river between two lakes, an excavation on the river bank was needed to pour footings for the bridge abutment. The silt fence along the excavation's perimeter, composed of concrete highway barriers with orange filter fabric, was designed to prevent stormwater from washing excavated spoil into the river and to fend off the river during high flows. A portion of the orange filter fabric that has blown away from the concrete barriers shows the need to overlap and reinforce the joints where two sections of filter fabric are attached.



Figure 19. *Silt fence for bridge abutment excavation*

Highway example. Because of the proximity of a construction site to a highway, a concrete barrier was required by Minnesota's DOT to protect the highway and an underground fiber optic cable next to the highway from construction activities. The concrete barrier was used to support a silt fence along the perimeter of a large amount of dirt that was stock piled before being used for fill at a different location.



Figure 20. *Silt fence protecting a highway and underground fiber optics cable*

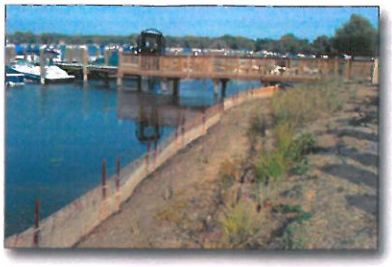


Figure 21. *Silt fence protecting a lake shore*

Lake shore example. The lake's shoreline is being restored with plant plugs and seeded with native plant species. A plywood, perimeter, silt fence is used to trap sediment from a construction site on the right-side of the picture, protect the lake shore from boat-wake erosion, and to prevent geese from eating the seeds and young plants. This fencing will be removed when 70% vegetative cover is achieved.

Inspection and Maintenance



Figure 22. *A silt fence full of sediment that needs maintenance*

Silt fences should be inspected routinely and after runoff events to determine whether they need maintenance because they are full (Figure 22) or damaged by construction equipment. The ASTM silt fence specification (ASTM 2003) recommends removing sediment deposits from behind the fence when they reach half the height of the fence or installing a second fence. However, there are several problems associated with cleaning out silt fences. Once the fabric is clogged with sediment, it can no longer drain slowly and function as originally designed. The result is normally a low volume sediment basin because the cleaning process doesn't unclog the fabric. The soil is normally very wet behind a silt fence, inhibiting the use of equipment needed to move it. A back hoe is commonly used, but, if the sediment is removed, what is to be done with it during construction? Another solution is to leave the sediment in place where it is stable and build a new silt fence above or below it to collect additional sediment as shown in Figure 23. The proper maintenance may be site specific, e.g. small construction sites might not have sufficient space for another silt fence. Adequate access to the sediment control devices should be provided so inspections and maintenance can be performed.



Figure 23. *New silt fence below the old fence*

Permanent Soil Stabilization

When the land disturbing activities are sufficiently completed to allow permanent soil stabilization on the site, the silt fences and sediment basins are removed. The fabric and damaged posts go to the landfill. Steel posts and some of the wooden posts can be reused. Then the sediment is spread over the site to provide fertile soil, and the area can be seeded and mulched to support revegetation.

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ASTM 2003. Standard Practice for Silt Fence Installation, D 6462-03(2008). West Conshohocken, PA: American Society of Testing Materials International. www.astm.org/SEARCH/search-reskin.html?query=D6462-03&siteType=store-standards&searchType=standards-full

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