AECOM

City of Guelph

2012 Annual Report – Solid Waste Transfer Station & Wet-Dry Recycling Centre, C of A (Waste Disposal Site) No. A170128

Report

City of Guelph

2012 Annual Report – Solid Waste Transfer Station & Wet-Dry Recycling Centre, C of A (Waste Disposal Site) No. A170128

Prepared by:

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www.aecom.com

Project Number:

60286226

Date:

March, 2013

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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2012-01-06

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March 25, 2013

Mr. Dean Wyman, Manager
Solid Waste Services Division
City of Guelph Works Department
59 Carden Street
Guelph, ON N1H 3A1

Dear Mr. Wyman:

Project No: **60286226**

Regarding: **2012 Annual Report – Solid Waste Transfer Station & Wet-Dry Recycling Centre, C of A (Waste Disposal Site) No. A170128**

Enclosed, please find our final report for this project, addressing the requirements of the WRIC and Transfer Station's Certificate of Approval.

Please do not hesitate to call me should you have any questions about this report. Thank you for allowing AECOM to be of continued service to the City of Guelph.

Sincerely,
AECOM Canada Ltd.

Terry La Chapelle, B.Sc., P.Geo.
Senior Geologist
Terry.lachapelle@aecom.com

TLC/PW:mm
Attach.

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ONTARIO

Report Reviewed By:

Terry La Chapelle, B.Sc., P.Geo.
Senior Geologist

Executive Summary

The City of Guelph Solid Waste Transfer Station and the Wet-Dry Recycling Centre are adjacent facilities that operate under a combined Amended Provisional Certificate of Approval issued by the Ministry of Environment, dated February 10, 2011. At the request of the MOE, the annual monitoring reports have been consolidated here to produce one monitoring report for both the sites.

The following table presents a summary of the 2012 Annual Report for the City of Guelph Solid Waste Transfer Station and Wet-Dry Recycling Centre. The Certificate of Approval (C of A) specifies annual reporting requirements. These have been outlined in the left-hand column below, while the right hand column provides a reference to the section of this report where the reader will find further details.

A. Amended Provisional C of A (Waste Disposal Site)

C of A Annual Report Requirement (Condition N)		Report Reference and Summary
52. *63(8)* *68(a)*	*The City shall submit an annual report on the operation of the Site for the previous calendar year to the District Manager by March 31st of each year. This report will include the information required as follows:* *(a) the information required by Condition 63(8) of the Certificate dealing with the Composting Site;* *By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager, an Annual Report summarizing the operation of the Composting Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:* *A monthly mass balance of the Organic Waste received, processed and transferred from this composting site, including waste type, quantity, sources and/or disposal destinations;*	• Table 1 (Section 2.1) provides details on the organic materials received, processed and transferred from the site. 17,338 tonnes of material was received by the composting facility. Of the materials received, mixed organic materials constituted 15,048 tonnes (87%), brush, leaf and yard waste constituted 719 tonnes (4%) and residue and amendment/mulch made up the remaining 1,572 tonnes. Materials accepted were mainly from the City of Guelph and Region of Waterloo. A total of 3,414 tonnes of finished compost was removed from the facility. All the finished compost was shipped to a farmer in Atwood, Ontario, northwest of Guelph. A total of 257 tonnes of screening and residual compost waste from the composting process were shipped to the Transfer Station and then the St Thomas (Green Lane) Landfill site in Elgin County, Ontario.
68(b)	*An annual summary mass balance of the organic waste, the wood waste, the waste wood and the amendment material, received, processed and transferred from this composting site, including waste type, quantity, sources, and/or disposal destination;*	• Table 1 (Section 2.1) provides details on the organic materials received, processed and transferred from the site including amendment material. In addition to the 15,048 tonnes of mixed organic material received, 1,572 tonnes of amendment material/mulch from Growbark, Green Step Recycling, the City of Hamilton and Speedskate was also accepted at the site. 326 tonnes of clean wood was received at the Transfer Station.
68(c)	*An annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this composting site and any remedial/mitigative action taken to correct them;*	• As reported in Section 10, there were no deficiencies, items of non-compliance, or process aberrations in 2012.
68(d)	*a descriptive summary of any spills, incidents or other emergency situations which have occurred at this composting site, any remedial measures taken and the measures taken to prevent future occurrences;*	• As reported in Section 2.2, no spills took place in 2012 at the composting site.
68(e)	*A summary describing any rejected waste including quantity, waste type, reasons for rejection and origin of the rejected waste;*	• As reported in Section 2.2, no loads were rejected in 2012 coming into the facility. The occasional curbside recyclables collection bag (blue bag) is included in the organics deliveries, which are separated and removed by the staff at the facility.
68(f)	*The quantity, by weight and volume of compost and residues produced and the quantity of compost and residues removed from the facility;*	• Table 1 (Section 2.1) shows that 3,414 tonnes of finished compost was removed from the facility. 257 tonnes of screening and residual compost waste from the composting process were generated.
68(g)	*Any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the composting site or identified during the facility inspections and any mitigative actions taken;*	• As reported in Section 2.2, there were no environmental or operational problems that negatively impacted the environment at the composting site in relation to the C of A in 2012. There were some problems with the acid system that had the potential to cause off-site odours early in the commission phase of the organics processing facility. An action plan was developed in consultation with the Ministry and the Public Liaison Committee.

A. Amended Provisional C of A (Waste Disposal Site)

C of A Annual Report Requirement (Condition N)		Report Reference and Summary
68(h)	*Any changes to the WRIC Environmental Emergency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual report;*	• As reported in Section 2.2, there were no changes to the Operations Manual or the Closure Plan since the last annual report. The WRIC Environmental Emergency Plan was updated in 2011 to include the new organic waste processing facility.
68(i)	*Any recommendations to minimize environmental impacts from the operation of the composting site and to improve the composting site operations and monitoring programs in this regard;*	• As discussed in Section 2.5, there were no deficiencies/non-compliance or environmental/operational issues related to the compost facility in 2012. The facility appears to be operating as designed.
68(j)	*A summary of any complaints received and the responses made, as required by the C of A (Air/Noise) for the composting site;*	• Section 2.3 discusses the 19 odour incidents received by staff at the Waste Resources Innovation Centre in 2012. These complaints were investigated by City of Guelph management staff and/or the MOE. Staff conducting the investigations did not detect any odours at the complainant locations, except for one, which was determined to not be related to the composting site. Each time a complaint was received, the complainant was contacted and a letter advising the complainant of the investigation findings was hand delivered to each of them. • The local district office of the M.O.E. conducted an odour survey during the summer of 2012 whereby staff was on-site and within 1 km radius of the site at variable locations and time of day on a daily basis between July 9, 2012 and August 17, 2012. The MOE concluded that there was a high possibility that some of the odours related to four of the odour complaints were attributable to the Materials Recovery Facility and the Transfer Station. The Ministry further concluded that the majority of off-site odours detected during the surveys were described as manure/animal sewer related odours and are potentially related to another nearby operation. Further, at the request of the Guelph District Office, the Environmental Monitoring and Reporting Branch (EMRB) conducted an air monitoring survey of the Guelph's Organic Waste Processing Facility (OWPF) from June 4-8 and June 11-14, 2012. The survey was performed in response to odour complaints from local residents. The EMRB survey concluded that chemical fingerprinting by the TAGA did not identify any volatile organic compounds (VOCs) attributable to the OWPF, including periods of mild odours detected by EMRB staff along Dunlop Drive. • The composting facility passed the source test under worse case conditions in August 2012.
68(k)	*A description of the compost distribution/markets;*	• As reported in Section 2.2, all compost produced at the site was shipped to a farmer in Atwood, Ontario, northwest of Guelph.
68(l)	*Conclusions from the advanced pathogen testing as the results relate to the pasteurization temperature monitoring; and*	• Section 2.4 reports samples taken from the maturation hall of the compost stream indicate that all compost that has been shipped off of the site has passed the conditions for a Class A compost under the CCME Guidelines and the conditions within the C of A. • Temperature monitoring logs of the tunnels at the composting facility show that pasteurisation at 55 degrees C was maintained for 72 hours, as required.
68(m)	*A condition-by-condition analysis of compliance with all Conditions of this Certificate.*	• Section 2.6 reports that the City is not aware of any non-compliance issues for 2012.
52(b)	*A monthly summary of the waste and/or recyclable materials received at the Site, including quantity, source and Ontario Regulation 347 waste classes;*	• Table 4 (Section 6.1) provides details of the incoming materials. 105,915 tonnes of material was received by the site. The compost facility received 17,338 tonnes of organics (16% of the materials received in 2012). Recyclables and mixed dry materials constituted 40,037 tonnes (38%) of the total materials received at the site. This included about 31,609 tonnes of paper products and 13 tonnes of plastics. There were 8,163 tonnes (8%) brush, leaves, yard waste and mixed organics received. Non-recyclable materials (mixed solid waste, medical waste, contaminated soil) constituted 40,377 tonnes (38%) of the total materials received at the site in 2012. • Materials were accepted mainly from the City of Guelph and the County of Wellington. The Regulation 347 waste classes received at the site are summarized on Table 4.

A. Amended Provisional C of A (Waste Disposal Site)

C of A Annual Report Requirement (Condition N)	Report Reference and Summary
52(c) A monthly summary of wastes and/or recyclable materials processed at the Site, including quantity and Ontario Regulation 347 waste classes.	• Table 5 (Section 6.2) provides details on processed waste to the site. There were 38,671 tonnes of outgoing materials from the Material Recovery (MRF), mainly paper and cardboard products. 19,881 tonnes of material remained in inventory at the end of 2012. Materials that are accepted by the site are either diverted to be re-used or sent to the landfill for disposal.
52(d) A monthly summary of wastes and/or recyclable materials transferred off-Site, including quantity, destination, and Ontario Regulation 347 waste classes.	• Table 5 (Section 6.2) provides details on the outgoing materials. Of the 90,915 tonnes of outgoing material, 31,728 tonnes (35%) was processed on-site through the Material Recovery facility (MRF) and 3,414 tonnes (4%) of finished compost was produced. The remaining 55,773 tonnes (61%) is shipped off-site to other destinations. • Of the 55,773 tonnes of non-processed outgoing materials received at the Transfer Station, 48,715 tonnes (87% of the outgoing materials) is sent to the St. Thomas (Green Lane) Landfill in Elgin County for disposal. 105 tonnes of material was sent to the Covanta Energy from Waste facility in Niagara Falls, New York. The remaining 6,953 tonnes of non-processed materials is marketable consisting of other recyclable materials such as shingles, construction and demolition debris, clean wood, drywall, concrete and rubble. • Of the 31,728 tonnes of marketable processed material transferred off the site from the WRIC facility, 19,150 tonnes (60%) was paper-based goods such as cardboard and newsprint, 1,719 tonnes (5%) was plastics and the remaining 10,860 tonnes (34%) was other recyclable materials such as aluminum, steel cans, glass, tires, metal, yard waste, brush and leaves. • 87% of the outbound waste/materials from the Transfer Station were shipped off-site to the St. Thomas (Green Lane) Landfill in Elgin County • HHW materials were shipped by the haulers identified in Section 6.2 for disposal or re-use.
52(e) An annual summary of the analytical results for the groundwater and surface water monitoring program including an interpretation of the results and any remedial/mitigative action undertaken,	• Section 8 discusses groundwater quality. Groundwater monitoring results indicate road salt effects at some up-gradient groundwater monitoring locations (5-96, 8-96, 18b-08, 19b-08, 20b-08). These are related to off-site winter road salting of the adjacent major roadways. Road salt impacts are detected in some on-site downgradient groundwater monitors (6b-96, 7-96, 13b-01, 15b-01, 17b-08). Monitors 5-96, 6b-96, 17b-08 and 19b-08 exceeded ODWS for sodium and/or chloride in 2012 as a result of road salt impacts. There were no apparent leachate impacts observed in the groundwater at the site boundary. • The nitrate ODWS was exceed by the June 2012 sample collected from 7-96. Historically, elevated nitrate concentrations were prevalent across the site at all locations prior to development of the site. Elevated nitrates are most likely a result of long-term agricultural land use in the area and are not a result of site operations. • Exceedances of the iron ODWS persisted throughout 2012 at many of the monitoring locations, though concentrations generally decreased compared to December 2011. These iron exceedances will be further investigated in future monitoring events, although they are not considered to be related to site operations. Aside from the sodium, chloride, nitrate and iron exceedances discussed above, there were no other exceedances of the Ontario Drinking Water Standards in 2012 for the groundwater monitors sampled for the WRIC and Transfer Station monitoring programs. • As the shallow outwash water quality is not impacted by site operations, no impacts to the deeper bedrock groundwater would be expected. No leachate impacts were detected in the bedrock monitors sampled in 2012.

A. Amended Provisional C of A (Waste Disposal Site)

C of A Annual Report Requirement (Condition N)	Report Reference and Summary
	• Section 8.5 discusses organic groundwater results. The 2012 organic sampling showed there were detections of DEHP, total and m- and p-xylene, toluene, naphthalene, acenaphthene, 1-methylnaphthalene, 2-methylnaphthalene, chloroform, isophorone and bromodichloromethane in a few of the monitors. However, based on the historic detections of occasional low levels of VOC throughout the site in both upgradient and downgradient monitors, most of the 2012 VOC detections are not considered to be related to site operations. New monitor 23b-12 showed detections of several VOC's in the initial and follow-up sampling in July 2012 but not in the December sample. These detections are most likely related to a hot summer and close proximity to Stone Road. There are no sources of VOCs on the WRIC or Transfer station property as waste is handled within the covered buildings, truck boxes are covered when outside (preventing contact between the waste and precipitation) and no waste processing occurs on-site. • No other organics were detected at any of the other groundwater monitors sampled during 2012. • Section 8.7 discusses the Guideline B-7 assessment for monitor nest 22-11, located along the western property boundary. December nitrate and iron at 22b-11 in the overburden and June nitrate and iron at 22a-11 in the bedrock exceed the Guideline B-7 limits. Historically, elevated nitrate concentrations were prevalent across the site at all locations prior to development of the site. Shallow background monitors 1b-91 and 6b-96 historically have also shown elevated nitrate concentrations in the early 1990s and late 1990s indicating that the elevated nitrates were present prior to the commencement of facility operations. As previously discussed, iron concentrations at some of the monitor locations were unusually high during the December 2011 monitoring event. These elevated concentrations persisted during 2012, though concentrations decreased. The elevated iron concentrations occurred in both upgradient and downgradient monitors and therefore, do not appear to be related to site operations. • Section 8.8 discusses surface water quality results. Monthly monitoring of the stormwater management pond in the northwest corner of the site was conducted, with samples collected at the culvert on the west side of the pond (TP1) on five occasions and at the discharge at the north end of the pond (TP1 (out)) on seven occasions in 2012. SWM pond samples at both TP1 and at TP1 (out) exceeded the PWQO for zinc, iron, total phosphorus and phenols during one or more 2012 sampling events. The elevated total phosphorus is a result of agricultural land use and not a result of operations at the Transfer Station. Elevated zinc, total phosphorus and iron concentrations appear to be related to external factors since background surface water have also exceeded PWQO for these parameters. Metals are a common contaminant from roadway runoff. Elevated phosphorus is typical in rural and urbanized areas. • Of the six sets of samples collected in 2012 at EPTS-01 (the existing Transfer Station on-site surface water pond (East Pond)), the PWQO for zinc was exceeded during all the 2012 monitoring events. Zinc has consistently exceeded PWQO in the past at this location and is considered naturally occurring. Phenols, total phosphorus and iron have exceeded PWQO in the past but were within PWQO in 2012. All the leachate indicator parameters concentrations were within background overburden ranges. The East Pond shows no indications of impacts as a result of site operations. • No surface water quality samples were collected at SW1 (Stormwater Detention Area 2) during 2012 due to dry conditions.

A. Amended Provisional C of A (Waste Disposal Site)

C of A Annual Report Requirement (Condition N)		Report Reference and Summary
		• The SW 2 (Stormwater Detention Area 1) samples at the WRIC showed elevated concentrations of the indicator parameters in 2012 during one or more of the four sampling events. The 2012 parameter concentrations were within the range of historic concentrations at SW2. The spring (March) concentrations were generally higher than the September, October and December concentrations, likely due to seasonal influences. Total phosphorus and iron exceeded the PWQO during all monitoring events in 2012. Phenols exceeded the PWQO during two of the four monitoring events in 2012. Zinc exceeded the PWQO on three occasions each during 2012. Total phosphorus, iron and zinc have historically routinely exceeded their PWQO. The phenol PWQO was historically only exceeded on five other occasions since 1997. It is noted that background bedrock monitors 5-96 and 8-96 have consistently shown elevated zinc concentrations indicating that high zinc is natural in the area. • Organic sampling could not be conducted in 2012 due to dry conditions throughout the late spring and summer. • As previously discussed, the design and operation of the Transfer Station minimizes the potential for leachate generation from site activities.
52(f)	*An annual summary of any deficiencies, items of non-compliance or process aberrations that occurred and remedial/mitigative action taken to correct them.*	• Section 12 of the report briefly discusses site compliance. As reported by the City, there were no deficiencies, items of non-compliance, or process aberrations in 2012.
52(g)	*A summary to any changes to the Engineer's Report and/or the Design and Operations Report that have been approved by the Director since the last annual report;*	• As stated in Section 12, there have been no changes to the Engineer's Report or the Design and Operations Report since the last annual report.
52(h)	*A summary of any changes to the Design and Operations Report Design and the WRIC Environmental Emergency Plan that were made in accordance with Condition 68(1) of this Certificate;*	• As stated in Section 12, there have been no changes to the Engineer's Report or the Design and Operations Report since the last annual report. The WRIC Environmental Emergency Plan was updated in 2011 to include the new organic waste processing facility.
52(i)	*A summary of any changes to the Design and Operations Report that have been approved by the Director since the last annual report;*	• Modifications to the MRF and Transfer Station are discussed in Section 12. Based on Golder's review of the modifications implemented at the Site, all modifications made are permitted within the Limited Operational Flexibility for the Site, are consistent with generally accepted best management practices, and are not likely to result in an adverse effect (e.g., discharge of a contaminant into the natural environment).
52(j)	*Update on activities of the PLC; and*	• Section 9 summarizes the 2012 PLC activities, as provided by the City.

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Appendices

1. Introduction and Background

In June 2000, Guelph's City Council made the decision to seek future solid waste disposal capacity through an agreement with a landfill owner outside of the city's corporate boundaries. Since the potential disposal site was to be distant from Guelph, the City needed a Transfer Station to facilitate waste bulking from small collection vehicles into larger transport vehicles. The City constructed the Solid Waste Transfer Station adjacent to the existing Waste Resource Innovation Centre (WRIC), formerly the Wet-Dry Recycling Centre. The WRIC was designed as a composting and multi-material recovery operation for the County of Wellington and the City of Guelph. The 29.54 ha site is located at 110 Dunlop Drive in the southeast part of Guelph. Figure 1 shows the location and layout of the Transfer Station and WRIC.

The Transfer Station has been designed to manage up to 299 tonnes/day of waste, calculated on a weekly average (six days), including municipal, industrial, commercial, and institutional wastes. The Transfer Station began receiving waste on October 14, 2003.

The City carries out a number of waste management operations at the WRIC. These operations include processing of recyclables from the City's "dry" waste stream, transfer of non-compostable materials and non-recyclable waste residues to disposal off-site, a public waste drop-off area, and a household hazardous waste depot. The City composting operations were active throughout 2012. The site is licensed to handle up to 200 tonnes of residual waste transported for disposal per day. Both the Transfer Station and WRIC facility operate under a combined Ministry of the Environment Amended Provisional Certificate of Approval (C of A) #A170128, dated February 10, 2011.

As part of the requirements to develop and design the WRIC, a hydrogeological assessment was conducted in 1991[1]. Further groundwater sampling at the proposed site was completed in 1992, 1994 and 1995 prior to the construction of the site[2].

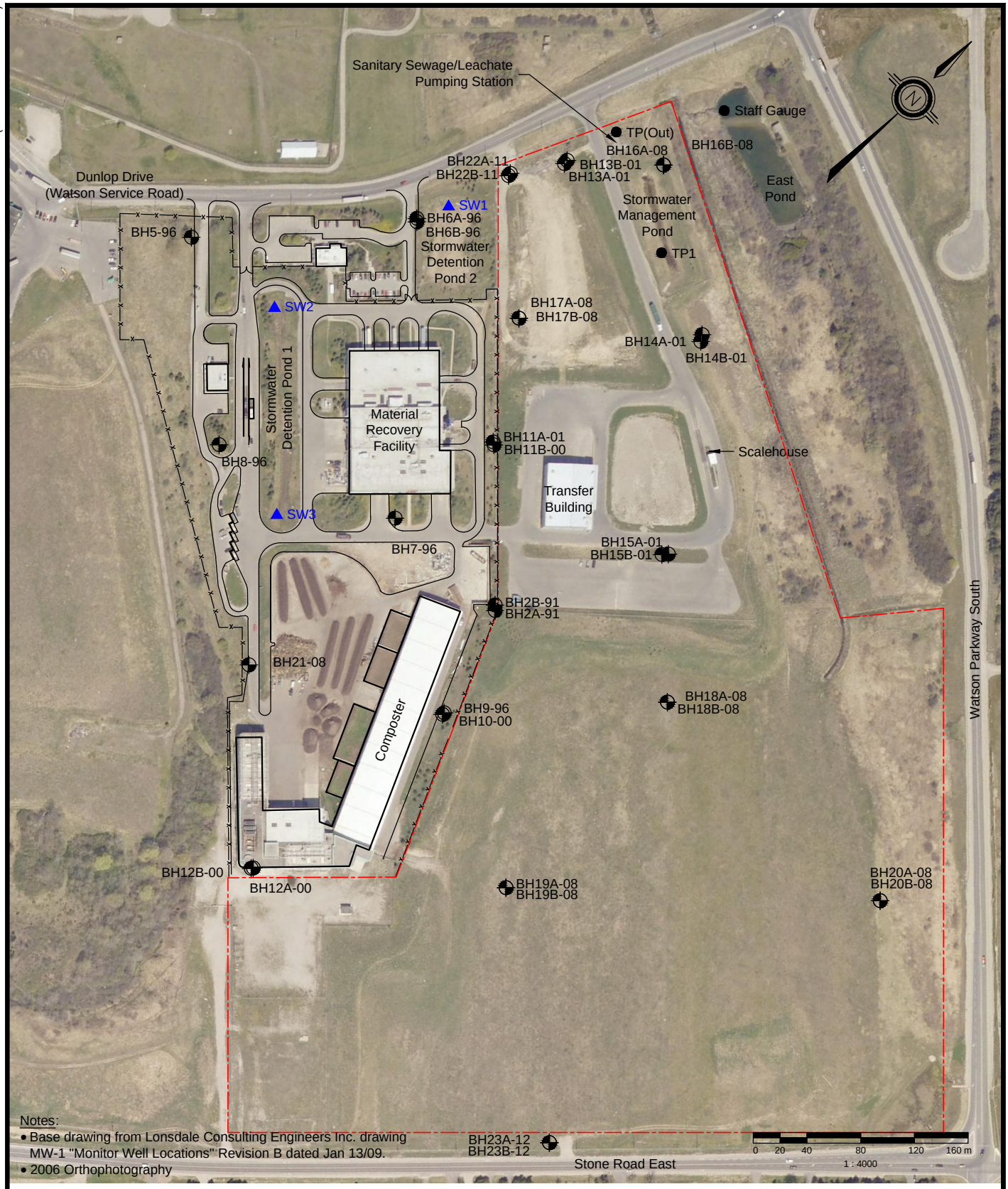
The main conclusions of these reports were:

a) groundwater flow in the shallow subsurface is towards the northeast to the Correctional Centre pond and Clythe Creek; and

b) background groundwater quality in the area is considered hard with calcium, magnesium, and alkalinity the dominant ions. The concentrations of the other major ions (i.e., sodium, potassium, sulphate and chloride) were found for the most part to be low. The exception to this was the 1995 sample collected from monitor 5-91, which exhibited higher than background concentrations of sodium and chloride. The source of the sodium and chloride was considered unknown at that time. The only other parameter of concern was nitrate. This was found at consistently elevated levels at monitors 1a-91, 1b-91, 2b-91 and 3-91, from 1991 until locations 1a-91, 1b-91 and 3-91 were destroyed due to construction activities.

In July 1997, the C of A was amended to allow the WRIC service area to be expanded.

1. *Jagger Hims Limited; Hydrogeological Assessment, Proposed Wet/Dry Facility, Guelph, Ontario; Report prepared for the City of Guelph, October 1991.*
2. *Jagger Hims Limited; Groundwater Monitoring Program; Guelph Wet/Dry Recycling Facility; Draft Report completed for the City of Guelph, September 1995.*



Notes:
- Base drawing from Lonsdale Consulting Engineers Inc. drawing MW-1 "Monitor Well Locations" Revision B dated Jan 13/09.
- 2006 Orthophotography

DO NOT SCALE THIS DOCUMENT. ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS.

AECOM

Transfer Station / WRIC
City of Guelph
Annual Monitoring Program

Groundwater Monitor Location Map

Legend
- Approximate Site Boundary
- Fence
- Monitoring Well
- Surface Water Location

PROJECT NUMBER **60286226**

DATE **February 2013**

FIGURE **1**

A SIZE 8.5" x 11" (215.9mm x 279.4mm)
PLOT: 2/19/2013 9:00:13 AM
BY:----
FILE NAME: 60286226-01-FIG01.DWG

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1.1 Annual Reporting Requirements

Section N, Condition 52 of the Amended Provisional Certificate of Approval states that:

The City shall submit an annual report on the operation of the Site for the previous calendar year to the District Manager by March 31st of each year. This report will include the information required as follows:

(a) the information required by Condition 63(8) of the Certificate dealing with the Composting Site;

63(8) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager, an Annual Report summarizing the operation of the Composting Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

68(a) A monthly mass balance of the Organic Waste received, processed and transferred from this composting site, including waste type, quantity, sources and/or disposal destinations;

68(b) An annual summary mass balance of the organic waste, the wood waste, the waste wood and the amendment material, received, processed and transferred from this composting site, including waste type, quantity, sources, and/or disposal destination;

68(c) An annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this composting site and any remedial/mitigative action taken to correct them;

68(d) A descriptive summary of any spills, incidents or other emergency situations which have occurred at this composting site, any remedial measures taken and the measures taken to prevent future occurrences;

68(e) A summary describing any rejected waste including quantity, waste type, reasons for rejection and origin of the rejected waste;

68(f) The quantity, by weight and volume of compost and residues produced and the quantity of compost and residues removed from the facility;

68(g) Any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the composting site or identified during the facility inspections and any mitigative actions taken;

68(h) Any changes to the WRIC Environmental Emergency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual report;

68(i) Any recommendations to minimize environmental impacts from the operation of the composting site and to improve the composting site operations and monitoring programs in this regard;

68(j) A summary of any complaints received and the responses made, as required by the C of A (Air/Noise) for the composting site;

68(k) A description of the compost distribution/markets;

68(l) Conclusions from the advanced pathogen testing as the results relate to the pasteurization temperature monitoring; and

68(m) A condition-by-condition analysis of compliance with all Conditions of this Certificate.

52(b) A monthly summary of the waste and/or recyclable materials received at the Site, including quantity, source and Ontario Regulation 347 waste classes;

52(c) A monthly summary of wastes and/or recyclable materials processed at the Site, including quantity and Ontario Regulation 347 waste classes.

52(d) A monthly summary of wastes and/or recyclable materials transferred off-Site, including quantity, destination, and Ontario Regulation 347 waste classes.

52(e) An annual summary of the analytical results for the groundwater and surface water monitoring program including an interpretation of the results and any remedial/mitigative action undertaken

52(f) An annual summary of any deficiencies, items of non-compliance or process aberrations that occurred and remedial/mitigative action taken to correct them.

52(g) A summary to any changes to the Engineer's Report and/or the Design and Operations Report that have been approved by the Director since the last annual report;

52(h) A summary of any changes to the Design and Operations Report Design and the WRIC Environmental Emergency Plan that were made in accordance with Condition 68(1) of this Certificate;

52(i) A summary of any changes to the Design and Operations Report that have been approved by the Director since the last annual report;

52(j) Update on activities of the PLC

The current C of A for the site is included in Appendix E.

2. Composting Facility

The original compost facility was shut down in 2006. The City commissioned a new compost facility design, which was completed by the summer of 2011. The new compost facility began to receive organics for composting on September 27 but stopped excepting organics on November 25, 2011. This shut down was to facilitate review of the design specification of the odour control system. The Certificate of Approval (Air) for the facility required the acidification system[3] to be operated based on ammonia levels. An amendment to the Air Certificate of Approval was submitted to the Ministry that would permit the acid system to operate using a pH system. The amended Certificate of Approval (now called an Environmental Compliance Approval) was approved and received on February 10, 2012. Organic material receipt resumed on February 13th and continued throughout 2012.

2.1 Material Received, Processed and Transferred

As per Section N, Condition 68(8)(a) and (b), Table 1 presents a summary of the waste volumes received, processed and transferred from the site. 17,338 tonnes of material was received by the composting facility. Of the materials received, mixed organic materials constituted 15,048 tonnes (87%), brush, leaf and yard waste constituted 719 tonnes (4%) and residue and amendment/mulch made up the remaining 1,572 tonnes. During 2012, the site accepted organic material mainly from the City of Guelph and Region of Waterloo (84% combined) with other sources including County of Simcoe, Hamilton Region, Halton Region, Brant County and Wellington County. Brush waste and leaf/ yard waste was received from the City of Guelph at the WRIC site. Amendment material was received from Growbark, Green Step Recycling, the City of Hamilton and Speedskate.

3. The acidification system sprays an acid into the humidification chambers to ensure the concentration of ammonia leaving the humidification chamber does not exceed 25 parts per million.

Table 1. 2012 Monthly Summary of Incoming and Outgoing Material, Composting Facility

Incoming Material	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Mixed Organics	71.43	256.76	726.59	1142.55	1473.26	1492.25	1757.46	1957.18	1359.54	1640.24	1776.47	1394.01	15,047.74
Yardwaste	11.62	3.41	0	0	0	0	0	0	0	0	0	3.02	18.05
Brush	31.49	17.9	76.05	77.06	74.48	59.57	51.75	68.94	26.6	83.77	106.2	26.89	700.70
Ammendmant/Mulch	239.41	656.13	370.56	240.89	0	0	0	31.09	0	0	33.49	0	1,571.57
Overs/Hamilton	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Total Month	**353.95**	**934.2**	**1173.2**	**1460.5**	**1547.74**	**1551.82**	**1809.21**	**2057.21**	**1386.14**	**1724.01**	**1916.16**	**1423.92**	**17,338**

Outgoing Mixed Waste	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Finished Compost	41.47	154.4	206.93	241.84	424.13	629.79	349.57	425.44	460.36	213.21	183.39	83.53	3,414.06
Screening Waste	23.07	12.35	10.63	9.77	11.99	4.75	8.51	30.71	10.13	22.39	20.64	19.44	184.38
Residual Compost Waste	0	0	0	6.41	0	1.34	0	4.19	8.76	15.3	13.58	22.98	72.56
Total Month	**64.54**	**166.75**	**217.56**	**258.02**	**436.12**	**635.88**	**358.08**	**460.34**	**479.25**	**250.9**	**217.61**	**125.95**	**3,671**

A total of 3,414 tonnes finished compost removed from the facility. All the finished compost was shipped to a farmer in Atwood, Ontario, northwest of Guelph. A total of 257 tonnes of screening and residual compost waste from the composting process were shipped to the Transfer Station and then the St Thomas (Green Lane) Landfill site in Elgin County, Ontario.

2.2 Deficiencies/Non-Compliance and Environmental/Operational Issues

No spills occurred in 2012 at the composting site.

No loads were rejected in 2012 coming into the facility. The occasional curbside recyclables collection bag (blue bag) is included in the organics deliveries, which are separated and removed by the staff at the facility.

There were no environmental or operational problems that negatively impacted the environment at the composting site in relation to the C of A. There were some problems with the acid system that had the potential to cause off-site odours early in the commission phase of the organics processing facility. An action plan was developed in consultation with the Ministry and the Public Liaison Committee.

There were no changes to the WRIC Environmental Emergency Plan, the Operations Manual or the Closure Plan since the last annual report.

2.3 Public Complaints

There were 19 odour incidents received by staff at the Waste Resources Innovation Centre from 15 different complainants in 2012. These complaints were investigated by City of Guelph management staff and/or the MOE. Staff conducting the investigations did not detect any odours at the complainant locations, except for one, which was determined to not be related to the composting site.

Each time a complaint was received, the complainant was contacted and a letter advising the complainant of the investigation findings was hand delivered to each of them.

The local district office of the M.O.E. conducted an odour survey during the summer of 2012 whereby staff was on-site and within 1 km radius of the site at variable locations and time of day on a daily basis between July 9, 2012 and August 17, 2012. The MOE concluded that there was a high possibility that some of the odours related to four of the odour complaints were attributable to the Materials Recovery Facility and the Transfer Station. The Ministry further concluded that the majority of off-site odours detected during the surveys were described as manure/animal sewer related odours and are potentially related to another nearby operation. Further, at the request of the Guelph District Office, the Environmental Monitoring and Reporting Branch (EMRB) conducted an air monitoring survey of the Guelph's Organic Waste Processing Facility (OWPF) from June 4-8 and June 11-14, 2012. The survey was performed in response to odour complaints from local residents. The EMRB survey concluded that chemical fingerprinting by the TAGA did not identify any volatile organic compounds (VOCs) attributable to the OWPF, including periods of mild odours detected by EMRB staff along Dunlop Drive. In response to the odour survey report, the City prepared an action plan to address the potential for off-site odours (see Proactive Work Plan to Address Potential On-Site Odours letter, Appendix D). This plan also addresses condition 63(8)(i).

The composting facility passed the source test under worse case conditions in August 2012.

2.4 Enhanced Pathogen Testing and Operations Summary

Samples taken from the maturation hall of the compost stream indicate that all compost that has been shipped off of the site has passed the conditions for a Class A[4] compost under the CCME[5] Guidelines and the conditions within the C of A.

To reduce the health risks of pathogenic organisms, yard waste must attain a temperature of 55 degrees C for a period of three days (72-hours) using in-vessel composting methods. The compost material goes through a series of tunnels to get to its finished state. There are seven tunnels at the facility. When material is in a tunnel the temperature in each of those tunnels is measured every five minutes and the logs are stored within a supervisory control and data acquisition (SCADA) system. The operator provides a weekly report which contains a snap shot of the tunnel temperatures. The Operator also takes readings of the curing piles that are maturing in the maturation building. The spreadsheet for the weekly readings of the compost temperatures and all the weekly reports for the snapshots of tunnel temperatures are available upon request. Temperature monitoring logs of the tunnels at the composting facility show that pasteurisation at 55 degrees C was maintained for 72 hours.

2.5 Site Operation Recommendations

Investigation into odour complaints in 2012 did not detect any odours at the complainant locations, except for one, which was determined to not be related to the composting site.

There were no confirmed deficiencies/non-compliance or environmental/operational issues related to the compost facility in 2012. The facility appears to be operating as designed.

2.6 Compliance with the Conditions of the Certificate of Approval

Section N, 52(a) refers to reporting requirements associated with the Composting site. Section 63 (8)(m) requires:

> *A condition-by-condition analysis of compliance with all Conditions of this Certificate.*

The City provided the following statement with respect to this condition:

> *"A condition by condition analysis of compliance of all conditions of this Certificate of Approval was done and the City is not aware of any non-compliance issues for 2012.*
>
> *The Executive Director of Planning & Building, Engineering and Environment and the General Manager of Solid Waste Resources continue to put a very high priority on compliance with applicable laws. Staff training continues to be provided both in-house and by external providers, and included inspections, reporting, due diligence, environmental regulations, competent person, contingency plans, emergency procedures, certificate of approval conditions, spills, TDGA, laboratory packing and other relevant topics."*

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4. *Category A = Unrestricted use. Compost that can be used in any application (i.e., agricultural, residential gardens, horticultural operations, nursery industry, other businesses.*
5. *CCME = Canadian Council of Ministers of the Environment, 2005: Guidelines for Compost Quality, PN 1340.*

3. Ground and Surface Water Monitoring Program

3.1 Groundwater Monitoring Program

Groundwater levels are measured at all monitoring locations on a quarterly basis each year. However, during 2012, groundwater level measurements were conducted on six occasions; April 12, June 18, August 7, September 27, November 2 and December 17 to better understand the groundwater flows with the addition of the new wells along Stone Road. As per Section N Condition 32 of the C of A, groundwater sampling was conducted two times in 2012; in June (dry period, late spring) and in December (wet period, late fall). As monitoring nest 23-12 was not completed until July 2012, it was sampled in July and December. Each of the 2012 sampling events included analyses for leachate indicator parameters, general chemistry and organics. Tables 2 and 3 below summarize the groundwater monitoring program and analytical parameters, respectively.

Table 2. Groundwater Monitoring Program

Location	April	June	July	August	September	November	December
13a-01	•	S		•	•	•	S
13b-01	•	S		•	•	•	S
14a-01	•	S		•	•	•	S
14b-01	•	S		•	•	•	S
15a-01	•	S		•	•	•	S
15-b-01	•	S		•	•	•	S
16a-08	•	S		•	•	•	S
16b-08	•	S		•	•	•	S
17a-08	•	S		•	•	•	S
17b-08	•	S		•	•	•	S
18a-08	•	S		•	•	•	S
18b-08	•	S		•	•	•	S
19a-08	•	S		•	•	•	S
19b-08	•	S		•	•	•	S
20a-08	•	S		•	•	•	S
20b-08	•	S		•	•	•	S
21-08	•	S		•	•	•	S
22a-11	•	S		•	•	•	S
22b-11	•	S		•	•	•	S
23a-12			S	•		•	S
23b-12			S	•		•	S

Notes: • Water Levels Only
S Sampling and Water Levels

Table 3. Analytical Parameter List

Leachate Indicator Parameters	• Biological Oxygen Demand (BOD) • Chemical Oxygen Demand (COD) • Total Kjeldahl Nitrogen (TKN) • Ammonia as Nitrogen (NH3-N) • Total Phosphorus (Total P) • Total Suspended Solids (TSS) for surface water and leachate only • Total Sulphate (SO4) • Phenols	• Chloride (Cl) • Sodium (Na) • Calcium (Ca) • Boron (B) • Total Iron (Fe) • Phosphorus (P) • Zinc (Zn) • Nitrate (NO3) and Nitrite (NO2)
General Parameters	• pH • Conductivity • Alkalinity	• Magnesium (Mg) • Potassium (K)
Organics	• EPA 624,625 (ATG 16+17+18 & ATG 19+20)	

The organic compound parameter list for the ATG MISA Groups are as follows:

Misa Group 16	Misa Group 19	
1,1,2,2-Tetrachloroethane	Acenaphthene	2-Methylnaphthalene
1,1,2-Trichloroethane	5-Nitroacenaphthene	Naphthalene
1,1-Dichloroethane	Acenaphthylene	Perylene
1,1-Dichloroethylene	Anthracene	Phenanthrene
1,2-Dichlorobenzene	Benzo(a)anthracene	Pyrene
1,2-Dichloroethane	Benzo(a)Pyrene	Benzyl Butyl Phthalate
1,2-Dichloropropane	Benzo(b)Fluoranthene	bis(2-ethylhexyl)Phthalate
1,3-Dichlorobenzene	Benzo(g,h,i)perylene	Di-N-butylPhthalate
1,4-Dichlorobenzene	Benzo(k)Fluoranthene	Di-N-octylPhthalate
Bromodichloromethane	Biphenyl	4-Bromophenyl phenyl Ether
Bromoform	Camphene	4-Chlorophenyl Phenyl Ether
Bromomethane	1-Chloronaphthalene	bis(2-chloroisopropyl)Ether
Carbon Tetrachloride	2-Chloronaphthalene	bis(2-Chloroethyl)Ether
Chlorobenzene	Chrysene	Diphenyl ether
Chloroform	Dibenzo(a,h)Anthracene	2,4-Dinitrotoluene
Chloromethane	Fluoranthene	2,6-Dinitrotoluene
Cis-1,3-Dichloropropylene	Fluorene	bis(2-chloroethoxy)Methane
Dibromochloromethane	Indeno(1,2,3-cd)Pyrene	Diphenylamine
1,2-Dibromoethane	Indole	N-Nitrosodiphenylamine
Methylene Chloride	1-Methylnaphthalene	N-Nitrosodi-N-propylamine
Tetrachloroethylene		
trans-1,2-Dichloroethylene		
Trans-1,3-Dichloropropylene		
Trichloroethylene		
Trichlorofluoromethane		
Vinyl chloride		
Misa Group 17	**Misa Group 20**	
Benzene	2,3,4,5-Tetrachlorophenol	2,6-Dichlorophenol
Ethylbenzene	2,3,4,6-Tetrachlorophenol	4,6-Dinitro-o-Cresol
Styrene	2,3,5,6-Tetrachlorophenol	2-Chlorophenol
Toluene	2,3,4-Trichlorophenol	4-Chloro-3-methylphenol
o-Xylene	2,3,5-Trichlorophenol	4-Nitrophenol
m-Xylene and p-Xylene	2,4,5-Trichlorophenol	m-,p-Cresol
Misa Group 18	2,4,6-Trichlorophenol	o-Cresol
	2,4-Dimethylphenol	Pentachlorophenol
Acrolein	2,4-Dinitrophenol	Phenol
Acrylonitrile	2,4-Dichlorophenol	

Section F, Monitoring Program

Section E of the C of A discusses the ground and surface water monitoring program as described below:

Condition 32 and 33 (Groundwater)

32. Groundwater shall be sampled on semi-annual basis (spring and fall).
33. The analysis of samples collected in accordance with Condition 32 shall seek to identify chloride, nitrate and a suite of compounds characteristic of waste at the site. Sampling frequency and parameters for analysis may be adjusted upon the approval of the District Manager, as groundwater information becomes available.

Groundwater monitoring was conducted at all locations in June and December 2012. The results of the groundwater monitoring are discussed in Sections 8.4 to 8.7.

3.2 Surface Water Monitoring Program

The objectives of the surface water monitoring program are outlined in the C of A in Section F, Condition 35. These are:

(a) The City shall annually review and update the existing surface water sampling program, designed to detect and quantify any impacts originating from the site;

(b) A surface water sampling program shall be implemented to ensure early detection of contaminants in the event that such contaminants escape the site. Surface water shall be sampled monthly for the following conventional parameters: BOD, TSS, ammonia, nitrogen, TKN, total phosphorus and phenolics. For all other parameters surface water shall be sampled on a semi-annual basis (spring and fall). The analysis shall seek to identify chloride, nitrate and a suite of organic and inorganic compounds characteristic of waste generated at the site;

(c) Sampling frequency and parameters for analysis may be adjusted upon the approval of the District Manager, as surface water information become available;

(d) Surface water shall be sampled at the discharge location of the final surface water detention pond;

(e) The City shall ensure that all stormwater which comes in contact with waste material is treated or discharged into the sanitary sewer; and

(f) the City shall annually review and update the detailed maintenance schedules for the infiltration trenches and stormwater detention ponds.

During 2012, monthly monitoring of surface water runoff into Detention Ponds 1 (SW2, SW3) and 2 (SW1) was completed. However, samples were only collected in March, September, October and December at SW2 and February and October at SW3 from Detention Pond 1. For the remaining months in 2012, no water remained in the detention ponds after rain events or they were dry by the end of each month or they were frozen/snow laden. No 2012 samples were collected from at SW1 in Detention Pond 2 due to dry conditions throughout the year. The results of the surface water monitoring are discussed in Section 8.8.

Surface water sampling is undertaken on a monthly basis in the stormwater management pond (SWM) for the parameters (excluding organics) shown in Table 3. Organic sampling could not be conducted in 2012 due to dry conditions throughout the late spring and summer. During each month, sampling will be undertaken when surface water runoff conditions occur (weather permitting). If no surface water events occur, sampling will be undertaken at the end of the month regardless. Measurements of discharge, surface water runoff events and overall conditions of the detention ponds (e.g., dry, or stagnant water) will be documented on a weekly basis throughout each month. Two surface water stations in the SWM pond were established by the City staff; TP1, located at the culvert along the western shore of the pond adjacent to the access road and TP1 (out), located at the discharge at the north end of the pond. 2012 monthly inorganic samples were collected from TP1 in March, July, September, October and December and TP1 (out) in March, April, June, July, September, October and December. No inorganic samples were collected from the SWM pond locations in the remaining months due to dry conditions.

The existing surface water pond ("East Pond" in Figure 1) was sampled in April, June, July, September, October and December 2012 (for inorganic parameters shown on Table 3). The East Pond setting is similar to the Transfer Station SWM and the WRIC ponds (influenced by road salting and within similar overburden soils) though it is within a different catchment area. As suggested by the MOE, surface water quality from the samples collected from the staff gauge in the East Pond (designated EPTS-01) can be considered as background surface water quality as it is upstream of both facilities[6] and will be used as comparison to the on-site surface water features.

A ditch located between the stormwater management pond and the East Pond is designed to receive pond overflow and direct it in a northwesterly direction beneath Dunlop Drive.

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6. Memorandum from Lynnette Latulippe (MOE) to Bill Shields (City of Guelph), Re: Annual Monitoring Report – 2009 Guelph Wet-Dry Recycling Centre and Waste Transfer Station, dated February 7, 2011.

4. Wet-Dry Recycling Facility Operations

4.1 HHW Waste Screening Procedures and Acceptance Criteria

The information presented in this section was reported by the City of Guelph. Household hazardous waste materials can only be received at the City of Guelph Depot in accordance with the conditions specified on amended Certificate of Approval A170128.

Purpose

This procedure is designed to assist the employees at the Household Hazardous Waste (HHW) Depot in the screening of waste that is brought to the depot and to prevent the acceptance of items not permitted by Certificate of Approval A170128. Adherence to these conditions is mandatory in order to ensure the operating permit is not revoked as a result of non-compliance issues.

Scope

These procedures are for employees at the Household Hazardous Waste (HHW) Depot and their Supervisor. The Depot is restricted to accepting only spent household consumer commodity goods that are widely available to the general public in quantities and concentrations typically found at conventional retail outlets.

Definitions

Household Hazardous Waste Depot ..... A collection centre which accepts household hazardous waste from residents, which consist of but not limited to, paint, waste oil, thinners, household cleansers, etc., with a capacity of less than fifty-five (55) drums of waste.

Industrial/Commercial/Institutional Waste ..... Waste from businesses, medical centres, etc. Such waste is not accepted at the HHW.

PCBs ..... Polychlorinated biphenyls. The import, manufacturing and re-sale of materials containing PCB's was banned in Canada in 1977, but legislation allowed the continued use of previously acquired products until the end of their functional life.

Residential Waste ..... Waste generated by an individual or a family at the place where the individual or the family lives.

TDG ..... Transportation of Dangerous Goods. This is a set of rules to follow regarding the transportation of dangerous substances, including how the materials are to be contained and labelled.

WHMIS..... The Workplace Hazardous Materials Information System (WHMIS) is Canada's national hazard communication standard. The key elements of the system are cautionary labelling of containers of WHMIS "controlled products", the provision of material safety data sheets (MSDSs) and worker education and training programs.

Conditions

1. The Depot is restricted to accepting HHW waste from residents within the City of Guelph or County of Wellington only. This information shall be documented on the Waste Ticket Form prior to acceptance of the HHW materials and must include all contact information necessary to validate residency status.
2. Spent consumer commodity goods that are widely available to the general public in quantities and concentrations typically found at conventional retails outlets, examples include:
   - Canadian Tire products; and
   - Home Depot products.
3. No industrial, commercial or institutional hazardous waste shall be received at this facility. Waste materials originating from these sources are items that would not be readily available to the general public nor would be considered consumer commodity. Examples include:
   - Laboratory reagents from the local University;
   - Large pesticide containers typically sold to farmers; and
   - Chemical agents in containers greater than 20 L in capacity.
4. The following are not acceptable under any circumstance:
   - Radioactive wastes;
   - Explosives and ammunition;
   - Pathological wastes (sharps however, are permitted if they are placed in a rigid plastic container, soaked in bleach overnight, drained, and labelled);
   - Unknown wastes; and
   - Polychlorinated biphenyls (PCBs).
5. Any unacceptable materials inadvertently received at the HHW or other areas on the WRIC site, must be handled and disposed of in accordance with applicable legislation. The HHW Co-ordinator is to be contacted immediately upon discovery for processing and handling of these unacceptable materials.

Additional Information

1. All waste received shall be clearly identified either by the labels of the original consumer packaging or if no labels are present, by the resident dropping the material off. The materials must be in a clear container and the contents identifiable by the HHW attendant. Materials identified by the homeowner will be labelled by City of Guelph staff prior to acceptance and laboratory packing.
2. Only propane in containers typically available to the public is acceptable [Small 1 kg tanks up to barbeque size containers (20 kg)].
3. The City of Guelph HHW depot reserves the right to reject any waste materials which if received could jeopardize the operational permits held by the site.

Procedures

1. Always wear the appropriate PPE (personal protective equipment) to handle the waste items.
2. All waste containers brought to the Depot shall be sealed prior to acceptance and must be surrendered by the resident. Unacceptable activities include:
   - Decanting gasoline for the purpose of returning jerry-cans to the homeowner; and
   - Decanting pesticides from small portable pumps.

3. Hazardous waste material characteristic ranking will determine the order in which waste is handled. Many items will have the properties of two or more hazards and items with more than one hazard must be placed in the highest hazards characteristic class. Use the following in order of highest to lowest precedence of hazard:

    1. Radioactive;
    2. Poisonous gases;
    3. Flammable gases;
    4. Non-flammable gases;
    5. Biohazardous materials;
    6. Poisonous liquid;
    7. Pyrophoric materials;
    8. Self-reactive;
    9. Flammable liquids;
    10. Flammable solids;
    11. Combustible materials; and
    12. Miscellaneous hazardous materials.

4. Refused items shall be recorded in the Waste Rejection section of the HHW Waste Ticket Form with reasons for the refusal documented. Offer the resident a list of Alternate Disposal Options. (See HHW Operations Manual).

5. Abandoned wastes will be recorded on an Unacceptable Waste Log. (See HHW Operations Manual).

6. Items of concern (extremely dangerous, toxic, explosive, biohazardous, infectious, or radioactive materials) shall be brought to the attention of the Supervisor of Governance and Compliance.

7. The resident will be contacted within three days in order to trace the whereabouts of any items of concern and to ensure that the material was properly disposed of. If required, the Ministry of Environment, City of Guelph Police Department, Fire Department or the Community Emergency Management Co-ordinator may also need to be notified.

8. Wastes containing PCB's or suspect PCB materials are not acceptable at the City of Guelph HHW depot, however should such material be suspected or identified after drop-off or in the case of illegal dumping, the following steps shall be taken:

    1. The PCB or suspect PCB waste materials shall be set aside in a secure area, along with the ticket identifying the resident that brought these materials to the depot if it was not illegally dumped.

    2. The material must be sampled and set for analysis to an accredited laboratory to determine the PCB concentration.

    3. Analytical results over 50 ppm confirm the waste to be PCBs.

    4. Upon confirmation of the presence of PCB waste, The City of Guelph shall obtain Directors Instructions from the Ministry of the Environment after which arrangements shall be made for removal and disposal.

Training

All HHW employees must be trained in WHMIS, TDG, Spills Response, Competent Person, and First Aid to perform these procedures.

Applicable Legislation and References

- OHSA Regulation 860 Workplace Hazardous Material Information System.
- O. Reg. 347 *General Waste Management Transportation of Dangerous Goods Act*, 2002.

5. Waste Transfer Station Operations

5.1 Facility Inspection and Routine Maintenance

The following information was reported by the City of Guelph. The facility is inspected on an ongoing basis by site employees. Corrective maintenance is carried out as required. There were no environmental or operational problems reported during 2012.

A log of all security and grounds inspection noting the condition of the fences, litter, birds, vermin and vectors and any off-site discharges is recorded daily. Routine maintenance is conducted at the site that includes litter pick-up, dust control, rodent control and clean-up of external roads within 1 km of the facility. The compactor is cleaned and inspected weekly when in use. Inspection of the inside floor drains, oil and grit separator, etc., are conducted weekly. The floor drain in the loading ramp is pumped and cleaned every three weeks. Maintenance was conducted on the holding tanks, floor drains and oil and grit separator once per month. The overhead doors are oiled every three weeks. All preventative maintenance performed on equipment are filed under the equipment number (hard copy) as well as recorded electronically in the Synergen program to indicate that the required maintenance has been completed.

A log book recording the weekly inspection of the detention ponds, ditches and facility inspections is kept on-site. Weekly inspections were recorded in 2012.

5.2 Contaminant Sources

5.2.1 Site Design and Operations

To determine if the Transfer Station is having an impact on the ground and surface water in the area, it is important to examine what are the potential sources of impact. The site has been designed to minimize the possible sources of impacts and limit the risk of their emission to the environment, as discussed below.

Waste is dumped from incoming collection vehicles onto an indoor tipping floor located within the transfer building. The transfer building is a steel framed, metal clad building with a reinforced, surface-hardened slab-on-grade floor. The tipping floor is curbed such that liquid discharges onto the floor cannot readily flow off of the floor to the building exterior. It is drained by floor drains and routed through an oil-water separator, with the provision to divert flows to holding tanks prior to reaching the pumping station through the sanitary sewer. Spill cleanup materials (e.g., sorbents) are kept on hand and any liquid spills on the tipping floor are cleaned up immediately. Washing of spilled materials into the floor drain system is avoided to the greatest degree possible. In the event of any potential for leachate or liquid discharge from the building, the shut-off valve for the stormwater management pond will be closed to prevent any off-site discharge.

No waste processing is undertaken in the Transfer Station, with the exception of removal of recyclable material that arrives in incoming waste loads (i.e., metal, wood, cardboard). Truck boxes (both incoming waste and transfer loads out) are tarped when outside of the transfer building to prevent odour and dust emissions as well as to prevent contact between the waste and precipitation that could potentially produce impacted runoff.

The Transfer Station building and the scale house are serviced with a connection to the City sanitary sewer. Domestic sewage from the washrooms in the transfer building and the scale house are discharged directly to the sewage pumping station. The stormwater management pond has a valved connection to the pumping station, which will permit any stormwater that becomes impacted to be discharged to the sanitary sewer system. The site is graded

such that all runoff drains to the stormwater management pond. As all waste handling occurs within the Transfer Station building, runoff from the site will be initially considered to be unimpacted.

Ditches are located on both sides of the driveway to collect road runoff and to convey upstream runoff to the pond. A culvert conveys flow from the ditch on the west side of the driveway to the ditch on the east side and ultimately to the pond. MOE approved dust suppressant and road salt for the internal paved areas may be used occasionally.

6. Incoming and Outgoing Waste and/or Recyclables

6.1 Summary of Incoming Materials

As per Section N, Condition 52(b) of the amended C of A, Table 4 is a monthly summary of the incoming materials received at the site during 2012, based on data recorded by City staff.

As shown on Table 4, 105,915 tonnes of material was received by the site. The compost facility received 17,338 tonnes of organics (16% of the materials received in 2012). Recyclables and mixed dry materials constituted 40,037 tonnes (38%)[7] of the total materials received at the site. This included about 31,609 tonnes of paper products and 13 tonnes of plastics. There were 8,163 tonnes (8%) brush, leaves, yard waste and mixed organics received. Non-recyclable materials (mixed solid waste, medical waste, contaminated soil) constituted 40,377 tonnes (38%) of the total materials received at the site in 2012. 326 tonnes of clean wood was accepted at the Transfer Station.

The on-site Household Hazardous Waste (HHW) depot serves residents of the City of Guelph and the County of Wellington. The depot accepted 18,168 drop offs of materials during 2012. A monthly summary of the 2012 drop off numbers are shown on the table below.

Public	Drop Offs
January	747
February	668
March	1,454
April	1,463
May	2,131
June	1,877
July	1,895
August	1,888
September	1,659
October	1,747
November	1,610
December	1,029
Totals	**18,168**

7. *Table 4 paper incoming to the WRIC (31,609 tonnes)+ plastic incoming to the WRIC (12.88 tonnes)+ other recyclable incoming to the Transfer Station and the WRIC (8,415 tonnes) = 40,037 tonnes*

Table 4. 2012 Monthly Summary of Incoming Material

Transfer Station Incoming Material

Incoming Material	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Mixed Solid Waste	2397.09	2268.66	2811.27	3491.2	4397.87	4089.36	4104.11	4091.57	3248.57	3517.74	3242.04	2535.2	40,194.68
Mixed Organics	768.63	464.09	73.7	33.59	1	3.86	0	0	0	0	3.34	0	1,348.21
Yardwaste	0.02	0	0	0.67	18.13	0	0	0	0	0	22.35	0	41.17
Brush	0	0	0.73	0	0	4.39	2.77	0.69	0	0	0	0	8.58
Leaves	0	0	0	0	0	0	0	0	0	0	23.88	0	23.88
Construction & Demolition	56.77	92.21	128.1	141.28	203.43	192.3	204.34	191.89	154.11	212.56	175.68	134.95	1,887.62
Medical Waste	1.7	0.89	1.61	1.39	2.31	1.76	1.18	2.03	0.88	1.95	1.16	1.04	17.90
MRF Residue	563.71	422.35	429.17	411.46	416.19	356.81	476.08	532.2	474.09	509.34	442.5	328	5,361.90
MRF Glass Residue	220.55	142.77	122.15	110.11	110.06	86.55	133.28	151.14	112.69	112.86	164.96	113.75	1,580.87
Contaminated Soil	0	0	0	0	164.22	0	0	0	0	0	0	0	164.22
Shingles	21.68	24.88	124.32	300.66	857.19	873.83	705.33	423.92	387.87	363.76	395.28	103.26	4,581.98
Clean Wood	3.25	9.05	22.33	15.94	23.75	28.48	17.83	40.72	53.64	53.47	41.24	16.18	325.88
Drywall	22.65	50.9	28.48	30.76	74.45	53.42	42.07	57.75	42.32	39.44	13.05	12.66	467.95
Rubble/Brick/Toilets	2.13	9.25	16.7	18.12	43.19	18.14	31.52	44.41	23.23	63.83	29.5	13.87	313.89
Screening Waste	23.07	12.35	10.63	9.77	11.99	4.75	8.51	30.71	10.13	22.39	20.64	19.44	184.38
Residual Compost Waste	0	0	0	6.41	0	1.34	0	4.19	8.76	15.3	13.58	22.98	72.56
Total Month	**4081.25**	**3497.4**	**3769.19**	**4571.36**	**6323.78**	**5714.99**	**5727.02**	**5571.22**	**4516.29**	**4912.64**	**4589.2**	**3301.33**	**56,576**

WRIC (MRF Recycling /PDO Facility) Incoming Material

Incoming Material	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Mixed Papers	80.77	87.08	89.79	86.94	89.62	93.24	82.3	85.91	61.9	99.1	101.71	129.84	1,088.20
Commingle	250.6	253.15	193.87	159.08	255.4	307.44	296.75	344.08	241.69	206.03	274.28	254.51	3,036.88
Single Stream Bagged	747.1	699.74	770.04	746.48	835.58	753.16	739.84	772.65	741.41	841.17	642.41	591.92	8,881.50
Single Stream Loose	1290.56	983.31	1160.75	1162.74	1283.2	1333.73	1046.05	1625.48	1374.58	1155.37	1190.83	1590.13	15,196.73
Single Stream Baled	0	0	0	0	0	0	0	0	0	0	0	0	0.00
PET #1	0	0	0	0	0	0	0	0	0	0	0	0	0.00
HDPE #2	0.13	4.19	0	0.04	0.05	0	0	1.51	1.88	0	0.17	0	7.97
Mixed Plastics	0	0	0.06	0	0	0	0	0	0	0	0	4.85	4.91
OCC - Baled	0	0	0	3.96	0	0	0	6.47	4.23	0	5.03	2.94	22.63
OCC - Loose	316.33	298.79	336.63	295.5	264.28	231.46	208.56	262.56	246.02	265.52	244.97	177.72	3,148.34
OWP/Fine - loose	13.66	19.14	22.23	19.31	14.9	14.94	16.19	17.88	9.69	22.74	14.32	4.78	189.78
ONP#6 Loose	2.49	0	0	0	0	0	0	0	0	0	0	0	2.49
ONP#8 Loose	0	0	0	0	0	0	0	0	0.07	0	0	0	0.07
ONP#8 Bales	20.28	0	22.17	0	0	0	0	0	0	0	0	0	42.45
Scrap Metal	29.79	21.59	40.09	25.16	1.09	101.07	79.54	20.89	86.02	6.43	58.79	34.83	505.29
Electronics	29.6	20.32	29.69	20.36	34.41	14.6	32.83	24.35	25.98	20.04	29.61	10.73	292.52
Tires	1.3	1.11	1.55	3.16	3.73	4.17	2.95	4.11	1.65	3.39	3.43	0.85	31.40
Clothing	0.77	0.63	0.73	0.97	0.88	0.74	0.77	0.43	0.96	1.01	0.66	0.36	8.91
Brush	31.49	17.9	76.78	194.1	162.77	299.11	161.19	176.92	86.23	155.9	155.97	35.78	1,554.14
Leaves	0	0	0	0	0	0	0	0	0	68.16	1969.1	0	2,037.26
Yardwaste	23.28	6.82	101.76	212.04	661.25	407.18	186.1	188.64	177.97	511.38	633.73	39.49	3,149.64
Total Month	**2838.15**	**2413.77**	**2846.14**	**2929.84**	**3607.16**	**3560.84**	**2853.07**	**3531.88**	**3060.28**	**3356.24**	**5325.01**	**2878.73**	**39,201**

Table 4. 2012 Monthly Summary of Incoming Material (continued)

Organics Compost Facility Incoming Material

Incoming Material	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Mixed Organics	71.43	256.76	726.59	1142.55	1473.26	1492.25	1757.46	1957.18	1359.54	1640.24	1776.47	1394.01	15,047.74
Yardwaste	11.62	3.41	0	0	0	0	0	0	0	0	0	3.02	18.05
Brush	31.49	17.9	76.05	77.06	74.48	59.57	51.75	68.94	26.6	83.77	106.2	26.89	700.70
Ammendmant/Mulch	239.41	656.13	370.56	240.89	0	0	0	31.09	0	0	33.49	0	1,571.57
Overs/Hamilton	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Total Month	**353.95**	**934.2**	**1173.2**	**1460.5**	**1547.74**	**1551.82**	**1809.21**	**2057.21**	**1386.14**	**1724.01**	**1916.16**	**1423.92**	**17,338**

Facility Totals	113,114.84
Residue from MRF and Organic	7,199.71
Overall Site Total	**105,915**

Notes: All volumes in tonnes

Overall Site Total = (Transfer Station Annual Tonnage + WRIC Annual Tonnage + Compost Facility Annual Tonnage) - (Transfer Station Residue from MRF and Organics)

MRF = Materials Recovery Facility

PDO = Public Drop Off

Single Stream = all recyclable products mixed together (bottles, cans, paper, cardboard, etc.)

OCC = Old Corrugated Cardboard

OWP = Office Waste Paper (also known as Fine Paper)

Overs/Hamilton or residual compost waste= a type of residue created during the composting process

Incoming HHW is sent to hazardous waste haulers for disposal or recycling. The City's Paint Plus Re-Use Program was conducted between April 24 and October 13, 2012. The results of the Paint Plus Re-Use Program for 2012 are tabulated below.

Material/Month	April	May	June	July	August	September	October	Total
Paints and coatings Non-aerosol; #145 (L)	379	1032.5	1454.5	1064	2460.5	714	155	7259.5
Paints and coatings Aerosol; # 331 (kg)	47	66.5	72.5	43	42.5	23	1.5	296
Solvents # 213 (L)	26	82.5	51	75.5	100.5	19	10	364.5
Antifreeze (L)	0	14	3.5	5	3.5	6	9	41
Propane Cylinders (kg)	0	9.5	.5	3	2	0	3.5	18.5
Cleaners/Detergents #148 (L)	57	91	100.5	76	92	42	6	464.5
Car products #213 (L)	15	64	26	22	15	5	3	150
Non-paint aerosols #331 (kg)	0	0	0	0	0.5	3	0	3.5
Motor Oil (L)	0	20	17.5	20	28.5	8	7	101
Plaster/cement/Grout (kg)	0	10	17	9.5	18	4	1	59.5
Client Count	**39**	**199**	**222**	**162**	**199**	**119**	**43**	**983**

The above table is a monthly summary of the amounts of HHW (separated by waste class) received at the site. A total of about 244,787 L and 21,044 kg of household special wastes were received in 2012. In addition, 956 propane tanks, 4,000 propane cylinders, 10,135 m (33,252 ft) of fluorescent tubes, 412 fire extinguishers and 13 compressed gas tanks were received in 2012. All materials accepted at the HHW depot are re-used, recycled or shipped off-site for disposal.

As shown on Table 4, the source of the bulk of the materials received was primarily mixed solid waste of domestic origin. Waste accepted by the site originated mainly from the City of Guelph, the County of Wellington, Dufferin County, the Region of Waterloo and the Region of Hamilton. The Transfer Station can accept waste from anywhere in Ontario as long as it is within the acceptable daily tonnage limit.

There were no rejected and no suspect loads received during 2012.

6.2 Summary of Wastes/Recyclables Processed and Outgoing

Materials that are accepted by the site are either processed (composted), diverted to be re-used or sent to the waste Transfer Station for disposal. Section N, Condition 52(c) requires monthly reporting of processed materials was the site, which are presented on Table 5. Of the 90,915 tonnes of outgoing material, 31,728 tonnes (35%) is processed on-site through the Material Recovery facility (MRF) and 3,414 tonnes (4%) of finished compost was produced. The remaining 55,773 tonnes (61%) is shipped off-site to other destinations.

Table 5. 2012 Monthly Summary of Outgoing Material

Transfer Station Outgoing Materials 2012

Outgoing Mixed Waste	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Mixed Solid Waste	3992.37	3321.91	3351.79	3749.55	5246.15	3985.36	5489.17	4943.38	3739.85	4170.47	3821.16	2903.82	48,714.98
C & D	0	132.14	148.53	204.8	293.47	277.1	228.2	260.24	230.95	181.69	170.1	69.34	2,196.56
Shingles	55.88	12.93	52.08	236.09	540.46	649.24	690.13	232.1	307.76	355.44	546.66	174.25	3,853.02
Clean Wood	0	7.02	26.71	24.63	19.72	7.77	38.79	43.86	49.29	38.79	18.62	42.68	317.88
Drywall	0	56.32	34.79	14.96	16.77	18.34	74.4	24.48	43.85	25.56	37.06	0	346.53
Concrete, Rubble	0	0	0	36.86	92.13	0	0	72.07	0	37.2	105.39	0	343.65
Total Month	**4048.25**	**3530.32**	**3613.9**	**4266.89**	**6208.7**	**4937.81**	**6520.69**	**5576.13**	**4371.7**	**4809.15**	**4698.99**	**3190.09**	**55,773**

WRIC (MRF Recycling /PDO Facility) Outgoing Material

Outgoing Mixed Waste	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Single Stream Loose	18.34	0	0	0	0	0	0	0	0	0	0	0	18.34
Single Stream Baled	171.71	0	0	0	0	0	0	0	0	0	0	0	171.71
Tires	1.3	1.11	1.55	3.16	3.73	4.17	2.95	4.11	1.65	3.39	3.43	0.85	31.40
PET #1	80.12	77.43	100.23	64.34	41.88	80.63	101.23	81.59	76.33	93.79	99.03	86.03	982.63
HDPE #2	18.42	58.19	20.1	18.31	28.65	19.78	55.36	35.27	37.56	15.85	35.64	36.91	380.04
Mixed Plastics Baled	20.06	45.5	19.57	21.09	33.56	20.97	20.04	40.59	42.8	40.06	0	52.23	356.47
Aluminum Baled	0	42.13	18.82	30.58	0	17.04	0	63.02	19.74	18.4	60.43	19.38	289.54
OCC Baled	705.09	646.64	639.68	713.19	751.28	682.73	560.49	581.37	532.66	611.73	486.65	495.88	7,407.39
ONP #6 Baled	363.84	299.62	425.96	376.69	347.31	405.44	372.03	395.76	513.4	299.61	294.78	426.03	4,520.47
ONP#7 Baled	0	0	0	0	0	0	25.03	0	0	0	0	0	25.03
ONP #8 Baled	388.67	467.16	533.9	523.43	616.44	556.91	496.35	641.12	639.4	595.92	682.17	643.87	6,785.34
OWP/Fine Paper	18.13	19.28	0	0	47.12	0	49.46	0	23.95	22.58	21.05	19.8	221.37
Tubs and Lids	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Steel Cans Baled	54.14	149.81	47.63	100.98	88.23	73.51	44.92	91.07	99.05	22.71	219.36	73.99	1,065.40
Polycoat/Tetra Pak		22.86	0	24.82	0	0	0	0	0	0	0	18.58	66.26
Mixed Glass	176.7	127.42	174.22	122.25	192.95	117.93	161.53	159.31	165.22	124.25	228.63	105.34	1,855.75
Scrap Metal	29.79	21.59	40.09	25.16	1.09	101.07	79.54	20.89	86.02	6.43	58.79	34.83	505.29
Electronics	29.6	20.32	29.69	20.36	34.41	14.6	32.83	24.35	25.98	20.04	29.61	10.73	292.52
Clothing	0.77	0.63	0.73	0.97	0.88	0.74	0.77	0.43	0.96	1.01	0.66	0.36	8.91
Mixed Recyclables	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Empty Oil Containers	0.1	0.08	0.26	0.35	0.27	0.15	0.37	0.24	0.26	0.37	0.99	0.11	3.55
Yard Waste	23.28	6.82	101.76	212.04	661.25	407.18	186.1	188.64	177.97	511.38	633.73	39.49	3,149.64
Brush	31.49	17.9	76.78	194.1	162.77	299.11	161.19	176.92	86.23	155.9	155.97	35.78	1,554.14
Leaves	0	0	0	0	0	0	0	0	0	68.16	1969.1	0	2,037.26
Residue (from processing)	563.71	422.35	429.17	411.46	416.19	356.81	476.08	532.2	474.09	509.34	442.5	328	5,361.90
Glass Residue(from process)	220.55	142.77	122.15	110.11	110.06	86.55	133.28	151.14	112.69	112.86	164.96	113.75	1,580.87
Total Month	**2915.81**	**2589.61**	**2782.29**	**2973.39**	**3538.07**	**3245.32**	**2959.55**	**3188.02**	**3115.96**	**3233.78**	**5587.48**	**2541.94**	**38,671**

Table 5. 2012 Monthly Summary of Outgoing Material (continued)

Organic Compost Plant Outgoing Materials 2012

Outgoing Mixed Waste	Jan Tonnes	Feb Tonnes	March Tonnes	Apr Tonnes	May Tonnes	June Tonnes	July Tonnes	Aug Tonnes	Sept Tonnes	Oct Tonnes	Nov Tonnes	Dec Tonnes	Yearly Total
Finished Compost	41.47	154.4	206.93	241.84	424.13	629.79	349.57	425.44	460.36	213.21	183.39	83.53	3,414.06
Screening Waste	23.07	12.35	10.63	9.77	11.99	4.75	8.51	30.71	10.13	22.39	20.64	19.44	184.38
Residual Compost Waste	0	0	0	6.41	0	1.34	0	4.19	8.76	15.3	13.58	22.98	72.56
Total Month	**64.54**	**166.75**	**217.56**	**258.02**	**436.12**	**635.88**	**358.08**	**460.34**	**479.25**	**250.9**	**217.61**	**125.95**	**3,671**

Facility Totals	98,114.84
MRF & Organic Residue to Transfer	7,199.71
Overall Site Total	**90,915**

Tonnages of incoming and outgoing materials will not be equal as some mass is lost through evaporation and processing. Table 6 is reconciliation of the incoming and outgoing materials and materials processed from the site.

Table 6. Summary of Incoming, Outgoing and Processed Quantities

Recyclable and Other Materials Processed in 2012	(tonnes)
Quantity Received (Table 4: Incoming 2012)	105,915
Quantity in Inventory from Prior Year (2011)	4,881
Quantity Sold (Table 5)	42,200
Quantity of Mixed Solid Waste Sent to Landfill (Table 5)	48,715
Quantity in Inventory at the End of 2012	(105,915 + 4,881) – 42,200 – 48,715 = 19,881

There is a difference of 19,881 tonnes between incoming and outgoing wastes/materials. This can largely be attributed to several factors:

- material in the organic facility that is still in the composting stage;
- stored recyclable material not yet processed;
- baled recyclable product awaiting shipment; and
- construction and demolition material including shingles, drywall, clean wood and rubble awaiting shipment.

Table 5 also shows a monthly summary of the outgoing materials shipped off during 2012 as per Section N, Condition 52(d) of the amended C of A. Of the 55,773 tonnes of non-processed outgoing materials received at the Transfer Station, 48,715 tonnes (87% of the outgoing materials) is sent to the St. Thomas (Green Lane) Landfill in Elgin County for disposal. 105 tonnes of material was sent to the Covanta Energy from Waste facility in Niagara Falls, New York. The remaining 6,953 tonnes of non-processed materials is marketable consisting of other recyclable materials such as shingles, construction and demolition debris, clean wood, drywall, concrete and rubble.

In 2012, 31,728 tonnes of marketable processed material transferred off the site from the WRIC facility 19,150 tonnes (60%) was paper-based goods such as cardboard and newsprint, 1,719 tonnes (5%) was plastics and the remaining 10,860 tonnes (34%) was other recyclable materials such as aluminum, steel cans, glass, tires, metal, yard waste, brush and leaves. As reflected in the volumes above, the majority of the marketable materials sold were paper products.

The WRIC achieved a 100% diversion rate for organic (yard, leaf and brush) and a 51% rate[8] of diversion for the remaining materials accepted at the site in 2012.

Most of the HHW materials were shipped by Photech Environmental, St. Catharines (the waste removal contractor for February to December 2012) for disposal or re-use. Hotz Environmental Services Inc., Hamilton was the waste removal contractor for the City for January and part of February.

8. *Diversion rate (excluding yard waste) = Incoming for Transfer Station and WRIC(99,100 tonnes) – Outgoing MSW from Transfer Station (48,715 tonnes)/Incoming (99,100 tonnes) x 100 = 51%.*

Outgoing household hazardous waste materials were manifested to Photech and disposed of by the companies identified below for recycling and re-use.

Waste Types	List of Intended Receivers
Paints	• Photech Environmental Solutions Inc.
Oil Filters	• Safety Kleen, Breslau, ON
Bulk Oil/Antifreeze	• Safety Kleen, Breslau, ON
Pesticides	• Clean Harbours, Thorold, ON
Pharmaceuticals	• Phase Separation Solutions
Oxidizers/Acids/Bases	• Stablex Canada Inc., Quebec
Pathological Wastes/Syringes	• Stericycle, Toronto, ON
Car Batteries	• Benmet Steel & Metal
Fluorescent Tubes/Lamps	• Aevitas
Household Batteries/Mercury	• Raw Materials Corp.
Propane Tanks	• Simcoe Energy & Technical Services
Aerosols	• Peintures Recuperees Du Quebec
Organics/Flammables	• Newalta Industrial Services Inc., ON

Destinations/buyers for dry recyclable processed materials include:

Material	Destination, Major Buyers
Shredded Yard Waste	• Budget Transport, Try Recycling.
Corrugated Cardboard	• Norampac, Solvay
Newsprint	• Continental Paper Grading, Canada Fibers
Fine Paper	• Cascades
Steel Cans	• Triple M Metals
Aluminum Cans	• Connecticut Metals
PET Bottles (#1)	• Plastrec, Ecotex, ReMM, Canadian Plastics
HDPE (#2 plastics)	• Entropex, Canadian Plastics
Mixed Plastic (# 4,5, 7)	• Entropex
Scrap Metal / White Goods	• Triple M Metals
Tires	• Envirocan
Scrap Wood	• Greenstep Environmental

In 2012, 84% of the outbound waste/materials from the Transfer Station were shipped off-site to the St. Thomas (Green Lane) Landfill in Elgin County. A portion of the outbound waste was shipped to Greenstep (9%), Tri Recycling (3%), Waste Management in Waterloo (2%), EFW in Niagara Falls, New York (0.2%) and with various other locations making up the remaining 2%.

7. Leachate Quality

7.1 Leachate Indicators

To determine the potential leachate quality that may be generated from the Transfer Station, the leachate quality from the City of Guelph closed Eastview Road Landfill was examined. Prior to closure in 2003, this landfill accepted a similar mix of waste as the Transfer Station. Groundwater monitoring has been routinely conducted on this site since 1991. Leachate quality is measured by a series of groundwater monitors in the waste and in the outwash layer beneath the waste. In general, the leachate quality is characterized by elevated concentrations of chloride, boron, phenols (critical leachate parameters), sodium, potassium, magnesium, iron, manganese, ammonia and alkalinity (leachate indicator parameters). Also, BOD, COD and oil and grease have been found to be elevated. Though monitoring continues at the site, leachate quality up to 2009 was only considered since leachate strength is expected

to decrease over time with closure of the landfill. Table 7 provides a summary of the historic leachate concentrations (1997 to 2009) for the leachate monitors.

Table 7. Summary of Leachate Quality from the Waste Monitors, Eastview Landfill

Parameters		Avg.	Min.	Max.
General	• pH	7.68	7.09	8.63
	• Conductivity (μS)	14,364	3,880	21,500
	• Alkalinity (mg/L)	6,195	2,900	9,050
	• Hardness (mg/L)	2,161	1,010	2,900
Critical Indicators	• Chloride (mg/L)	1,841	101	2,660
	• Boron (mg/L)	22.8	6.22	47
	• Phenol (μg/L)	100	0.72	830
Leachate Indicators	• Calcium (mg/L)	96	33	221
	• Sodium (mg/L)	1,468	424	2,300
	• Magnesium (mg/L)	468	144	661
	• Potassium (mg/L)	794	149	1,410
	• Iron (mg/L)	11	1.1	41.4
	• Manganese (mg/L)	0.10	0.027	0.688
	• Ammonia (mg/L)	583	0.05	1,200

The concentrations of the leachate indicator parameters vary with location across the landfill but in most cases are elevated above the background concentrations. However, it should be noted that parameters such as chloride and sodium are also elevated in the background due to other sources such as road salt. Further, parameters such as iron, manganese, and ammonia can be elevated due to natural background conditions, in either the sandy outwash (manganese) or the wetland peat (iron and ammonia). Of all the leachate indicator parameters identified, boron, chloride and phenols are considered as critical leachate indicator parameters.

Annual routine organic analysis of the leachate shows low concentrations of BTEX (benzene, toluene, ethyl benzene and xylene) and organic compounds at the closed Eastview Road Landfill indicating that organic compounds are not generated in significant quantities in this landfill.

With regard to the Transfer Station, downgradient water quality is compared to background water quality for the critical leachate indicator parameters, as identified above, to determine potential impacts from site operations.

The Transfer Station operation is not expected to generate any significant quantities of leachate because all waste handling operations are conducted in an indoor environment within the transfer building. The Design and Operations plan incorporates a number of features to protect the groundwater and surface water resources. This includes features such as a completely contained waste tipping floor and collection system and operating procedures that ensure that waste is handled indoors in a closed environment and is not stored on-site for any length of time. Nevertheless, it is still appropriate to examine water quality at the site for indicators of leachate impacts to confirm that all of the safeguards are functioning.

7.2 Petroleum Indicators

The Transfer Station operations do not involve the use, storage or handling of significant quantities of potential contaminants, other than machine fuel/lubricants (the only on-site equipment that requires fuelling is a front-end loader) and occasional dust suppressant chemicals. If these are handled with normal, reasonable precaution (according to the regulations) then the risk of groundwater contamination is very low. Established procedures for spills response and contingency are in place. BTEX analysis results are examined to determine if there is any indication of hydrocarbon contamination. Downgradient water quality is discussed in Sections 5.4 and 5.5.

8. Groundwater, Leachate and Surface Water

A ground and surface water monitoring program is conducted on the sites as outlined in Section 2.

8.1 Groundwater Elevation and Flow Directions

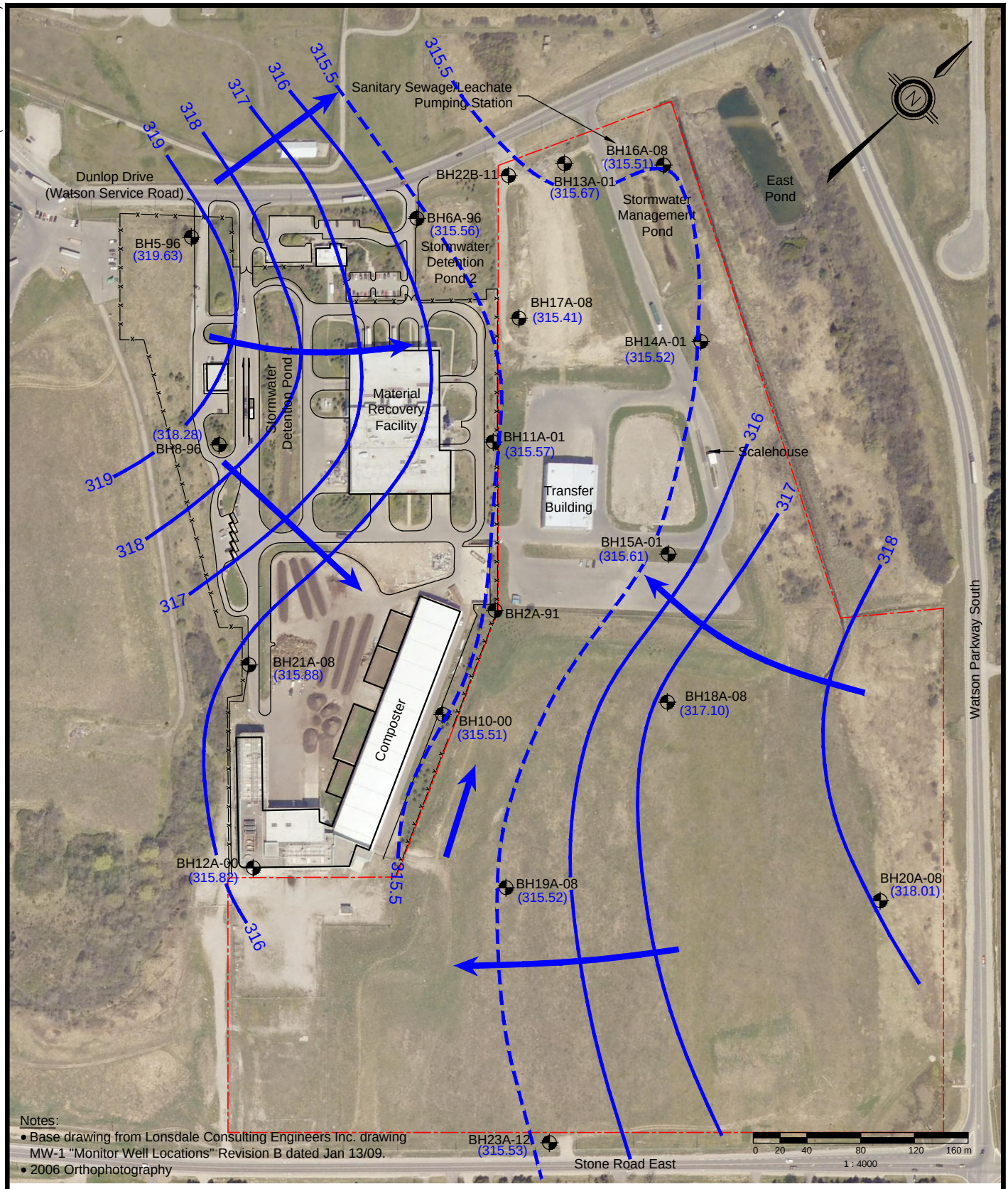
Groundwater levels were collected in April, June, August, September, November and December during 2012. Groundwater elevations were measured at 19 locations that included a total of 34 monitors. At the request of the MOE, a monitoring nest (23-12) was installed in July 2012, southeast of the Transfer Station/WRIC, adjacent to Stone Road East to better understand the direction of groundwater flow and as a background location to monitor the potential for effects from the soil stockpiles on the site. This monitoring nest was incorporated into the routine monitoring program for the site. The C of A only requires collection of water levels four times per year but two additional rounds of water levels were collected to better understand the flow direction in the vicinity of the new well nest. The monitors are outlined below with the geological unit they are measuring. Groundwater elevations are appended. Hydrographs for each location are presented in Appendix A.

Monitor	Geological Unit	Groundwater Zone
2a-91	Sandy Silt Till	Not Used
2b-91	Sandy Outwash	Water Table
5-96	Dolostone Bedrock	Water Table/Bedrock
6a-96	Dolostone Bedrock	Bedrock
6b-96	Sandy Outwash	Water Table
7-96	Sandy Outwash	Water Table
8-96	Dolostone Bedrock	Water Table/Bedrock
9-96	Sandy Outwash	Water Table
10-00[1]	Dolostone Bedrock	Bedrock
11a-01[1]	Dolostone Bedrock	Bedrock
11b-00[1]	Gravelly Outwash	Water Table
12a-00[2]	Dolostone Bedrock	Bedrock
12b-00	Gravelly Outwash	Water Table
13a-01[3]	Dolostone Bedrock	Bedrock
13b-01[3]	Gravelly Outwash	Water Table
14a-01[3]	Dolostone Bedrock	Bedrock
14b-01[3]	Gravelly Outwash	Water Table

Monitor	Geological Unit	Groundwater Zone
15a-01[3]	Dolostone Bedrock	Bedrock
15b-01[3]	Gravelly Outwash	Water Table
16a-08[3]	Dolostone Bedrock	Bedrock
16b-08[3]	Gravelly Outwash	Water Table
17a-08[3]	Dolostone Bedrock	Bedrock
17b-08[3]	Gravelly Outwash	Water Table
18a-08[3]	Dolostone Bedrock	Bedrock
18b-08[3]	Gravelly Outwash	Water Table
19a-08[3]	Dolostone Bedrock	Bedrock
19b-08[3]	Gravelly Outwash	Water Table
20a-08[3]	Dolostone Bedrock	Bedrock
20b-08[3]	Gravelly Outwash	Water Table
21-08	Dolostone Bedrock	Water Table/Bedrock
22a-11 [3]	Dolostone Bedrock	Bedrock
22b-11 [3]	Gravelly Outwash	Water Table
23a-12	Gravelly Outwash	Water Table
23b-12	Dolostone Bedrock	Bedrock

Notes: (1) Locations recommended by MOE.
(2) Replaces 3-97.
(3) Locations on Transfer Station Property.

The bedrock groundwater flow is discussed first as the understanding of the geology controlling this flow is important to the shallow water table flow. In general, the groundwater flow is similar to previous years (Figure 2). Groundwater flow is generally from southwest to northeast (bedrock high) and northeast to southwest (from Watson Road) coming into the site from both directions. It is expected that flow would ultimately merge and be directed northerly based on the assessment of the bedrock surface topography, which suggests that the bedrock is deepening to the north. This is important as previous hydrogeological assessments in the area suggest that the bedrock low observed in this area is a former paleo river valley (incised bedrock low) that trends to the north. Therefore, it would be expected that the groundwater flow would follow this feature. The 2008 monitoring nests (bedrock and overburden) were placed to the east of the facility (BH18-08, BH19-08 and BH20-08) to confirm the geology and groundwater flow in this area. Southeast of the Transfer Station, the bedrock elevation is highest at BH20-8, sloping to the northwest towards the paleo river valley. A more detailed assessment of the geology in the area incorporating the 2008 borehole data was provided in the 2009 Annual report (AECOM, 2010), which confirms that there is a pronounced incised bedrock low that trends through the site to the north. The addition of the new location on Stone Road, also suggest that the flow in the incised bedrock low is to the north.



Notes:
- Base drawing from Lonsdale Consulting Engineers Inc. drawing MW-1 "Monitor Well Locations" Revision B dated Jan 13/09.
- 2006 Orthophotography

DO NOT SCALE THIS DOCUMENT. ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS.

AECOM

Transfer Station / WRIC
City of Guelph
Annual Monitoring Program
Bedrock Groundwater Flow (December 2012)

Legend
- Approximate Site Boundary
- Fence
- Monitoring Well
- (166.45) Bedrock Groundwater Elevation
- 170 Bedrock Groundwater Contour

PROJECT NUMBER **60286266**
DATE **March 2013**
FIGURE **2**

A SIZE 8.5" x 11" (215.9mm x 279.4mm)
PLOT: 3/8/2013 11:01:37 AM
BY:----
FILE NAME: 60286226-01-FIG02.DWG

\\catrt3fs001\prod\AecomPrjs\60286226\000-CADD\040 CADD-BIM WIP\01-GW Monitoring\60286226-01-Fig02.dwg Layout:Fig 03 Plotted: Mar 08, 2013 @ 11:01am by jiangr

In general, the shallow groundwater flow beneath the site is similar to previous years (Figure 3) though flows have been refined and confirmed based on the groundwater elevation information from the new monitors installed in 2008 and the updated geological model assessment in 2009. Shallow groundwater flow in the sandy outwash is expected to follow the bedrock topography and be similar to the bedrock groundwater flow. Overall, the shallow flow is similar, directed into the site from the bedrock high on the southwest area of the site and from along Watson Road. It is also expected that flow would ultimately merge and be directed northerly within the alignment of the incised bedrock low. The 2008 drilling also identified a bedrock high (similar to the high to the west) southeast of the site in the vicinity of 20a-08, between which the bedrock trends. The shallow water table elevation is generally similar to BH19B-08 to apparently slightly lower (BH19B-08 was 315.68 mASL, whereas BH23B-12 was 315.63 mASL in December 2012). The slight difference is most likely related to the actual positioning in the bedrock low as the new location intercepted the bedrock at a deeper elevation than at BH19 indicating that BH19 is most likely higher up on the edge the bedrock low. Though this is the case, the overall trend of the bedrock low is to the northwest.

In their review of the 2006 Annual Monitoring report, the MOE commented that though water levels are collected four times per year, only one data set was used to plot the groundwater contour map. It should be noted that for our assessment of groundwater flow conditions, each set of water level data are plotted and reviewed. However, for reporting purposes, only one set of data are presented as flow contours from season to season (and from year to year) as flows have been quite similar. Should significant differences between the seasonal flow conditions be noted, they would be identified and discussed.

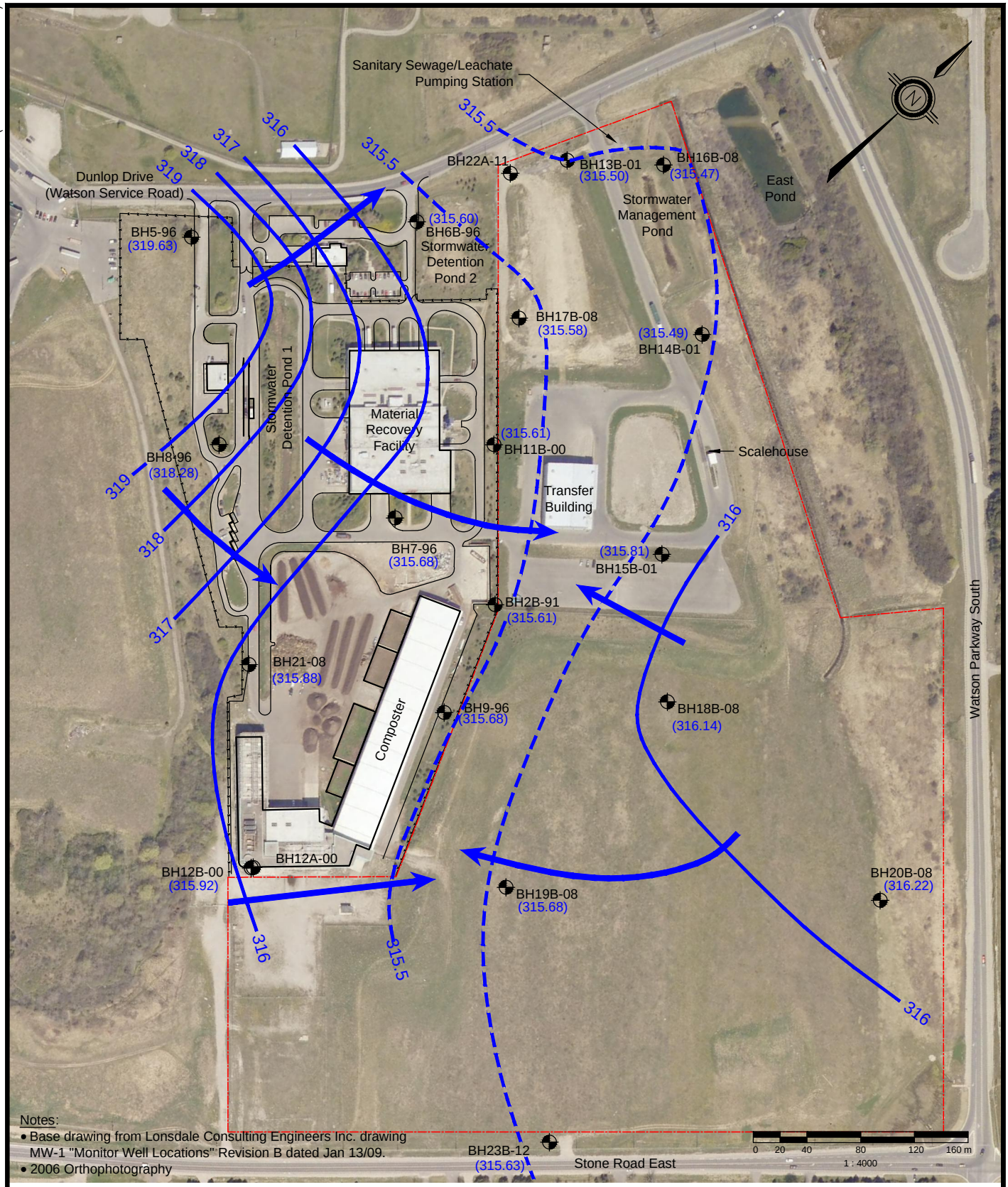
8.2 WRIC Detention Pond 1 (SW 3) Monitoring

In 2012, the pond at SW 3 was inspected monthly with samples collected when possible. The table below briefly outlines the conditions at Detention Pond 1 (SW 3) during the 2012 monthly monitoring events.

Month	Runoff From Pad	Conditions	Sampling Date
January	None	Dry	**No Sample**
February	None	Sample collected at outlet	**February 16, 2012**
March	None	Dry	**No Sample**
April	None	Dry	**No Sample**
May	None	Dry	**No Sample**
June	None	Dry	**No Sample**
July	None	Dry	**No Sample**
August	None	Dry	**No Sample**
September	None	Dry	**No Sample**
October	None	Sample collected at outlet	**October 24, 2012**
November	None	Dry	**No Sample**
December	None	Dry	**No Sample**

No further effects are expected at SW 3 since compost is no longer stored on the pad and has not been since 2006. Composting did occur on the site during 2012 however, all composting activities occurred indoors. In the past when the water quality was sampled at SW 3 (or CL-1 leachate), it showed elevated concentrations of conductivity, potassium, BOD, COD, TKN, ammonia, total phosphorus, chloride, sodium and iron. In 2012, SW3 parameter concentrations are generally much lower than pre-2007 concentrations in the absence of compost inputs. However, the February 2012 samples showed conductivity, chloride and sodium concentrations higher than pre-2007 concentrations. These elevated concentrations are possibly due to flushing of residual leachate impacts combined with road salt impacts at this location and have been apparent during previous thaw events and early spring sampling events. As suggested by the MOE, SW3 quality was compared to the water quality from the samples collected from the staff gauge in the East Pond (designated EPTS-01). The East Pond can be considered as background surface water quality as it is upstream of both facilities[9]. Most indicator parameters were elevated at SW3 in 2012 compared to historic concentrations in the East Pond. Parameter concentrations were within the range of historic concentrations, except for the February 2012 conductivity, chloride and sodium, which are the highest measured at this location.

9. *Memorandum from Lynnette Latulippe (MOE) to Bill Shields (City of Guelph), Re: Annual Monitoring Report – 2009 Guelph Wet-Dry Recycling Centre and Waste Transfer Station, dated February 7, 2011.*



Notes:
- Base drawing from Lonsdale Consulting Engineers Inc. drawing MW-1 "Monitor Well Locations" Revision B dated Jan 13/09.
- 2006 Orthophotography

DO NOT SCALE THIS DOCUMENT. ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS.

AECOM

Transfer Station / WRIC
City of Guelph
Annual Monitoring Program
Shallow Groundwater Flow (December 2012)

Legend
- Approximate Site Boundary
- Fence
- Monitoring Well
- (317.67) Shallow Groundwater Elevation
- 317 Shallow Groundwater Contour

PROJECT NUMBER **60286226**
DATE **March 2013**
FIGURE **3**

A SIZE 8.5" x 11" (215.9mm x 279.4mm)
PLOT: 3/8/2013 11:00:50 AM
BY:----
FILE NAME: 60286226-01-FIG03.DWG

\\catrt3fs001\prod\AecomPrjs\60286226\000-CADD\040 CADD-BIM WIP\01-GW Monitoring\60286226-01-Fig03.dwg Layout:Fig 02 Plotted: Mar 08, 2013 @ 11:00am by jiangr

Elevated concentrations may be related to residual leachate inputs in the clay-lined pond, which is expected to continue to flush out over time. Although this was the case, all water collected from the compost pad into the pond was directed to the sanity sewer.

8.3 Groundwater Monitoring

Transfer Station

The monitoring program for the site includes three overburden monitors (in outwash materials) 13b-01, 14b-01 and 15b-01 and three bedrock monitors 13a-01, 14a-01 and 15a-01. The MOE completed a review of the 2004 and 2005 Annual Monitoring reports for the Eastview Landfill and the Transfer Station. The MOE recommended installation of additional monitoring locations to better address the geological setting with respect to the groundwater flow. Based on the MOE review comments, six monitoring nest locations (BH16-08 to BH21-08) were completed in 2008, at the locations shown on Figures 1 to 3. These monitors consist of overburden outwash (16b-08, 17b-08, 18b-08, 19b-08, 20b-08) and bedrock monitors (16a-08, 17a-08, 18a-08, 19a-08, 20a-08). These monitors were incorporated into the routine monitoring program in 2008. Based on the confirmation of groundwater flow at the site, the MOE recommended that a new monitoring location be established at the northerly boundary to serve as a Guideline B7 (RUP) boundary compliance point. This location was completed in 2011 and consists of a deep bedrock and shallow overburden outwash monitor (22a-11 and 22b-11). A further location along Stone Road was completed in the summer of 2012, as recommended to the MOE, to better assess the potential effects, if any, from the soils that have been stored on site. This location also consists of a deep bedrock and shallow overburden outwash monitor (23a-12 and 23b-12).

In 2012, the groundwater monitoring program included biannual (June and December) routine organic and inorganic water quality sampling plus six water levels measurement events.

WRIC

Baseline groundwater monitoring was conducted from 1991 to 1995, prior to construction at the WRIC site (monitor locations 1a-91, 1b-91, 2a-91, 2b-91, 3-91 and 5-91). Monitoring of the groundwater at the WRIC Facility commenced in April 1996 at the remaining monitoring locations that were not destroyed during construction (Figure 1). In late 1996, replacements for the monitors that were destroyed were completed and added to the program. The present monitoring program, initiated in 1999 after MOE approval, is twice per year (June and December). Groundwater samples were collected in June and December in 2012.

8.3.1 Groundwater Quality

Groundwater sampling was conducted for both the Transfer Station and the WRIC in June and December 2012. Groundwater quality results are appended.

8.3.1.1 Background Outwash Water Quality

Background outwash groundwater quality has historically been measured at locations 14 and 15 on the adjacent eastern property. Location 15 is now considered a downgradient location due to the construction of the compost pad to the east. Groundwater flow is directed towards the site from these areas. Recent monitors BH18b-08, BH19b-08 and BH20b-08, located southeast of the Transfer Station and 16b-08, located north of the Transfer Station are also representative of background outwash conditions based on the groundwater flow patterns in this area. BH18b-08 and 19b-08 were dry and therefore were not sampled in June 2012. BH18b-08 had insufficient volume of water for

sampling in June 2012 therefore, no samples were collected from this monitor in 2012. New monitor 23b-12 is a background location and included in this discussion. Water quality for the indicator parameters are summarized in the table below.

Monitor		Alkalinity (ppm)	Chloride (ppm)	Sodium (ppm)	Calcium (ppm)	Magnesium (ppm)	Potassium (ppm)
14b-01	Historical Range	267 – 438	22.3 – 280	0.1 – 170	0.2 – 140	0.05 – 38	0.2 – 2.6
	2012 Average	375	121	86.5	130	31	2.15
16b-08	2008-2011 Range	318 – 597	23 – 260	38 – 150	120 – 170	37 – 51	1.3 – 3.1
	2012 Average	460	65	71.5	129.5	36	1.6
18b-08	2008-2011 Range*	284 - 423	8 - 19	190 - 270	29 - 60	12 - 18	2.1 – 5.5
19b-08	2008-2011 Range	289 – 666	16 – 60	160 – 480	23 – 85	10 – 25	4.5 – 8.6
	Dec 2012	620	7	260	57	18	11
20b-08	2008-2011 Range	235 – 296	7 – 170	3.5 – 58	78 – 110	25 – 31	1.1 – 3.3
	2012 Average	275	45.5	20.5	95	29.5	1.65
23b-12	2012 Range	330 - 380	140 - 190	120	120 - 130	35 - 40	4.2 - 5
	2012 Average	340	170	120	125	37.5	4.68

Note: Historical Ranges include all data up to and including 2011, except where specified.
**Only two samples have been collected from monitor 18b-08: March 2008 and June 2011*

Monitors 18b-08, 19b-08, 20b-08 and 23b-12 have chemistry similar to monitors 14b-01, located northeast of the WRIC though a few parameters at 19b-08 were notably higher than the other overburden background monitors. Monitor 19b-08 showed elevated concentrations of alkalinity, potassium, sodium and boron. Sulphate concentrations at 19b-08, which were previously elevated, were within the range of concentrations at the other overburden background monitors in 2012. Sulphate concentrations were also elevated at monitor 18b-08 though this monitor has only been sampled twice due to persistent dry conditions. The cause of these elevated concentrations is unknown, however, since these monitors are upgradient of the site, the elevated concentrations are not a result of site activities. December potassium and total phosphorus at 19b-08, June COD, TKN, ammonia, total phosphorus and phenol at 20b-08 were higher than the historic maximum concentrations. The December sulphate and chloride at 19b-08 were lower than historic minimum concentrations. Since most of these monitors have a fairly limited dataset, some variability in parameter concentrations is expected. Alkalinity appears to be showing an increasing trend over time at 19b-08.

Elevated iron at 14b-01, 16b-08, 19b-08 and 20b-08 has been noted since December 2011. The December 2011 iron concentrations at these monitors were considered anomalous in our 2011 annual report. However, the 2012 iron concentrations at all four of these monitors are significantly elevated compared to pre-2011 concentrations. At 14b-01, where iron concentrations have increased the most, the December 2011 iron was at a concentration of 61 mg/L compared to the historic maximum iron concentration of 1.3 mg/L. 2012 iron concentrations at this location are 39 mg/L and 27 mg/L. Iron concentrations at 23b-12 are high at 26 mg/L to 120 mg/L. City sampling staff were asked if there have been any changes to sampling protocols, equipment or site conditions in the past year. No changes have occurred so it is unknown as to the cause of the increase in iron concentrations. As these elevated concentrations are apparent in the background monitors, it is concluded that they are not a result of site operations.

Elevated sodium and chloride concentrations at 19b-08 have decreased since the first few sampling events such that the December 2012 sodium and chloride concentrations were 260 mg/L and 7 mg/L, respectively, compared to the 2008 averages of 415 mg/L and 49 mg/L. The 2012 16b-08, 20b-11 and 13b-08 chloride concentration are within the range of concentrations found at 14b-01.

The 2012 parameter concentrations at monitor 14b-01 were generally within the historic range of concentrations at this monitor for both sampling events, except for the December COD and TKN, which are higher than the historic maximums. COD concentrations at 14b-01 were showing a decreasing trend since peaking in 2004-2003 such that

the 2012 concentrations were about 11 mg/L, similar to lower than the other background overburden monitors. However, the December 2012 COD concentration was 46 mg/L, the highest recorded at this location. Monitor 14b-01 has shown increasing sodium and chloride over time from about 20 mg/L and 40 mg/L, respectively in 2001-2003 to 170 mg/L and 270 mg/L in 2009, though 2010 to 2012 concentrations appear to show a declining trend or stabilizing. The elevated sodium and chloride concentrations are most likely related to road salting along Watson Parkway. The average 2012 indicator parameter concentrations at monitor 14b-01 were generally similar to the average 2011 concentrations.

Monitor 16b-08 is located near the northwest corner of the of the Transfer Station site by the stormwater management pond. Indicator parameter concentrations are within the range of concentrations for the other background overburden monitors though they tend to be at the high end of the range. The 2012 parameter concentrations at monitor 16b-08 are within their historic ranges, except for December chloride and sodium which are lower than the historic minimum concentrations. The average 2012 indicator parameter concentrations at monitor 16b-08 were generally lower than average 2011 concentrations.

8.3.1.2 Background Bedrock Water Quality

Background bedrock groundwater quality is measured at locations 5-96 (northwest) and 8-96 (west) on the bedrock high along the western portion of the WRIC site from where groundwater flows into the immediate area of the WRIC. As well, groundwater quality in the bedrock below the site was measured at location 6a-96, 14a-01, 16a-08, 18a-08, 19a-08 and 20a-08, as well as new upgradient monitor 23a-12. Background bedrock groundwater quality is typically hard with more elevated concentrations of the major ions, most noticeably alkalinity and calcium. These types of concentrations are associated with dolostone, which is made up of calcium and magnesium carbonate. The average concentrations of these parameters observed in 2012, along with the historical ranges at these locations are provided below.

Also, provided in this table are the 2012 averages from the downgradient bedrock WRIC site monitors (10-00, 11a-00) installed in late 2001 and late 2011 (22a-11) on the Solid Waste Transfer Station property, the bedrock monitors (13a-01, 15a-01, 17a-08, 18a-08, 19a-08, 20a-08).

	Monitor		Alkalinity (ppm)	Chloride (ppm)	Sodium (ppm)	Calcium (ppm)	Magnesium (ppm)	Potassium (ppm)
Background	**5-96**	Historical Range[1]	278 – 380	112 – 474	71.9 – 263	83.7 – 134	24.2 – 38.4	3.9 – 6
		2012 Average	270	580[2]	370[2]	106.5	23	4
	8-96	Historical Range	264 – 356	37.2 – 332	17.6 – 171	87 – 123	32 – 43.4	1.73 – 3.1
		2012 Average	295	94	60.5	90.5	31.5	2.3
	14a-01	Historical Range	215 – 263	4.8 – 28	9.1 – 27.4	63.5 – 86	22.4 – 29	1 – 2
		2012 Average	240	20	16	78.5	27.5	1.1
	16a-08	2008-2011 Range	232 – 251	28 – 39	2.1 – 42	76 – 88	26 – 30	1.8 – 3.6
		2012 Average	240	32	2.6	86	27	1.9
	18a-08	2008-2011 Range	233 – 258	16 – 57	4 – 89	65 – 100	27 – 34	1.1 – 3
		2012 Average	243	16	4.2	86	29	1.3
	19a-08	2008-2011 Range	234 – 246	27 – 70	12 – 47	94 – 110	33 – 37	1.2 – 1.5
		2012 Average	245	67	30	110	35	1.45
	20a-08	2008-2011 Range	236 – 262	16 – 37	4.7 – 56	72 – 88	26 – 31	1 – 1.8
		2012 Average	245	17	4.25	84.5	28.5	1.25
	23a-12	2012 Range	230 - 250	24 – 30	11 - 15	85 - 97	28 - 35	0.95 – 1.3
		2012 Average	243	28	14	93	32	1.18

	Monitor		Alkalinity (ppm)	Chloride (ppm)	Sodium (ppm)	Calcium (ppm)	Magnesium (ppm)	Potassium (ppm)
Downgradient	**6a-96**	Historical Range	206 – 420	158 – 345	70 – 176	94.6 – 158	26 – 42	2 – 16.4
		2012 Average	285	150(2)	110(2)	94.5	24.5	2.85
	10-00	Historical Range	236 – 267	17 – 44.9	7.7 – 14	79 - 95.1	27 – 32	1 – 2
		2012 Average	240	23.5	9.2	89	30	1.1
	11a-00	Historical Range	225 – 263	4 – 24	4.3 - 25.9	62 - 83.2	23 – 28	1 – 3
		2012 Average	235	23	5.2	74.5	26	1.8
	13a-01	Historical Range	241 – 272	83.9 – 111	38 – 49	90 – 112	32 – 38.8	2 – 2.9
		2012 Average	250	92	42	100	33	2.6
	15a-01	Historical Range	243 – 271	42 – 62.4	7.7 – 24	88 – 129	29 – 39	1 – 2
		2012 Average	250	62.5	21.5	105	34	1.25
	17a-08	2008-2011 Range	225 – 248	27 – 39	10 – 67	64 – 83	26 – 30	1.4 – 2.2
		2012 Average	230	38.5	12	84.5	29	1.6
	21-08	2008-2011 Range	261 – 284	4 – 54	7.5 – 34	75 – 87	25 – 32	0.86 – 1.2
		2012 Average	275	12.5	13.9	78.5	26	1
	22a-11	December 2011	212	56	16	110	35	1.6
		2012 Average	250	89.5	47	97	25.5	1.45

Note: 1. Historical Ranges only include data from 1997 up to 2003 due to continued increasing chloride and sodium values after 2003.
2. Road salt impact.
Historical Ranges include all data up to and including 2011, except where specified.

Generally the average 2012 concentrations fall within the historical ranges, with the following exceptions. The 2012 average concentrations of sodium and chloride at monitor 5-96 continue to show significant road salt impacts. The sodium and chloride concentrations at 5-96 have shown a significant increase in recent years from less than 140 mg/L and 300 mg/L pre-2003, respectively to about 370 mg/L and 580 mg/L in 2012. The effects are found to be seasonal with the dry weather (June) sampling period showing higher sodium and chloride concentrations as compared to the wet weather sampling periods. As well, there have been historical road salt effects observed at location 6a-96 and 8-96. Sodium and chloride at monitor 5-96 exceed ODWS. Sodium and chloride are elevated (but within ODWS) at monitor 6a-96. The elevated sodium and chloride concentrations at monitors 5-96 and 6a-96 are due to road salt impacts. The average 2012 chloride and magnesium concentrations at 6a-96 are slightly lower than historic minimums at this location though no declining concentrations trends are noted.

The average 2012 calcium concentration at 17a-08 is slightly higher than the maximum historic concentration. Examination of the calcium and chloride concentrations over time at 17a-08 shows a subtle increasing trend. June 2011 chloride, conductivity, magnesium, sodium, calcium concentration at 18a-01 showed concentrations higher than historic maximums during this monitoring event. These parameter concentrations have since returned to historic concentrations. The June 2010 chloride concentration at monitor 20a-08 of 37 mg/L was about double historic chloride concentrations and accompanied by elevated sulphate and iron and low nitrate and nitrite. The 2011 and 2012 parameter concentrations at 20a-08 have returned to within the range of historic concentrations, except for iron (discussed further below).

Unusually high iron concentrations in the December 2011 samples were noted at monitors 2b-91, 5-96, 6b-96, 11b-00, 12a-00, 13b-01, 14b-01, 15b-01, 16a-08, 16b-08, 17a-08, 17b-08, 18a-08, 19a-08 and 21a-08. These elevated iron results occurred across the site in both upgradient and downgradient and overburden and bedrock monitors. Elevated iron concentrations have continued in 2012 except at 5-96 and 12a-00 which show 2012 iron concentrations similar to historic. Iron concentrations in the remaining monitors have generally decreased (though remain elevated) since peaking in December 2011. City sampling staff were asked if there have been any changes to sampling protocols, equipment or site conditions in the past year. No changes have occurred so it is unknown as to the cause of the increase in iron concentrations. As these elevated concentrations are apparent in the background monitors, it is concluded that they are not a result of site operations.

When the water quality from the monitors located along the eastern boundary of the WRIC (10-00, 11a-00) and in the Transfer Station property (13a-01, 14a-01, 15a-01, 16a-08, 17a-08) are compared to the historical monitors to the west, there is a difference in bedrock water quality observed. With the exception of alkalinity, the concentrations of the major ions are generally lower indicating a less mineralized water. This difference in water quality is attributed to the bedrock units they are completed in. As stated earlier, there is a bedrock high to the west of the site. This high is dominated by the dolostone units of the Guelph Formation. The bedrock topography dips steeply from this high, across the WRIC site, towards a deeply incised bedrock valley low. This valley cuts into the underlying Gasport Formation (formerly the Amabel). These monitors are installed in this formation or at the contact of this formation at the eastern boundary of the WRIC facility. Overall, water quality from this lower formation is found to be less mineralized, which is confirmed by sampling of these monitors.

Monitor 22a-11 is located downgradient in the bedrock low and constructed as a piezometer in the bedrock (total depth of 24.4 m below ground surface[10]). The three samples collected at the site shows parameter concentrations within the range of other downgradient bedrock monitors. Chloride and sodium concentrations are slightly elevated suggesting possible road salt impacts, as observed further up-gradient.

Monitor 23-12 is located upgradient of the site and is representative of background conditions. The three samples collected from the site show parameter concentrations within the range of other background groundwater monitors.

8.4 Downgradient Groundwater Quality

8.4.1 Shallow Outwash Groundwater Quality

Monitors along the eastern property boundary of the WRIC and within the paleo-valley in this same area are downgradient of operations at the Transfer Station and the WRIC based on shallow groundwater flows (Figure 3). The table below compares downgradient water quality at monitors 2b-01, 6b-96, 7-96, 11b-00, 13b-01, 15b-01, 17b-08 and 22b-11 to the Ontario Drinking Water Standards (ODWS), leachate quality (from Eastview Landfill) and background outwash water quality from monitors BH14b-01, 16b-08, 18b-08, 19b-08 and 20b-08.

	Monitor		Critical Leachate Indicators				Other Leachate Indicators			
			Boron (ppm)	***Phenols (ppm)***	***Alkalinity (ppm)***	***Chloride (ppm)***	***Sodium (ppm)***	***Calcium (ppm)***	***Magnesium (ppm)***	***Potassium (ppm)***
Leachate		ODWS	5.0		30 – 500	250	200			
		Historical Range (1997-2010)	6.22 – 47	0.72 – 830	2,900 – 9,050	101 – 2,660	424 – 2,300	33 – 221	144 – 661	149 – 1,410
		Average (1997-2010)	22.8	100	6,195	1,842	1,481	96	467	802
Downgradient	**2b-91**	Historical Range	< 0.005 – 0.028	< 0.72 – 6	166 – 362	3 – 17	1.8 – 5.2	52.2 – 90	21.8 – 39	0.69 – 1
		2012 Average	0.011	< 1	290	3	3.8	87	28	0.99
	6b-96	Historical Range	0.02 – 0.078	< 0.72 – 11	246 – 412	90.3 – 815	53.1 – 467	85.9 – 217	20.5 – 47	5.36 – 18
		2012 Average	0.026	1.1	330	195	160	94.5	21.5	7.6
	9-96	Historical Range	0.01 – 0.063	< 0.72 – 4	171 – 348	5 – 83.7	1.48 – 34	68.6 – 100	14.7 – 34	0.3 – 1.5
		2012 Average	0.015	< 1	92.5	13.5	18	29.5	7.2	3.05
	7-96	Historical Range	0.03 – 0.102	< 0.72 – 12	224 – 378	54.3 – 397	28.7 – 212	95.1 – 226	28 – 52.7	9.06 – 27
		2012 Average	0.037	< 1	320	115	88.5	105	28	10.25
	11b-00	Historical Range	0.04 – 1.9	< 1 – 7	185 – 279	54 – 192	26.8 – 150	44 – 103	12 – 28.4	1 – 2.2
		2012 Average	0.20	< 1	240	140	100	77.5	17	1.55

10. The monitors at 22-11 will be surveyed during 2013 to obtain ground and top of pipe elevations in order to tie it in to the site.

	Monitor		Critical Leachate Indicators				Other Leachate Indicators			
			Boron (ppm)	***Phenols (ppm)***	***Alkalinity (ppm)***	***Chloride (ppm)***	***Sodium (ppm)***	***Calcium (ppm)***	***Magnesium (ppm)***	***Potassium (ppm)***
Downgradient *continued*	**13b-01**	Historical Range	0.01 – 0.1	< 1 – 12	287 – 506	7 – 200	4.8 – 88	84.7 – 160	28 – 45	1 – 2.5
		2012 Average	0.029	< 1	425	67	40.5	140	29	2.1
	15b-01	Historical Range	< 0.01 – 0.08	< 1 – 10	200 – 544	4 – 270	2 – 130	73.4 – 210	18.7 – 53	0.92 – 2
		2012 Average	0.02	< 1	425	55	47.5	160	32.5	1.05
	17b-08	2008-2011 Range	0.015 – 0.025	< 1	304 – 357	230 – 620	160 – 330	110 – 190	28 – 48	2.1 – 3.1
		2012 Average	0.024	< 1	330	440	245	155	35.5	2.6
	22b-11	Dec 2011	0.014	< 1	299	57	43	110	24	1.6
		2012 Average	0.022	< 1	285	52.5	30.5	103	27	1.4
Background	**14b-01**	Historical Range	< 0.01 – 0.05	< 1 – 13	267 – 438	22.3 – 280	0.1 – 170	0.2 – 140	0.05 – 38	0.2 – 2.6
		2012 Average	0.018	< 1	375	121	86.5	130	31	2.15
	16b-08	2008-2011 Range	< 0.01 – 0.033	< 1	318 – 597	23 – 260	38 – 150	120 – 170	37 – 51	1.3 – 3.1
		2012 Average	0.028	< 3	460	65	71.5	129.5	36	1.6
	18b-08	March 2008	0.07	< 1	284	8	270	29	12	2.1
		June 2011	0.10	<1	424	19	190	60	18	5.5
	19b-08	2008-2011 Range	0.1 – 0.27	< 1	289 – 666	16 – 60	160 – 480	23 – 85	10 – 25	4.5 – 8.6
		2012 Average	0.140	< 1	620	7	260	57	18	11
	20b-08	2008-2011 Range	< 0.01 – 0.018	< 1	235 – 296	7 – 170	3.5 – 58	78 – 110	25 – 31	1.1 – 3.3
		2012 Average	0.01	5	275	45.5	20.5	95	29.5	1.65

Note: Historical Ranges includes all data up to and including 2011, except where specified.
ODWS = Ontario Drinking Water Standards.
**No samples collected in 2010 due to insufficient volume.*

Alkalinity concentrations at 2b-91 have increased compared to the pre-2003 average of 183 mg/L. The average 2012 alkalinity concentration was 290 mg/L. Sulphate concentrations have been decreasing over time from about 30 mg/L in the mid-1990s to its current 2012 concentration of 6 mg/L. Recent chloride concentrations since 2008 have been about 3 mg/L compared to pre-2008 concentrations of about 10 mg/L. No other trends in indicator parameter concentrations were noted at 2b-91. Of note are the low nitrate concentrations since 2008 of less than 1.5 mg/L. Historically, nitrate concentrations frequently exceeded the ODWS at 2b-91.

Outwash at monitors 6b-96 (northeast corner) and 7-96 (central) as well as at the historical monitor 3-97 (southwest corner), which was destroyed during the construction of the SUBBOR pilot facility and replaced with monitor 12b-00, are upgradient of the WRIC and Transfer Station. These locations are along the flow path that trends from the southwest to the northeast and receives groundwater inputs from the bedrock high to the west. This water quality is typified by concentrations of the major ions that are elevated above the background outwash but for the most part lower than the bedrock concentrations. This is anticipated as the more ionized water from the bedrock to the west would mix with the less ionized waters in the overburden.

Monitor 6b-96 usually shows lower concentrations of chloride and sodium than observed in the background bedrock at monitor 5-96. These sodium and chloride concentrations tend to show a seasonal trend, usually highest in the early spring, suggesting they are attributed to road salting of the surrounding area. Monitor 5-96 has been showing increasing chloride concentrations over time from about 200 mg/L up to 2002 to around 800 mg/L in the late-2000s, likely in response to long-term road salting in the area. Monitor 12b-00 shows lower sodium and chloride concentrations compared to 6b-96 and 7-96, likely due to the absence of road salt sources upgradient of this location.

As shown on the above table, indicator parameter concentrations observed in the background and downgradient outwash monitors on the Transfer Station/WRIC property are considerably lower than typical leachate concentrations from the closed Eastview Road Landfill. Chloride and sodium at 17b-08 (June and December 2012) exceeded ODWS. These exceedances are due to road salt impacts. Monitor 17b-08 is in the shallow outwash, downgradient of Transfer

Station. The sodium and chloride concentrations at 17b-08 are within the more recent range of concentrations of the background WRIC bedrock monitors 5-96 and 6a-96, which have been impacted by road salt. Elevated sodium and chloride at 17b-08 suggests road salt impacts by lateral dispersion at this location. Other leachate indicator parameter concentrations are within background outwash ranges for the Transfer Station indicating no impacts.

The average 2012 nitrate concentration at monitor 7-96 continues to exceed the ODWS. This has been observed historically, as well as prior to the start-up of the WRIC facility and is most likely a result of past agricultural land use. There were no other exceedances of ODWS for the shallow groundwater monitors in 2012 for the parameters tested, except for iron (previously discussed).

At 13b-01, both sodium and chloride have shown increasing trends since 2004, peaking in 2008 and slowly declining since then. These elevated concentrations are likely due to road salt impacts as this monitor is located adjacent to the access road to the Transfer Station and Dunlop Road. The 2012 sodium and chloride concentrations are similar to lower than the 2011 concentrations. Since indicator parameter concentrations at monitor 13b-01 remain within background concentrations, it has been concluded that there are no leachate impacts.

At monitor 15b-01, the average chloride concentration has increased from a 2006 average concentration of 6 mg/L to a peak in 2010 with an average concentration of 195 mg/L. Sodium and chloride showed a noticeable increase in concentrations in 2010 with a 2010 average of 108 mg/L and 195 mg/L, respectively, compared to a 2009 average of 72 mg/L and 63 mg/L and a 2007 average concentrations of 11 mg/L and 29 mg/L. Sodium and chloride decreased in 2011 to an average concentration of 101.5 mg/L and 79.5 mg/L, respectively and have continued to decrease in 2012 with average concentrations of 47.5 mg/L and 55 mg/L. This monitor shows a subtle increasing trend in alkalinity, peaking in 2008 at about 496 mg/L and gradually decreasing to an average 2012 concentration of 425 mg/L. These increases are likely related to the construction of the paved pad immediately south (discussed below). This monitor had previously been considered an upgradient background location due to its location east of the WRIC and south of the Transfer Station. However, in the mid-2000s, a large paved pad was constructed southeast of this monitor location. This pad was originally intended for storage of leaf compost but is now being used to store construction and demolition material (roofing shingles, clean wood, drywall, rubble). The pad is sloped such that surface water runoff is captured by a catch basin located near the middle of the pad and directed to the storm sewer. The change in water quality at this location may be due to a combination of road runoff impacts from the Transfer Station access road to the northwest, a reduction of infiltration (and therefore, dilution) with the installation of the paved pad as well as the road salt from the south as observed in the background monitors.

Monitor, 22b-11, completed in November 2011, is representative of downgradient overburden conditions based on its location along the western site boundary. The 2011 and 2012 water quality is similar to 18b-08, 19b-08 and 20b-08. Elevated sodium and chloride at concentrations of 52.5 mg/L and 30.5 mg/L, respectively, reflect road salt impacts due to its location immediately adjacent to Dunlop Drive.

We conclude from this assessment, there have been no leachate impacts to the shallow groundwater in the vicinity of the WRIC and Transfer Station as a result of site operations in 2012.

8.4.2 Downgradient Bedrock Groundwater Quality

The interpreted bedrock groundwater flow directions (Figure 2) indicate that monitors 6a-96, 10-00, 11a-01, 13a-01, 15a-01, 17a-08 and 22a-11 are downgradient of the active Transfer Station and WRIC area, within or on the edge of the paleo-valley trending through the site.

The bedrock groundwater quality was compared to Ontario Drinking Water Standards (ODWS), as applicable. Sodium and chloride exceed ODWS at background bedrock monitor 5-96 due to road salt impacts. There are no other exceedances of ODWS in 2012 for the bedrock groundwater monitors for the parameters tested (except for iron, previously discussed).

As the shallow outwash water quality is not impacted by site operations, no impacts to the deeper bedrock groundwater would be expected nor observed.

8.5 Groundwater Organics Results

Groundwater monitors were analyzed for organics during both the June (dry) and December (wet) monitoring events at monitoring locations 2, 6, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 22 and monitors 5-96, 7-96, 8-96, 9-96, 10-00 and 21a-08. Monitoring location 23-12 was also sampled for organics in July and December 2012.

Monitor 14b-01 had a detection of bis(2-ethylhexyl) Phthalate (DEHP) during both monitoring events in 2012 at concentrations of 38 μg/L and 52 μg/L. Previously, DEHP detections had been observed at monitor 14b-01 in December 2011 at a concentration of 21 μg/L, 14b-01, 18a-08 and 20a-08 in June 2010 at concentrations of 50 μg/L, 6 μg/L and 3 μg/L and at monitors 14b-01 and 16a-08 in June 2009 ranging from 2 μg/L (14b-01) to 8 μg/L (16a-08). DEHP was also detected during both monitoring events in 2007 at monitor 14b-01. It has historically been detected at both upgradient and downgradient monitors in since 1997 up to and including 2010. Historic DEHP detections ranged from 0.73 μg/L to 120 μg/L. DEHP is prevalent in the environment due to their use in plastics. There is no ODWS for DEHP. Since DEHP has sporadically been detected at monitors across the site, we have concluded that it is not related to site operations.

Total xylene and m- and p-xylene was detected at 14b-01 (0.12 μg/L to 0.2 μg/L), just at or slightly above the 0.1 μg/L laboratory detection limit. Historically, low levels (0.1 μg/L to 0.3 μg/L) of m- and p-xylene have been detected at 11b-00, 12a-00, 12b-00, 13b-00, 14b-01, 15b-01 and 20a-08 between 2001 and 2011 both upgradient and downgradient of the site. The ODWS for xylenes is 300 μg/L. Concentrations detected here are well within ODWS and are not likely related to site activities as they are observed in the background locations as well.

Toluene at a concentration of 0.31 μg/L was detected at 14b-01 in June 2012. Historically, low concentrations of toluene have been detected at 2a-91, 11a-00, 12a-00, 12b-00, 13b-01, 14b-01 and 15b-01. The historic and 2012 toluene concentrations detected on the site are well within the aesthetic ODWS of 24 μg/L. Since it has been detected at both upgradient and downgradient monitors and at low concentrations at or just above the laboratory detection limit, these detections are not likely related to site activities.

Naphthalene was detected at 15a-01 (1.8 μg/L) and 15b-01 (13 μg/L) in December 2012. It was previously detected at CL-1 (leachate) at a concentration of 0.7 μg/L in June 2000 and in June 1998 (0.2 μg/L). Monitor 15b-01 also showed detections of acenaphthene, 1-methylnaphthalene and 2-methylnaphthalene at concentrations of between 0.3 μg/L and 0.6 μg/L in December 2012. There is no ODWS for any of these compounds.

Monitors 6a-96 and 11b-00 had detections of bromodichloromethane (0.17 μg/L to 0.3 μg/L) in 2012 during both monitoring events. A low concentration (0.12 μg/L) of bromodichloromethane was observed historically at 6a-96 in December 2011. Bromodichloromethane was previously detected at monitor 11b-00 in 2010 at a concentration of 1.4 μg/L and during both 2011 monitoring events at concentrations of 0.39 μg/L and 0.5 μg/L but had not previously been detected at this location. It had previously been detected in 2010 at 17b-08 (2.9 μg/L) and in 2002 at CL-1 in the leachate (0.4 μg/L). Bromodichloromethane can be found in chlorinated drinking water as a disinfection by-product. In the past, they were used as a solvent, a flame retardant and in the manufacture of other chemicals. There is no ODWS for this parameter and it also considered not related to site operations.

Low concentrations of chloroform (0.5 μg/L and 0.58 μg/L) were detected at monitors 6a-96 and 11b-00 and 17b-08 (0.47 μg/L and 0.54 μg/L) during both monitoring events in 2012. Chloroform was also detected at a concentration of 0.11 μg/L at 22a-11 in June 2012. Monitors 6a-96, 11b-00 and 17b-08 also showed low levels of chloroform in 2011 and 2010. A low concentration of chloroform (0.2 μg/L) was detected at monitor 6a-96 in 2009. The laboratory detection limit for chloroform is 0.1 μg/L. Low chloroform (0.3 μg/L) was also detected during 2008 and both 2007 sampling events at this same monitor. Chloroform has historically been detected at low levels at monitors 6a-96, 6b-96 and 11b-00, in the overburden and bedrock with no elevated indicator parameter concentrations indicating that these occasional detections are not a result of activities on the site. There is no ODWS for chloroform.

Monitor 9-96 was not sampled in 2010 and 2011 due to inaccessibility due to construction activities in the area. Monitor 9-96 did not show any detection of 1,1,1-Trichloroethane in 2012. Persistent low levels of 1,1,1-Trichloroethane had previously been detected at this location. Historically 1,1,1-Trichloroethane has not been detected in any of the monitors on the Transfer Station or the WRIC site indicating that it is localized and is not moving beyond the monitor area. Concentrations will continue to be monitored in the future to determine that it no longer is present.

Isophorone was detected at monitors 9-96 (0.7 μg/L) and 10-00 (0.8 μg/L) during the June 2012 monitoring event. It has not previously been detected in any of the groundwater monitors during historic monitoring events. Isophorone has no ODWS. It is a solvent in some printing inks, paints, lacquers, adhesives, co-polymers, coatings, finishings and pesticides.

Monitor 23b-12 was completed to better understand groundwater flow in the area and to assess potential water quality at the boundary along Stone Road. A sample was taken after the monitors were completed on July 5, 2012. Several VOC compounds were detected including BTEX (Benzene, Toluene, Ethylbenzene and Xylenes), 2-Methylnaphthalene, Tetrachloroethylene, Bis(2-ethylhexyl)phthalate, Chloroform and Dibromochloromethane. Several of these compounds have historically been detected in the background locations. Of note for this sample was the presence of 2-Methylnaphthalene, which is known to come from automobile exhaust. Where applicable, all concentrations were still well below the ODWS. To confirm these results, a sample was completed on July 19, 2012. This sample has significantly less detections which only included Benzene, Toluene, Xylenes and Tetrachloroethylene. All of the concentrations were at or just above the detection limit and, in most cases, were lower than those observed at the background monitor 14b-01 in June 2012. No VOC's were detected from the sample completed in December 2012, as part of the routine monitoring, with the exception of a trace concentration of Chloroform. As stated earlier, Chloroform is not considered to be related to site operations as it is routinely observed across the site including background wells. It is most likely that the July detections are related to very hot summer conditions and the close proximity of this monitor to Stone Road. However, future monitoring should continue to assess the validity of the July 2012 VOC results.

No other organics were detected at any of the monitors that are part of the WRIC and Transfer Station monitoring program in 2012.

Historically, there have been occasional low level detections of organics at both upgradient and downgradient monitors. Because the detection limits for organic compounds are very low, it is not unusual to have sporadic low level organic detections at sites where organic samples are frequently collected. The presence of persistent organics at one location combined with elevated indicator parameter concentrations and/or increasing trend in parameter concentrations would trigger more intense scrutiny of water quality results. This has not been the case for the organic detections at this site.

To further check the validity of future organic detections, a trip blank and a field blank should be collected with each organic monitoring event for QA/QC purposes.

8.6 General Groundwater Quality Discussion

Overall, the groundwater chemistry during 2012 was similar to previous years.

In 2007, nitrate and nitrite analysis was re-instated into the routine monitoring program for both the sites as per the MOE's recommendations. Historically, nitrates were included in the monitoring program but were removed since elevated nitrate concentrations were prevalent across the site at all locations prior to development of the site. This was once again confirmed in 2012. The nitrate ODWS was exceed by the June 2012 sample collected from 7-96, as it has pre-development of the site. Shallow background monitors 1b-91 and 6b-96 historically have also shown elevated nitrate concentrations in the early 1990s (up to 32 mg/L at 1b-91) and late 1990s (up to 44 mg/L at 6b-96) indicating that the elevated nitrates were present prior to the commencement of facility operations.

Monitors 5-96, 6b-96, 17b-08 and 19b-08 exceeded ODWS for sodium and/or chloride in 2012 as a result of road salt effects. Exceedances of the iron ODWS occurred at many of the monitoring locations during the December 2011 and persisted throughout 2012, though at lower concentrations suggesting that the iron impact occurred during late 2011 and the monitors are now only showing residual effects. These iron exceedances will be investigated further in future monitoring events. There were no other exceedances of the Ontario Drinking Water Standards in 2012.

Low detections of DEHP, total and m- and p-xylene, toluene, naphthalene, acenaphthene, 1-methylnaphthalene, 2-methylnaphthalene, chloroform, isophorone and bromodichloromethane were detected in a few of the monitors during 2012, most of which have been observed historically.

Chloroform was detected at 6a-96 and 11b-00 in 2012. Historically, chloroform has been detected at low levels at monitors 6a-96, 11b-00 and 17b-08, in both the overburden and bedrock with no elevated indicator parameter concentrations indicating that these occasional detections are not a result of activities on the site.

Monitors 6a-96 and 11b-00 had detections of bromodichloromethane in 2012 at low concentrations. Bromodichloromethane was previously detected at monitor 6a-96, 11b-00 and 17b-08. There is no ODWS for this parameter and it is considered not related to site operations.

Of the organics that were detected in 2012, naphthalene, acenaphthene, 1-methylnaphthalene and 2-methylnaphthalene had not previously been detected in any of the groundwater monitors during historic monitoring events. None of these organics have ODWS and are considered not related to site operations.

New monitor 23b-12 showed detections of several VOC's in the initial sample and to a lesser degree in the follow-up sample (similar to and, in some cases, lower than observed at background). No VOC's were detected in December 2012, with the exception of Chloroform, which is not considered to be related to site operations. It was concluded the VOC results from July were most likely related to a very hot summer and the close proximity of this location to Stone Road.

Historically, there have been occasional low level detections of organics at both upgradient and downgradient monitors. Because the detection limits for organic compounds are very low, it is not unusual to have sporadic low level organic detections at sites where organic samples are frequently collected. The presence of persistent organics at one location combined with elevated indicator parameter concentrations and/or increasing trend in parameter concentrations would trigger more intense scrutiny of water quality results. In previous monitoring reports, we had recommended discontinuation of the organic sampling from the groundwater monitoring program for all historical locations. The MOE review of the 2009 Annual Monitoring report (Groundwater Review), the reviewer did not support the discontinuation of the organic groundwater sampling program since an impact assessment with respect to the requirements of Guideline B-7 had not yet been completed. Further additional monitoring is required

to better assess the new location with respect to the VOC detections observed in July 2012. Organic sampling events should include a trip blank and a field blank collected with each organic monitoring event for QA/QC purposes.

In conclusion, there were no observable effects attributed to the WRIC and the Transfer Station on the groundwater quality beneath the site. No effects were observed at the site boundaries. Road salt effects continue to be observed at location 5-96, 8-96 (upgradient of site), 7-96 and 9-96 (on-site) and are related to off-site as well as potential on-site activities.

8.7 Guideline B-7 Assessment

MOE Guideline B-7 (formerly Policy 15-08 referred to as the Reasonable Use Policy) applies the reasonable use approach to groundwater quality management at waste management sites. Guideline B-7 describes acceptable levels of contaminants in the groundwater at site boundaries, based on the Ontario Drinking Water Standards (ODWS) and natural background conditions. In addition, it is used to determine whether any remedial action is warranted. The Guideline B7 limits were calculated using the formula outlined in the MOE's Procedure B-7-1 (MOEE 1994a and 1994b).

The basic methodology to assess groundwater quality in relation to Guideline B7 limits (reasonable use guidelines), is to compare the shallow downgradient groundwater quality to the calculated maximum concentrations. The leachate indicator parameters used in the assessment are either health related or aesthetic parameters specified in the ODWS. Based on the MOE reasonable use approach from Guideline B-7, the maximum concentrations (**Cm**) allowed at the site boundaries are calculated from the drinking water quality criteria (**Cr)** and background concentrations (**Cb**) based on the formula provided in Procedure B-7-1. Guideline B7 allows for some incremental impact to occur on the neighbouring property, relative to background. Input for a given chemical parameter includes the background concentration, the Ontario Drinking Water Standards (MOE, 2000), and a safety factor that was established by the MOE based on human health and aesthetic considerations.

As part of the MOE review on the 2009 Annual Monitoring report, it was recommended that Guideline B-7 be applied to this site as the geological model and groundwater flow have been confirmed, which is generally northeasterly. Monitor 22a-11 (bedrock) and 22b-11 (overburden) were installed at the downgradient northwestern property boundary adjacent to Dunlop Drive to be utilized for an impact assessment with respect to the requirements of Guideline B-7[11]. The median historic concentrations from background overburden monitors 12b-00 and 14b-01 and from background bedrock monitors 5-96 and 8-86 were used to calculate the maximum concentration levels presented in Tables 8 and 9, respectively.

$$C_m = C_b + F \times (C_{ODWS} - C_b)$$

where, C_m is the maximum concentration,

C_b is the median background concentration,

C_{ODWS} is the maximum concentration (dependant on water use),

F is a constant – 0.5 mg/L for aesthetic parameters, 0.25 mg/L for health related parameters.

11. Memorandum from Lynnette Latulippe (MOE) to Bill Shields (City of Guelph), Re: Annual Monitoring Report – 2009 Guelph Wet-Dry Recycling Centre and Waste Transfer Station Groundwater Review, dated February 7, 2011.

Table 8. Guideline B-7 Calculated Maximum Parameter Concentrations - Overburden

Parameter	C_b	F	C_{ODWS}	C_m
Nitrate (mg/L)	0.4	0.25	10	2.8
Boron (mg/L)	0.035	0.25	5	1.28
Sodium (mg/L)	31	0.5	200	116
Chloride (mg/L)	63	0.5	250	157
Sulphate (mg/L)	32.3	0.5	500	266
Iron (mg/L)	0.15	0.5	0.3	0.23

Note that monitors 5-96 and 8-86 show elevated sodium and chloride concentrations due to road salt impacts, however, these conditions are representative of this area.

Table 9. Guideline B-7 Calculated Maximum Parameter Concentrations – Bedrock

Parameter	C_b	F	C_{ODWS}	C_m
Nitrate (mg/L)	0.75	0.25	10	3.06
Boron (mg/L)	0.02	0.25	5	1.27
Sodium (mg/L)	86.1	0.5	200	143
Chloride (mg/L)	154.5	0.5	250	202
Sulphate (mg/L)	45	0.5	500	273
Iron (mg/L)	0.02	0.5	0.3	0.16

Maximum allowable concentrations (C_m) are compared to the groundwater quality results from 22-11 sampled in in Table 10.

Table 10. Summary of 2012 MOE Guideline B-7 (Reasonable Use) Calculations at the Northwest Boundary

Parameters in mg/L		Overburden			Bedrock		
		Cm	*Monitor 22b-11*		Cm	*Monitor 22a-11*	
			Jun 2012	*Dec 2012*		*June 2012*	*Dec 2012*
Health Related Parameters	Nitrate	2.8	< 0.1	***3.5***	3.06	***4***	< 0.1
	Boron	1.28	0.019	0.024	1.27	0.024	0.023
Aesthetic Parameters	Sodium	116	13	48	143	78	16
	Chloride	157	48	59	202	130	49
	Sulphate	266	83	26	273	25	93
	Iron	0.23	***1.4***	***0.28***	0.16	***0.19***	***0.89***

Bold, italicized concentrations in Table 10 exceed Guideline B-7 limits. December nitrate and iron at 22b-11 in the overburden and June nitrate and iron at 22a-11 in the bedrock exceed the Guideline B-7 limits. Historically, elevated nitrate concentrations were prevalent across the site at all locations prior to development of the site. Shallow background monitors 1b-91 and 6b-96 historically have also shown elevated nitrate concentrations in the early 1990s (up to 32 mg/L at 1b-91, prior to the facility operations) and late 1990s (up to 44 mg/L at 6b-96) indicating that the elevated nitrates were present prior to the commencement of facility operations. As previously discussed, iron concentrations at some of the monitor locations were unusually high during the December 2011 monitoring event. These elevated concentrations persisted during 2012, though concentrations have generally decreased. The elevated iron concentrations occurred in both upgradient and downgradient monitors and therefore, do not appear to be related to site operations.

Strictly speaking, Guideline B-7 is in place to assess groundwater impacts leaving the site for protection of downgradient users. There are no downgradient well users as the surrounding area is municipally serviced.

8.8 Surface Water Monitoring

Transfer Station

In 2012, monthly inorganic surface water sampling of the stormwater management pond (SWM) for the parameters shown on Table 3 occurred when water was present. The SWM pond was routinely checked during 2012. When water was present, samples were collected at the culvert on the west side of the pond (TP1 on Figure 1) and at the discharge at the north end of the pond (TP1 (out) on Figure 1) on a monthly basis. The water in the SWM pond at TP1 and TP1 (out) was sampled in March, July, September, October and December in 2012. TP1(out) only was also sampled in April and June 2012.

The existing on-site surface water pond ("East Pond" on Figure 1) is also included in the monitoring program. Water quality from the East Pond is considered representative of background surface water quality as it does not receive any inputs from the facilities. It was recommended in the 2011 annual monitoring report that the monitoring frequency of the East Pond be increased to monthly to coincide with those occasions when samples are collected from the on-site SWM ponds. If no samples are collected from the any of the SWM pond locations, no sample from the East Pond for that month is required. East Pond surface water samples (designated EPTS-01) were collected in April, June, July, September, October and December. The 2012 surface water results for the leachate indicator parameters are tabulated below, and the testing results are presented in Appendix C.

Surface water results were compared to Provincial Water Quality Objectives (PWQO), background surface water quality (EPTS-01) and background overburden water quality. At EPTS-01, the PWQO for zinc was exceeded during all six monitoring events in 2012. Zinc has consistently exceeded PWQO in the past at this location. Phenols, total phosphorus and iron have exceeded PWQO in the past but were within PWQO in 2012. All the leachate indicator parameters concentrations were within background overburden ranges.

Location	Date	Critical Leachate Indicators			Other Leachate Indicators				
		Boron (ppm)	***Phenols (ppm)***	***Chloride (ppm)***	***Alkalinity (ppm)***	***Sodium (ppm)***	***Calcium (ppm)***	***Magnesium (ppm)***	***Potassium (ppm)***
PWQO/		0.2	0.001	-	-	-	-	-	-
Background Overburden(1)		0.005 – 0.063	< 0.001 – 0.013	3 – 280	166 – 438	1.5 – 170	52 – 140	14.7 – 39	0.3 – 2.6
Background Overburden(2)		<0.01 – 0.27	< 0.001	7 – 620	235 – 666	3.5 – 480	23 – 190	10 – 51	1.1 – 8.6
TP1	29-Mar-12	0.023	< 0.001	210	280	160	89	21	4.8
	26-Jul-12	0.045	0.014	29	44	27	31	4.1	16
	20-Sept-12	0.024	0.0028	48	170	41	57	9.4	3.2
	24-Oct-12	0.02	0.001	73	230	50	73	12	3.2
	18-Dec-12	0.011	< 0.001	130	240	100	82	12	2.6
TP1 (out)	29-Mar-12	0.02	< 0.001	170	170	130	60	8.8	3.7
	17-Apr-12	0.018	< 0.001	170	180	130	65	8	4.2
	22-Jun-12	0.057	< 0.001	26	140	32	48	4.5	3.8
	26-Jul-12	0.052	< 0.001	28	140	36	46	3.3	5.4
	20-Sept-12	0.024	0.0031	32	140	26	47	6.7	3
	24-Oct-12	0.019	< 0.001	38	180	36	58	9	2.8
	18-Dec-12	0.011	< 0.001	120	160	87	54	6.9	2
EPTS-01	17-Apr-12	0.016	< 0.001	45	250	31	86	23	1.4
	22-Jun-12	0.016	< 0.001	38	230	22	74	21	1.3
	26-Jul-12	0.015	< 0.001	34	230	18	74	22	1.4
	20-Sept-12	0.017	< 0.001	47	250	29	84	25	1.5
	24-Oct-12	0.018	< 0.001	49	250	30	87	24	1.6
	18-Dec-12	< 0.01	< 0.001	58	270	37	94	25	1.7
	Historic Range	<0.01 – 0.19	<0.001 – 0.002	26 – 190	169 – 334	13 – 120	68 – 160	19 – 27	1 – 2

Note: (1) Range of background overburden water quality from 1997 to 2011 for monitors 2b-91, 9-96 and 14b-01.
(2) Range of background overburden water quality from 2008-2011 for monitors 16b-08, 17b-08, 18b-08, 19b-08 and 20b-08.

For the SWM pond samples at TP1, the PWQO was exceeded for total phosphorus and iron for all five events and zinc and phenols for two events of the five events. For the SWM pond samples at TP1 (out), the PWQO was exceeded for total phosphorus for all 2012 events, iron for five of the seven 2012 events and zinc for one event. The PWQO for total phosphorus, iron and zinc have routinely to occasionally been exceeded at these locations in the past. Phenol concentrations have occasionally exceeded PWQO in the past. The elevated total phosphorus is a result of former agricultural land use and not a result of operations at the Transfer Station. Elevated zinc, total phosphorus and iron concentrations appear to be related to external factors since background surface water have also exceeded PWQO for these parameters. Metals are a common contaminant from roadway runoff. Elevated phosphorus is typical in rural and urbanized areas. The 2012 concentrations are within the range of historic background overburden quality, except for July TP1 phenols, which were slightly higher than background. The July TP1 phenol concentration was 0.014 μg/L compared to the maximum overburden background of 0.013 μg/L and was within the range of phenol concentrations historically observed at this location. 2012 indicator parameter concentrations are within the range of background surface water concentrations, except for TP1 and TP1(out) phenols (two and one occasion, respectively), TP1 chloride (one occasion), TP1 and TP1(out) sodium (one and two occasions, respectively) and TP1 and TP1(out) potassium (five and six occasions, respectively). Baseline water quality information collected prior to building the WRIC had historically shown elevated total phosphorus concentrations and occasional elevated phenols, sodium, magnesium and potassium concentrations. Therefore, the elevated parameter results are due to the impacts of former land use and not a result of operations at the Transfer Station.

The results for the indicator parameters from TP1, TP1 (out) and EPTS-01 for each monitoring event were compared to each other for direct quality comparison to background. In April 2012, TP1(out) concentrations of potassium, chloride and sodium exceeded background surface water concentrations at EPTS-01. In June, TP1(out) concentrations of potassium, sodium and boron exceeded background surface water concentrations. In July, potassium, sodium and boron at both TP1 and TP1(out) and phenol at TP1 exceeded background surface water concentrations. In September, potassium, phenol and boron at both TP1 and TP1(out) and sodium and chloride at TP1 exceeded background surface water concentrations. In October, potassium, sodium and boron at both TP1 and TP1(out) and phenol and chloride at TP1 exceeded background surface water concentrations. In December, potassium, sodium, chloride and boron at both TP1 and TP1(out) exceeded background surface water concentrations. It is noted that both the June and July TP1(out) samples were collected from standing water, likely resulting in higher parameter concentrations due to concentrated samples. Elevated parameter concentrations are not attributed to the Transfer Station as site handling and maintenance practices would deter potential surface water impacts. Elevated sodium and chloride concentrations are likely a result of road salt impacts from the adjacent internal road.

2012 parameter concentrations at TP1 were within the range of historic concentrations, except for March alkalinity (280 mg/L), which was higher than its historic maximum of 254 mg/L and July potassium (16 mg/L), which was higher than its historic maximum of 9 mg/L. 2012 parameter concentrations at TP1(out) were within the range of historic concentrations. The SWM Pond shows elevated sodium and chloride concentrations suggesting road salt impacts from the adjacent access road.

No organic samples were collected from the surface water locations due to dry conditions. Organic sampling will occur in 2013.

WRIC

Monitoring of surface water at the WRIC commenced in March 1996. As required in the C of A, this monitoring was to be to be on a monthly basis for a short parameter list and on a quarterly basis for the full leachate parameter list (updated in 1999), as outlined in Section 3. There are two surface water sampling stations at the site, designated as

SW 1 located at the off-site discharge point in Stormwater Detention Area 2 and SW 2 located in the Stormwater Detention Area 1 (Figure 1). Surface water runoff from the site is directed to a series of on-site stormwater catch basins. Excess water from Stormwater Detention Area 1 flows to Stormwater Detention Area 2 where it would ultimately discharges via a pond outlet structure in the northwest portion of the pond to the York-Watson Stormwater Detention Area.

East Pond water quality will serve as background surface water for comparison purposes. There is no baseline surface water analysis (prior to site operations), so any impacts due to runoff from the WRIC would be difficult to determine at the discharge point SW 1, due to the potential for other sources of non-facility impacts. These sources include runoff from the surrounding agricultural lands and road systems.

During mid-1998, the surface water monitoring program was re-designed to better understand contributions from runoff directly related to the site and not stagnant pond conditions. Surface water sampling is still undertaken on a monthly basis. However, more detailed recordings on discharge and overall conditions (such as dry or stagnant water) are undertaken. As well, the monthly sampling is to be undertaken during runoff conditions (weather permitting), and if no event occurs, are to be sampled at the end of the month regardless.

Detention Pond 2 (SW 1) was dry throughout 2012 therefore no samples were collected. Below is a discussion of the surface water monitoring at station SW 2 during 2012. Samples were collected from Detention Pond 1 (SW 2) on March 29, September 20, October 24 and December 18. No other surface water samples were collected due to frozen or dry conditions. The table below briefly outlines the surface water monitoring events for the past year at these surface water stations.

Month	Discharge Events	SW2 Conditions	Sampling Date
January	No Discharge	Dry	**No Sample**
February	No Discharge	Snow covered	**No Sample**
March	No Discharge	Standing Water	**March 29, 2012**
April	No Discharge	Dry	**No Sample**
May	No Discharge	Dry	**No Sample**
June	No Discharge	Dry	**No Sample**

Month	Discharge Events	SW2 Conditions	Sampling Date
July	No Discharge	Dry	**No Sample**
August	No Discharge	Dry	**No Sample**
September	No Discharge	Standing Water	**September 20, 2012**
October	No Discharge	Standing Water	**October 24, 2012**
November	No Discharge	Dry	**No Sample**
December	No Discharge	Standing Water	**December 18, 2012**

*Note: * June SW2 sample collected but inadvertently not submitted to the laboratory.*

SW2 quality results were compared to the background East Pond parameter concentrations, where samples were collected from both locations. Most parameters are elevated compared to background surface water at the on-site SW2 (Stormwater Detention Area 1) station. All indicator parameters were elevated at SW2 compared to background surface water in September. In October and December, of the indicator parameters, elevated concentrations of potassium (both) phenols (October), chloride (December) and sodium (December) were reported in 2012. The 2012 parameter concentrations were within the range of historic concentrations at SW2. The spring (March) concentrations were generally higher than the September, October and December concentrations, likely due to seasonal influences. Total phosphorus and iron exceeded the PWQO during all monitoring events in 2012. Phenols exceeded the PWQO during two of the four monitoring events in 2012. Zinc exceeded the PWQO on three occasions each during 2012. Total phosphorus, iron and zinc have historically routinely exceeded their PWQO. The phenol PWQO was historically only exceeded on five other occasions since 1997. It is noted that background bedrock monitors 5-96 and 8-96 have consistently shown elevated zinc concentrations indicating that high zinc is natural in the area. All surface water quality results are appended.

As per the requirements of the C of A, the surface water was to be analyzed for organics once annually (typically in June). Our 2008 annual report recommended organic samples at SW 1 and SW 2 earlier in the year to avoid frequent dry conditions that typically occur in June. Organic sampling was not completed in 2012 but will be completed in 2013.

It is recommended that surface water monitoring continue to be conducted monthly until a suitable water quality database, has been achieved.

8.9 Adequacy of Program and Proposed Changes

In conclusion, there were no observable effects attributed to the WRIC and the Transfer Station on the groundwater quality beneath the site. Monitor 15b-01 shows elevated sodium and chloride concentrations however, background overburden monitors 18b-08 and 19b-08 have much higher sodium concentrations compared to 15b-01 and new background overburden monitor 23b-12 also shows much higher sodium and chloride concentrations indicating that the site operations are not the source of these parameters.

There were detections of DEHP, total and m- and p-xylene, toluene, naphthalene, acenaphthene, 1-methylnaphthalene, 2-methylnaphthalene, chloroform, isophorone and bromodichloromethane in a few of the monitors during 2012. However, based on the historic detections of occasional low levels of VOC throughout the site in both upgradient and downgradient monitors, most of the 2012 VOC detections are not considered to be a result site operations. Detections of VOCs at new monitor 23b-12 are likely related hot summer conditions and the close proximity to Stone Road.

The MOE recommended installation of a well nest along the downgradient property boundary to be utilized for an impact assessment with respect to the requirements of Guideline B-7[12]. New monitoring nest 22-11 with a bedrock and overburden monitor was installed in November 2011 and the Guideline B-7 analysis was completed. December nitrate and iron at 22b-11 in the overburden and June nitrate and iron at 22a-11 in the bedrock exceed the Guideline B-7 limits. Historically, elevated nitrate concentrations were prevalent across the site at all locations prior to development of the site. Shallow background monitors 1b-91 and 6b-96 historically have also shown elevated nitrate concentrations in the early 1990s and late 1990s indicating that the elevated nitrates were present prior to the commencement of facility operations. As previously discussed, iron concentrations at some of the monitor locations were unusually high during the December 2011 monitoring event. These elevated concentrations persisted during 2012, though concentrations generally decreased. The elevated iron concentrations occurred in both upgradient and downgradient monitors and therefore, do not appear to be related to site operations.

In previous monitoring reports, we had recommended discontinuation of the organic sampling from the groundwater monitoring program for all historical locations. The MOE review of the 2009 Annual Monitoring report (Groundwater Review), the reviewer did not support the discontinuation of the organic groundwater sampling program since an impact assessment with respect to the requirements of Guideline B-7 had not yet been completed. This Guideline B-7 assessment was completed (discussed above) and found that there were no impacts at the western downgradient site boundary as a result of site operations therefore, we request removal of the organic sampling from the groundwater monitoring program, once a better understanding of the VOC detections at 23b-12 have been completed.

The East Pond setting is similar to the Transfer Station SWM and the WRIC ponds (influenced by road salting and within similar overburden soils) though it is within a different catchment area. The East Pond will be used as a background surface water station to water quality from the on-site surface water features. To effectively compare surface water samples, samples should be collected on the same day. This same day sampling was completed in 2012 and should continue. It was recommended that the monitoring frequency of the East Pond be increased to monthly to coincide with those occasions when samples are collected from the on-site SWM ponds. This monthly sampling was completed in 2012, where possible. If no samples are collected from the any of the SWM pond locations, no sample from the East Pond for that month is required.

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12. Memorandum from Lynnette Latulippe (MOE) to Bill Shields (City of Guelph), Re: Annual Monitoring Report – 2009 Guelph Wet-Dry Recycling Centre and Waste Transfer Station Groundwater Review, dated February 7, 2011.

The 2012 Transfer Station surface water monitoring program shows that there have been no leachate impacts to the SWM pond as a result of operations at the Waste Transfer Station. The 2012 SWM Pond results from TP1 and TP1(out) showed phenols, chloride, sodium, boron and potassium exceeded background surface water concentrations at EPTS-01 on one or more occasions in 2012 at one or both locations. Some of these parameters at TP1 (alkalinity, potassium) concentrations were also higher than their historic background maximum concentrations but are generally within background overburden concentrations. The 2012 TP1(out) concentrations were within their historic ranges. It is noted that some of the samples were collected from standing water, likely resulting in higher parameter concentrations due to concentrated samples. Elevated concentrations are not attributed to the Transfer Station as site handling and maintenance practices would deter potential surface water impacts. Elevated sodium and chloride concentrations suggest road salt impacts from the adjacent access road. No surface water organic sampling was conducted in 2012 however, historically only low levels of a few organics have occasionally been detected in the surface water samples. As previously discussed, the design and operation of the Transfer Station minimizes the potential for leachate generation from site activities.

The 2012 WRIC surface water monitoring program shows occasionally elevated parameter concentrations at SW2, due to road salt impacted runoff from the adjacent internal roadways, occasional stagnant water conditions in the pond and/or seasonal influences. The total phosphorus, phenols, zinc and iron PWQO were exceeded during two or more sampling events at the Stormwater Detention Ponds, as they have occasionally to routinely been exceeded in the past. It is noted that background bedrock monitors 5-96 and 8-96 have consistently shown elevated zinc concentrations indicating that high zinc is natural in the area.

It is concluded that the current monitoring program, as described in Section 2, is adequate for the WRIC and the Transfer Station.

9. Public Liaison (PLC) Activities

The following is a summary of the PLC activities in 2012, as provided by the City.

The City ensured that meetings were held on a quarterly basis. The PLC has been informed and provided an opportunity to comment on all site ECA amendments that were submitted to the Ministry in 2012.

10. WRIC Certificate of Approval for Discharge

The WRIC operates under a C of A for municipal and private sewage works (number 9970-VEVLBH) for discharge off-site. Runoff generated from the site is directed to the two stormwater detention ponds located at the northwest end of the site (Detention Pond 1 and 2). Condition 6(2) of the C of A outlines the monitoring program for the site which includes sampling of the compost pad storage pond overflow during a rainfall event for a return storm of two years or greater and stormwater effluent monitoring for a rainfall event generating a depth of 25 mm or more.

Amended Certificate of Approval 5015-856HHF, issued June 16, 2010 removed this condition from the C of A.

11. WRIC Contingency Plans

The City has detailed contingency plans in place for the site prepared by the Environmental Services Department, Solid Waste Resources. The 2008 Emergency and Contingency Plan and the 2006 Contingency Plan documents (WRIC Contingency Programs, WRIC Business Continuity Plan, WRIC Emergency Plan, WRIC Fire Safety Plan) were reviewed by AECOM.

The pertinent items identified by the C of A are summarized below.

11.1 Spills

The WRIC has a Spills Handling and Reporting procedure in place. This procedure applies to all areas, employees and contractors at the WRIC. The procedure defines spills: minor, major, moderate and hazardous materials. The Spills procedure then outlines how to clean up a minor spill and who must be notified in the case of moderate or major spills.

In the event of a minor spill, the plan indicates that appropriate personal protective equipment should be worn and absorbents used to soak up the spill. Absorbed material should be transported to the Transfer Station for disposal.

The plan also covers procedures to follow in the event of a moderate or major spill. The City of Guelph Operations Department, the Environmental Protection Officer at the Wastewater Treatment Plant and the MOE Spills Action Centre must be notified, also in the event of a major spill, the Fire Department, Police, Operations Department, or City of Guelph Emergency Operations Control Group may need to be notified. The plan indicates that all necessary steps should be taken to eliminate possible ignition sources and prevent the spill from leaving the area or entering a watercourse. The plan notes that an Employee Incident Report must be completed once the cleanup is underway. Finally, the plan provides sources of additional information and applicable legislation and references.

11.2 Fire or Similar Emergency

The WRIC has comprehensive plans in place in case of fire or similar emergency documented in the WRIC Fire Safety Plan and the WRIC Emergency Plan. The Fire Safety Plan includes site mapping, floor plans for each of the on-site buildings (including locations of fire alarms and extinguishers), procedures to be followed in the event of a fire/emergency, staff responsibilities and contacts in the event of a fire/emergency, procedures for fire drills, prevention and monitoring equipment maintenance.

The Emergency Plan includes many of the elements incorporated into the Fire Safety Plan plus emergency communications procedures, locations of emergency supplies, emergency equipment information and procedures related to specific emergency situations. The original Fire Safety Plan was reviewed and approved by the City Fire Department.

11.3 Composting Facilities

The Organic Waste Processing Facility operated from mid-February to December 2012. There is a 2012 contingency plan that now includes the waste processing facility, approved in late 2011.

11.4 Power or Equipment Failure

Procedures related to power failure are discussed in the Emergency and Contingency Plan and the WRIC Emergency Plan. In the event of a minor power outage, a portable generator is available at the closed Eastview Road Landfill site. There is currently no contract for a company to supply the WRIC with a generator in the event of a major power outage. However, arrangements are in place for an outside power generation unit for the WRIC Administration Building if it is being used as an Operations Control Centre. If electricity is unavailable for more than a 24-hour period, the WRIC would be required to re-direct waste materials. Emergency procedures have also been assessed for on-site facilities should the power failure be accompanied by flood or freezing conditions.

Procedures as a result of loss of on-site facilities are addressed in the Emergency and Contingency Plan as well as the WRIC Business Continuity Plan. Recommended procedures associated with the loss of each of the facilities are documented. Ultimately, management will assess the course of action to restore the facilities and re-gain normal operations. A new generator has been installed at the Organic Waste Processing Facility.

11.5 Odour

Twice daily odour monitoring is conducted by qualified Solid Waste Resources (SWR) staff. Odour complaints from the public are investigated through the SWR Environmental Complaint Investigation Procedure in compliance with Condition 46 of the C of A. Control measures may include closing doors, cleaning up standing water and/or spills, other housekeeping measures, making changes to the processes or removal of the odour source to the landfill. If the odour persists, a portion of the operation or the entire site may be closed until the issue is resolved.

In response to the odour survey report completed by the MOE in 2012, the City prepared an action plan to address the potential for off-site odours (see Proactive Work Plan to Address Potential On-Site Odours letter, Appendix D).

11.6 Aircraft Hazards/Bird Control

The Guelph Air Park is located within three km of the site. The most obvious aircraft hazard, as it relates to the operation of the WRIC, is the nuisance bird population. Daily monitoring of the number of birds occurs as part of the site inspections. A maximum number of birds on-site was determined in the bird hazard evaluation referred to in the C of A. Continual housekeeping measures, such as litter pick up around the site, at the yard waste pile and compost area, occur at the site to deter the attraction of birds and vermin. Should nuisance birds become an issue at the site, trained birds-of-prey or other mitigative measures will be considered. If necessary, the site operations may cease until the issue is resolved.

Dust, steam, smoke or any airborne vapour may pose an aircraft hazard due to decreased visibility. Operations are conducted in a manner to minimize emissions.

11.7 Un-Authorized Waste

Non-compliant loads are rejected at the scale house prior to entering the site. If un-authorized, hazardous or inappropriate waste is inadvertently accepted, the material will be loaded back on the vehicle (if it has not left the site) or the material will be placed in the appropriate bin for removal by a licensed hauler to an appropriate disposal site. The waste will be transported off-site as soon as arrangements can be made with a certified disposal company. If possible, the vehicle that brought the non-compliant load will be charged for the disposal fee.

11.8 Groundwater/Surface Water Contamination

The site and operational procedures are designed such that there will be minimal impacts on the environment. In the event of a surface water impact, the on-site SWM detention ponds have valves that can stop off-site flow. A Spills Contingency Plan (discussed in Section 11.1) is in place to handle spills. Dry and wet waste received and handled at the site is conducted in indoor covered areas with impermeable floor surfaces and materials stored outside are covered such that impacted runoff is not generated.

Nevertheless, should water quality results suggest that there are impacts to the ground or surface water, the monitor locations/surface water stations will be re-sampled within a reasonable period of time to confirm results. As well, the area immediately adjacent and upgradient of the impacted location will be inspected for possible contaminant sources. Equipment and floor drains may also be inspected to determine if repairs are required. These repairs will be completed immediately. Should the repairs be such that normal operation is not possible, this portion of the operation will be shut down until maintenance is complete. If the contamination is a result of failure in the infrastructure that cannot be repaired under normal maintenance procedures, a remedial plan will be developed to prevent further impacts.

11.9 Quality/Fungal Contamination

If issues arise regarding air quality or fungal contamination, the appropriate qualified professional will be contracted to investigate the cause and recommend remedial measures. Remedial measures may include a change/alteration of operations or suspension of operations in the affected area(s).

All staff receive and are trained on the procedures contained within the WRIC Emergency Plan and WRIC Fire Safety Plan. The WRIC Business Continuity Plan is for use only by City Management staff due to personal information within the document. Contingency Plans are available at the WRIC for review by the Ministry.

12. Summary of Site Operational Changes and Compliance

As reported by the City, there were no deficiencies, items of non-compliance, or process aberrations in 2012. There have been no changes to the Engineer's Report[13] or to the Design and Operations Report[14] since the last annual report. The WRIC Environmental Emergency Plan was updated in 2011 to include the organic waste processing facility.

Condition 52(i) requires a summary of any changes to the Design and Operations Report that have been approved by the Director since the last annual report. The following description was provided by the City for inclusion in this annual report.

The Guelph WRIC includes a MRF, Waste (solid, non-hazardous) Transfer Station, Municipal Hazardous and Special Waste ("MHSW") Transfer Station, Organic Waste Composting Facility, and public drop-off area. In 2010, the City, in consultation with the MOE, amended multiple Waste Disposal Site approvals issued for the WRIC operations, consolidating Site conditions into a single approval (i.e., Environmental Compliance Approvals (ECA) No. A170128) and including Limited Operational Flexibility for the MRF and the Waste Transfer Station.

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13. *Engineer's Report for the City of Guelph Waste Recycling Innovation Centre prepared by Golder Associates dated July 20, 2010.*
14. *The Design and Operations Report for the City of Guelph Material Recovery Facility prepared by Golder Associates, dated January 12, 2010. The Design and Operations Report for the City of Guelph Waste Transfer Station prepared by Golder Associates, dated January 12, 2010. The Design and Operations Report for the City of Guelph WRIC Public Drop Off and Municipal Hazardous and Special Waste Facilities prepared by Golder Associates, dated January 12, 2010.*

As specified by Condition 67 of ECA Number A170128, modifications may be made to the MRF and Waste Transfer Station in accordance with the ECA and the pre-approved changes of the Operating Envelope, as described in the Engineer's Report for the Site. The Operating Envelope is defined as the limits on the pre-approved modifications that the Owner may make to the Site without further amendment to the ECA. Condition 67 of the ECA outlines the modifications that are allowed for both the MRF and Waste Transfer Station, including modifications to infrastructure, and modifications to the Site's processing operations and equipment to improve the efficiency and effectiveness of operations.

Modifications Requiring Notification

Modifications recently implemented at the MRF and Waste Transfer Station in 2012 is the addition of a new outdoor storage area (asphalt pad) consisting of concrete bunkers proposed for storage of scrap metal and shingles. The addition of this storage area is described in further detail in the Golder Environmental Compliance Approval letter dated August 2, 2012 (included in Appendix D)[15]. Based on Golder's review of the modifications implemented at the Site, all modifications made are permitted within the Limited Operational Flexibility for the Site, are consistent with generally accepted best management practices, and are not likely to result in an adverse effect (e.g., discharge of a contaminant into the natural environment).

Site design, Site operations, recyclables screening and processing procedures, environmental emergency and contingency plans, site inspection procedures, record keeping or reporting practices, and closure plans have not changed significantly as a result of the modifications outlined herein. As such, no required updates to these technical documents are identified.

Statement of Accountability

This description above accurately and fully describes and discloses the modifications made to the Guelph WRIC MRF and Waste Transfer Station. In support of the notification letter, and as required by Condition 67 of ECA No. A170128, a statement signed by the Site Owner/Permit Holder and an Independent Professional Engineer were provided to the Ministry. These statements declare that the modifications made to the Site are done so in accordance with the Operating Envelope, are consistent with industry's best management practices and are not likely to result in an adverse effect.

13. Conclusions

The site operations at the Solid Waste Transfer Station and Wet-Dry Recycling Centre do not appear to have any negative impacts on the ground and surface water quality in the vicinity of the site.

The following conclusions are provided based on the findings of the 2012 program:

Composting Site

a) The total tonnage of organic waste received at the composting site in 2012 was 17,338 tonnes. The organic waste was mostly from the City of Guelph and Region of Waterloo.

b) A total tonnage of 3,414 tonnes of finished compost was produced and shipped to a farmer in Atwood, Ontario, northwest of Guelph in 2012. A total of 267 tonnes residuals and screened waste from the composting process were shipped to the Transfer Station and then the Green Lane Landfill site in Elgin County, Ontario.

15. *Environmental Compliance Approval No. 170128 Guelph Waste Resource Innovation Centre, 80-110 Dunlop Drive, Guelph, Ontario, Notification of Modification Made to the Material Recovery Facility and Waste Transfer Station Under the Approved Limited Operational Flexibility for the Site prepared by Golder Associates dated August 2, 2012.*

c) The total tonnage of wood waste ("clean wood") and amendment/mulch material received at the site in 2012 was about 326 tonnes and 1,572 tonnes, respectively. Wood waste was received mostly from the City of Guelph. Amendment material was received from Growbark, Green Step Recycling, the City of Hamilton and Speedskate.

d) There were 19 odour incidents received by staff at the Waste Resources Innovation Centre from 15 different complainants in 2012. These complaints were investigated by City of Guelph management staff and/or the MOE. Staff conducting the investigations did not detect any odours at the complainant locations, except for one, which was determined to not be related to the composting site. In response to the MOE odour survey report completed in 2012, the City prepared an action plan to address the potential for off-site odours. The composting facility passed the source test under worse case conditions in August 2012.

e) Compost samples indicate that all compost that has been shipped off of the site has passed the conditions for a Class A compost under the CCME Guidelines and the conditions within the C of A. Temperature monitoring logs of the tunnels at the composting facility show that pasteurisation at 55 degrees C was maintained for 72 hours, as required.

f) The City is not aware of any non-compliance issues with the conditions of the C of A for 2012.

Operations

a) The total tonnage of waste accepted by the site in 2012 was 105,915 tonnes. By the end of 2012, 90,915 tonnes were shipped off-site with 38,671 tonnes of outgoing materials from the Material Recovery facility (MRF).

b) Of the 55,773 tonnes of non-processed outgoing materials received at the Transfer Station in 2012, 48,715 tonnes (87% of the outgoing materials) of material was sent to St. Thomas (Green Lane) Landfill in Elgin County. 105 tonnes of material was sent to the Covanta Energy from Waste facility in Niagara Falls, New York. The remaining 6,953 tonnes of non-processed materials is marketable consisting of other recyclable materials such as shingles, construction and demolition debris, clean wood, drywall, concrete and rubble.

c) In 2012, 31,728 tonnes of marketable processed material transferred off the site from the WRIC facility 19,150 tonnes (60%) was paper-based goods such as cardboard and newsprint, 1,719 tonnes (5%) was plastics and the remaining 10,860 tonnes (34%) was other recyclable materials such as aluminum, steel cans, glass, tires, metal, yard waste, brush and leaves. As reflected in the volumes above, the majority of the marketable materials sold were paper products.

d) The Emergency and Contingency Plan for the site were reviewed and the items pertinent to the C of A are summarized in this document.

e) No remedial or mitigative actions were required at the WRIC Facility or the Transfer Station in 2012 based on findings from the monitoring program.

Groundwater Elevations and Flows

a) Shallow groundwater flow beneath the majority of the site is in a northeasterly direction. To the west of the site, groundwater flows out of a bedrock high into the outwash beneath the site before being directed to the northeast. The 2008 drilling identified a bedrock high southeast of the site in the vicinity of 20a-08. The 2012 drilling further refined flow directions.

b) The bedrock groundwater flow pattern is similar to the overlying shallow groundwater system. Groundwater flow is from west to east and east to west coming into the site area from both directions and ultimately to the north following the former paleo river valley (incised bedrock low) that trends to the north.

Leachate

a) Historically, WRIC Monitoring results from SW3 was used the characterize leachate inputs. SW3 receives mostly runoff from the former compost pad. SW3 is no longer representative of compost leachate. In the past SW3 (or CL-1 leachate), showed elevated concentrations of conductivity, potassium, BOD, COD, TKN, ammonia, total phosphorus, chloride, sodium and iron. SW3 parameter concentrations are generally much lower than pre-2007 concentrations in the absence of compost runoff. Most indicator parameters were elevated at SW3 in 2012 compared to historic background surface water concentrations (East Pond). Parameter concentrations were within the range of historic concentrations, except for the February 2012 conductivity, chloride and sodium, which are the highest measured at this location. Elevated concentrations may be related to residual leachate inputs in the clay-lined pond, which is expected to continue to flush out over time. This water was ultimately directed to the sanitary sewer.

b) Organics were not sampled at the surface water locations during 2012 due to dry conditions, however, historically only low levels of a few organics have occasionally been detected in the surface water samples. The design and operation of the Transfer Station minimizes the potential for leachate generation from site activities.

Groundwater

a) Groundwater monitoring results indicate road salt effects at some up-gradient groundwater monitoring locations (5-96, 8-96, 18b-08, 19b-08, 20b-08). These are related to off-site winter road salting of the adjacent major roadways. Road salt impacts are detected in some on-site downgradient groundwater monitors (6b-96, 7-96, 13b-01, 15b-01, 17b-08). Monitors 5-96, 6b-96, 17b-08 and 19b-08 exceeded ODWS for sodium and/or chloride in 2012 as a result of road salt impacts. There were no apparent leachate impacts observed in the groundwater at the site boundary.

b) The nitrate ODWS was exceed by the June 2012 sample collected from 7-96. Historically, elevated nitrate concentrations were prevalent across the site at all locations prior to development of the site. Elevated nitrates are most likely a result of long-term agricultural land use in the area and are not a result of site operations.

c) Exceedances of the iron ODWS persisted throughout 2012 at many of the monitoring locations, though concentrations generally decreased compared to December 2011. These iron exceedances, although not considered related to site operations, will be further investigated in future monitoring events. Aside from the sodium, chloride, nitrate and iron exceedances discussed above, there were no other exceedances of the Ontario Drinking Water Standards in 2012 for the groundwater monitors sampled for the WRIC and Transfer Station monitoring programs.

d) The 2012 organic sampling showed there were detections of DEHP, total and m- and p-xylene, toluene, naphthalene, acenaphthene, 1-methylnaphthalene, 2-methylnaphthalene, chloroform, isophorone and bromodichloromethane in a few of the monitors. However, based on the historic detections of occasional low levels of VOC throughout the site in both upgradient and downgradient monitors, most of the 2012 VOC detections are not considered to be related to site operations. New monitor 23b-12 showed detections of several VOC's, in the initial and follow-up sampling in July 2012 but not in the December sample. These detections are most likely related a hot summer and close proximity to Stone Road. There are no sources of VOCs on the WRIC or Transfer station property as waste is handled within the covered buildings, truck boxes are covered when outside (preventing contact between the waste and precipitation) and no waste processing occurs on-site.

e) No other organics were detected at any of the other groundwater monitors sampled during 2012.

f) A Guideline B-7 assessment for the overburden and the bedrock was completed for the new monitor nest 22-11, located along the western property boundary. December nitrate and iron at 22b-11 in the overburden and June nitrate and iron at 22a-11 in the bedrock exceed the Guideline B-7 limits. Historically, elevated nitrate concentrations were prevalent across the site at all locations prior to development of the site. Shallow background monitors 1b-91 and 6b-96 historically have also shown elevated nitrate concentrations in the early 1990s and late 1990s indicating that the elevated nitrates were present prior to the commencement of facility operations. As previously discussed, iron concentrations at some of the monitor locations were unusually high during the December 2011 monitoring event. These elevated concentrations persisted during 2012, though concentrations generally decreased. The elevated iron concentrations occurred in both upgradient and downgradient monitors and therefore, do not appear to be related to site operations.

g) No observable effects were detected in the shallow outwash water quality related to site operations. Similarly, no effects related to site operation were observed in the bedrock. Further, no effects related to site operations was observed at the downgradient site boundary.

Surface Water Monitoring

a) Monthly monitoring of the stormwater management pond in the northwest corner of the site was conducted, with samples collected at the culvert on the west side of the pond (TP1) on five occasions and at the discharge at the north end of the pond (TP1 (out)) on seven occasions in 2012. SWM pond samples at both TP1 and at TP1 (out) exceeded the PWQO for zinc, iron, total phosphorus and phenols during one or more 2012 sampling events. The elevated total phosphorus is a result of agricultural land use and not a result of operations at the Transfer Station. Elevated zinc, total phosphorus and iron concentrations appear to be related to external factors since background surface water have also exceeded PWQO for these parameters. Metals are a common contaminant from roadway runoff. Elevated phosphorus is typical in rural and urbanized areas.

b) Of the six sets of samples collected in 2012 at EPTS-01 (the existing Transfer Station on-site surface water pond (East Pond)), the PWQO for zinc was exceeded during all the 2012 monitoring events. Zinc has consistently exceeded PWQO in the past at this location. Phenols, total phosphorus and iron have exceeded PWQO in the past but were within PWQO in 2012. All the leachate indicator parameters concentrations were within background overburden ranges. The East Pond shows no indications of impacts as a result of site operations.

c) No surface water quality samples were collected at SW1 (Stormwater Detention Area 2) during 2012 due to dry conditions.

d) The SW 2 (Stormwater Detention Area 1) samples at the WRIC showed elevated concentrations of the indicator parameters in 2012 during one or more of the four sampling events. The 2012 parameter concentrations were within the range of historic concentrations at SW2. The spring (March) concentrations were generally higher than the September, October and December concentrations, likely due to seasonal influences. Total phosphorus and iron exceeded the PWQO during all monitoring events in 2012. Phenols exceeded the PWQO during two of the four monitoring events in 2012. Zinc exceeded the PWQO on three occasions each during 2012. Total phosphorus, iron and zinc have historically routinely exceeded their PWQO. The phenol PWQO was historically only exceeded on five other occasions since 1997. It is noted that background bedrock monitors 5-96 and 8-96 have consistently shown elevated zinc concentrations indicating that high zinc is natural in the area.

e) Organic sampling was not conducted in 2012 but will be completed in 2013.

14. Recommendations

The following recommendations are provided for consideration:

a) Records pertaining to details of the incoming and outgoing waste/materials, environmental and operational problems should continue to be kept up to date for the WRIC and the Transfer Station.

b) The approved ground and surface water monitoring program should be continued for the Transfer Station during 2013 for the site with the inclusion of the new monitoring location 23-12 drilled during 2012. As previously recommended by the MOE, additional annual VOC sampling of monitors 5-96, 7-96, 9-96, 12b-00 and nitrate and nitrite analysis have been included in the monitoring program for the site. The monitoring program for both the sites is summarized on Table 11.

c) Groundwater, surface water and leachate sampling should be continued for the WRIC in 2013 as originally outlined in the 1997 annual report and revised in 1999.

d) All samples should be analyzed for the parameters listed in the table below.

Monitoring Parameter List

Leachate Indicator		
Parameters	• Biological Oxygen Demand (BOD) • Chemical Oxygen Demand (COD) • Total Kjeldahl Nitrogen (TKN) • Ammonia as Nitrogen (NH3-N) • Total Phosphorus (Total P) • Total Suspended Solids (TSS) for surface water and leachate. • Total Sulphate (SO4) • Phenols • Nitrate (NO3) and Nitrite (NO2)	• Chloride (Cl) • Sodium (Na) • Calcium (Ca) • Boron (B) • Total Iron (Fe) • Phosphorus (P) • Zinc (Zn)
General Parameters	• pH • Conductivity • Alkalinity	• Magnesium (Mg) • Potassium (K)
Organics	• EPA 624,625 (ATG 16+17+18 & ATG 19+20)	

e) During organic sampling events, a trip blank and a field blank should be collected and submitted for QA/QC purposes.

f) The East Pond will be used as a background surface water station for water quality from the on-site surface water features. To effectively compare surface water samples, monthly samples should continue to be collected on the same day. If no samples are collected from the any of the SWM pond locations, no sample from the East Pond for that month is required.

Table 11. Monitoring Program Summary

AECOM

City of Guelph WRIC

Groundwater Monitoring Locations and Sampling Frequency

Formation	Monitor Locations		Sampling Frequency	Water Levels *
Sandy Silt Till	2a-91	7-96	Semi Annually - Inorganics (June, December)	Semi Annually (June, December)
Sandy Outwash	2b-91 6b-96	9-96	Semi Annually - Inorganics (June, December)	Semi Annually (June, December)
Gravelly Outwash	11b-00	12b-00	Semi Annually - Inorganics (June, December)	Semi Annually (June, December)
Dolostone Bedrock	5-96 6a-96 8-96	10-00 11a-00 12a-00	Semi Annually - Inorganics (June, December)	Semi Annually (June, December)

Leachate Monitoring Location and Sampling Frequency

Monitor Locations	Sampling Frequency	Leachate Level Sampling
SW3 - Forbay (Southern end) of Detention Pond 1 (Scalehouse)	Semi Annually** - Inorganics Annually** - Organics	Monthly * - Discharge

Surface Water Monitoring Stations and Sampling Frequency

Monitor Locations	Sampling Frequency	SW Level Sampling
SW1 - Downstream outflow of Detention Pond 2	Monthly** - Inorganics Annually** - Organics	Monthly ** - Discharge
SW2 - Downstream outflow of Detention Pond 1	Monthly** - Inorganics Annually** - Organics	Monthly ** - Discharge

* C of A requirements for Wet-Dry is semi-annual. Recommend quarterly water levels collected to compare to Waste Transfer Station locations, which have quarterly requirements.

** After a rain event or if no rain, at end of sampling period

City of Guelph Transfer Station

Groundwater Monitoring Locations and Sampling Frequency

Formation	Monitor Locations		Sampling Program
Gravelly Outwash	13b-01 14b-01 15b-01 16b-08 17b-08	18b-08 19b-08 20b-08 22b-11 23b-12	Semi Annually - Inorganics (June, December) Annually - Organics (June)
Dolostone Bedrock	13a-01 14a-01 15a-01 16a-08 17a-08 18a-08	19a-08 20a-08 21a-08 22a-11 23a-12 EPTS-01	Semi Annually - Inorganics (June, December) Annually - Organics (June)

Groundwater Levels

Formation	Monitor Locations		Sampling Program
Gravelly Outwash	13b-01 14b-01 15b-01 16b-08 17b-08	18b-08 19b-08 20b-08 22b-11 23b-12	Quarterly (June, December)
Dolostone Bedrock	13a-01 14a-01 15a-01 16a-08 17a-08 23a-12	18a-08 19a-08 20a-08 21a-08 22a-11	Quarterly (June, December)

Surface Water Monitoring Stations and Sampling Frequency

Monitor Locations	Sampling Program
TP1	Monthly*** - Inorganics Annually*** - Organics
TP (out)	Monthly*** - Inorganics Annually*** - Organics
East Pond (EPTS-01)	Monthly*** - Inorganics Annually*** - Organics

*** After a rain event or if no rain, at end of sampling period

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