BISSETT CREEK WASTE DISPOSAL SITE
CORPORATION OF THE UNITED TOWNSHIPS OF HEAD, CLARA AND MARIA

2010/2011 BIENNIAL REPORT

Prepared by: Jp2g Consultants Inc.
Engineers • Planners • Project Managers
Project No. 2006023M – AOR
and
AECOM
File No. 60246826-6.1

May 2012

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

Jp2g Consultants Inc.
ENGINEERS ▪ PLANNERS ▪ PROJECT MANAGERS

J.M. Janota, M.Sc., P.Eng.
J.E. Hunton, MCIP, RPP

TRANSMITTAL

Date	May 31, 2012		
To	Lance Larkin Ministry of the Environment Ottawa District Office 2430 Don Reid Drive Ottawa, ON K1H 1E1	**From**	Kevin Mooder Jp2g Consultants Inc. 1150 Morrison Drive, Suite 410 Ottawa, ON K2H 8S6
		Jp2g No.	2006023M / 2006024M
Re	Bissett Creek WDS / Deux Rivieres Closed WDS		

☐ mail ☐ e-mail ☐ courier ☒ by hand ☐ for your review ☑ for your records ☐ for your action

Quantity	Description
1	2010 / 2011 Biennial Report Bissett Creek Waste Disposal Site
1	CD containing the AECOM monitoring report
1	2010 / 2011 Biennial Report Deux Rivieres Waste Disposal Site
1	1 CD containing the AECOM monitoring report

Comments

Per

Kevin Mooder, MCIP, RPP

c.c.: - Melinda Reith, Township
- Perry Larochelle, Jp2g
- Spencer Bootsma, AECOM

EXECUTIVE SUMMARY

The Bissett Creek Waste Disposal Site is located on Lots 12 and 13, Concession 13, in the geographic Township of Maria, in the Township of Head, Clara and Maria. The 2010/2011 Biennial Report provides a brief description of the site's approval status as required to satisfy Condition 20 of the Provisional Certificate of Approval No. A412406, dated March 27, 1980 as amended under Notice No. 1 November 19, 2001; amended November 27, 2003; and Notice No. 3 July 19, 2006. The report details the results of the 2010/2011 operations and environmental monitoring program.

Site Development and Operations

Site operations in 2010/2011 can be summarized as follows:

- The Certificate approved a total site capacity of 18,502m^3 as detailed in the Site Development and Operations Plan dated May, 2002
- As of December 31, 2011 the total landfilled capacity used was estimated to be 8,970m^3
- The Township has implemented a curbside collection of recyclables and an enhanced waste diversion program at this site
- The Township in consultation with MNR completed the plan of survey in April 2009 and transfer of lands from the Crown involving an issuance of Letter of Patent was completed August 31, 2011 as required under Condition 17
- An application to amend the Certificate was filed with EAAB on November 11, 2011 to reflect the new site size

Environmental Monitoring

The results of the 2010/2011 monitoring program are presented in a report prepared by AECOM and entitled "2010/2011 Monitoring Report – Bissett Creek Landfill", dated May 2012, which is attached to this report as Part 2. Reference should be made to the AECOM Report for a discussion on the results and for recommendations related to future monitoring.

Recommendations

- The Township and contractors must keep accurate records of waste types received and hauled from the site.

TABLE OF CONTENTS

DRAWINGS

DRAWING 1: EXISTING CONDITIONS PLAN 2011
DRAWINGS 2 TO 4 MAY 2002
PLAN 49R-13963 APRIL 2009

APPENDICES

PART 2 – 2010/2011 MONITORING REPORT

Part 1

2010/2011 Site Development and Operations

1.0 INTRODUCTION

The Township of Head, Clara and Maria retained Jp2g Consultants Inc. to complete the 2010/2011 Biennial Report for the Bissett Creek Waste Disposal Site. The completion of this report is required to satisfy Condition 20 of the Provisional Certificate of Approval Number A412406 last amended July 19, 2006 for the use and operation of a 0.6 hectare landfill site within a total site area of 2.0 hectares. The site is located on Lots 12 and 13, Concession 13, geographic Township of Maria in the Township of Head, Clara and Maria.

1.1 Background

In May 2001 Jp2g Consultants Inc. submitted an Application to amend the Certificate No. A412406 dated March 27, 1980 to reflect current MOE guidelines as requested by the Ministry. Notice No. 1 dated November 19, 2001 amended the Certificate which acknowledged a theoretical maximum volumetric capacity for the site at 18,502m^3, conditional upon the development of more detailed design and operational requirements for review by the MOE (Condition 14).

An amendment to the Certificate was issued November 27, 2003 in response to a MOE review of the "Site Development and Operations Plan" dated May 2002 prepared by Jp2g Consultants Inc. and the "Bissett Creek Landfill Site Hydrogeology and 2000-2001 Monitoring Report" dated May 2002 prepared by Gartner Lee Limited.

Specific conditions under the amended Certificate required the Township's action.

16. By March 31, 2004 the Owner to submit to the Director for approval, plans for the area designated as Fill Beyond Approved Limits.
    - On March 23, 2004 Jp2g filed a report to EAAB
    - Notice No. 2 dated October 4, 2004 required final cover on the FBAL by July 31, 2005
    - Application of final cover over the FBAL was completed by the Township in 2005/2006

17. By July 31, 2004 the Owner to complete the survey of the landfilling area and Site Area to be purchased from MNR, complete the transfer of ownership, and provide the Director with a copy proof of registration.
    - The Ministry was advised that this timeline was not achievable, and in correspondence from Nafiseh Pourhassani (EAAB) dated August 6, 2004, it was agreed that a December 31, 2005 deadline was more reasonable.
    - Jp2g filed a formal request to Mr. Ian Parrott dated December 21, 2005 to extend the deadline to December 31, 2006.
    - Notice No. 4 dated July 19, 2006 extended the deadline to December 31, 2006; however through correspondence with the OLS and MNR this timeline could not be achieved.
    - On April 21, 2009 Plan 49R-16963 was registered and on August 31, 2011 the Crown issued Letters of Patent to the Township

1.2 Scope

Condition 20 of the Provisional Certificate of Approval for the Bissett Creek Waste Disposal Site, requires that the Township submit a Biennial Report documenting the site operations and environmental monitoring of the Site by May 31, 2006 and by May 31 every two (2) years thereafter. The 2010/2011 Biennial Report includes a summary of site development, operations, compliance issues, and the groundwater monitoring results presented in this report as follows:

Part 1 Site Development and Operations
Part 2 Environmental Quality Monitoring

2.0 SITE DEVELOPMENT

During 2010/2011 the Bissett Creek Waste Disposal Site operations involved a trench and cover method of landfilling as shown on **Drawing No. 1**. Covering is to occur once per week.

Development of the site is to proceed in accordance with the approved design drawings contained in the "Site Development and Operations Plan", dated May 2002 as follows:

- Drawing 2 of 4 "Trench Layout" dated May 2002, plotted May 17, 2002
- Drawing 3 of 4 "Landfill Phasing and Sequencing" dated May 2002, plotted May 17, 2002
- Drawing 3 of 4 "Final Contour and Section" dated May 2002, plotted May 17, 2002

Copies of these drawings have been included in this report for reference.

In 2008 the Township erected a bear fence within the 0.6 ha landfilling area. In 2010/2011 the Township conducted trenching within the designated landfilling area, within the limits of the bear fence (assumed to be relocated in 2010). Two (2) trenches upon completion at the end of 2009 generally exhausted the below ground capacity within the bear fence. The sequence of trenching will not exactly follow Drawing 3 of 4. The extent of total trenching to be reviewed in 2012/2013.

It has been decided that a modified area method of disposal be initiated within the bear fencing to achieve final design contours, and the final disposal on site will involve trenching and area disposal within the remaining 0.6 ha landfilling area.

As reported in the previous Biennial Reports the limits of the landfill site based on the Ontario Land Surveyor plan reflected a 2.881 ha area encompassing the squared limits around the landfilling area shown as Part 1 Plan 49R-16963. The remainder of the site comprises Parts 2 to 18 involving a total site area of 22.75 ha (including the 0.923 ha portion of Bissett Creek Road). A copy of **Plan 49R-16963** is enclosed.

3.0 SITE OPERATIONS

The operational portion of this Biennial Report is based on documentation provided by the Township and a site survey undertaken by Jp2g Consultants Inc.

3.1 Survey of the Landfill Site

A topographic survey of the waste disposal area was conducted by Jp2g Consultants Inc. in October 2009 (assuming GPS) and November 18, 2011. The survey information has been used to update Drawing No. 1: Existing Conditions Plan to show the location of waste placement designated waste storage areas and the landfill site contours to date.

3.2 Landfill Capacity

Based on a test pit investigation in July 2000 it was estimated that approximately 4790m^3 of landfilled space had been utilized at the Bissett Creek Site. The design (Jp2g 2002) provides for a total waste disposal volume of 18,423m^3, so as of July 2000 there was a remaining capacity of 13,433m^3: an estimated 8,523m^3 trench method of landfilling and 4,910m^3 by the area method.

Based on the November, 2011 survey in comparison to the final approved waste disposal contours (not including final cover) shown on Drawing 3 of 4 there is an estimated remaining capacity of 8,970m^3:4,060m^3 trench (say 1,400m^2 x 2.9m depth) and 4,910m^3 area method.

3.3 Waste Diversion Program

In February 2007 the Township implemented a curbside collection recycling program through a private contractor. The list of materials picked up includes:

- metal and aluminum cans
- plastic containers and bottles
- milk and juice boxes/cartons
- paper and cardboard
- glass containers and bottles
- aluminum foil and plates
- plastic bags
- styrofoam
- waste oil products
- small appliances

In addition the contractor collects many other materials deposited at the site including but not limited to:

- white goods and scrap metal
- waste electrical and electronic equipment
- textiles and furniture
- usable construction & demolition wastes

3.4 Summary of Waste Received and Transferred From the Site

The Bissett Creek Waste Disposal Site accepts solid non-hazardous municipal waste, scrap metal, white goods, tires, scrap wood, brush, leaves, and other yard waste. Waste is landfilled, brush and clean wood is burnt, white goods, scrap metal and tires are removed as required by a licensed contractor. Based on the site attendants' and municipal records **Appendix A** the following summarizes the waste types and quantities managed at the site.

According to available Township records the following summarizes waste deliveries to the site:

	2010			2011		
Month	**Private**	**Business**	**# Bags**	**Private**	**Business**	**# Bags**
Jan.	4	0	29	23	0	48
Feb.	5	0	NA	24	0	NA
Mar.	7	0	13	20	0	36
Apr.	10	0	31	22	0	49
May	43	2	181	49	5	278
June	22	9	325	31	9	302
July	41	8	363	36	17	550
Aug.	30	15	713	35	18	756
Sept.	19	8	275	56	9	284
Oct.	14	6	113	38	6	311
Nov.	4	0	19	27	1	99
Dec.	9	0	112	16	0	NA
Total	**208**	**48**	**2174**	**377**	**65**	**2742**

The municipal truck collected and delivered to the Bissett Creek Site 1,677 bags in 2010 and 1,612 bags in 2011.

Based on records maintained for the Municipal Datacall for Recycling the following summarizes waste types received at the site:

	2010	**2011**
Yard Waste	11	22
Tires	16	20
White Goods	19	41
Computers	3	4
Electronics	5	13
Toy, Leisure Sports Equipment	0	2
Electric Tools	1	5
Textiles	7	8
Scrap Metal	6	5
C & D Waste	22	7
Furniture	35	23

The following summarizes 2011 statistics for waste diversion.

- Scrap Metal/White Goods/Refrigerated Appliances
  A recorded 30 appliances and an estimated 1 tonne of scrap metal were removed from the site.

- Tires
  Based on Township records, no tires were removed from the site in 2010/2011.

- Brush Burning
  Clean brush and lumber was received and piled separately at the landfill site in 2010/2011. An estimated 25 loads were burned at the site.

- Computers and Electronics
  Four (4) units were removed by the Contractor.

- Furniture
  Three (3) loads of textile furniture were diverted from landfilling.

3.5 Compliance Issues

The Township received an MOE Site Inspection Report prepared by Lance Larkin dated June 23, 2010 requesting detailed timelimes to address Condition 17. Jp2g filed a response dated July 29, 2010 with accompanying email correspondence with MNR. Jp2g filed a letter dated August 6, 2010 with an accompany letter from the Township solicitor to the Director.

The Township received an MOE Site Inspection Report prepared by Lance Larkin on August 12, 2011. A copy of the reports and the Jp2g responses on behalf of the Township is included in **Appendix B** which addressed Condition 17

- completion of plan of survey
- documentation transferring ownership
- registration

A table in **Appendix C** summarizes compliance with Conditions of the Certificate of Approval A412406 dated March 27, 1980 as amended by Notice No. 1 November 19, 2001, November 27, 2003 by Notice No. 2 October 4, 2004 and by Notice No. 4 July 19, 2006.

4.0 ENVIRONMENTAL QUALITY MONITORING

The information required to address the environmental quality monitoring reporting requirements of Condition 19 and 20 is based on the report entitled "2010-2011 Monitoring Report – Bissett Creek Landfill" dated May 2012, prepared by AECOM. This report is found in **Part 2** of this Annual Report.

5.0 RECOMMENDATIONS

As the majority of landfilling will occur above ground for the 2010/2011 period, the next field survey will permit a more comprehensive review to determine the quantity of annual landfilled volume and remaining site capacity.

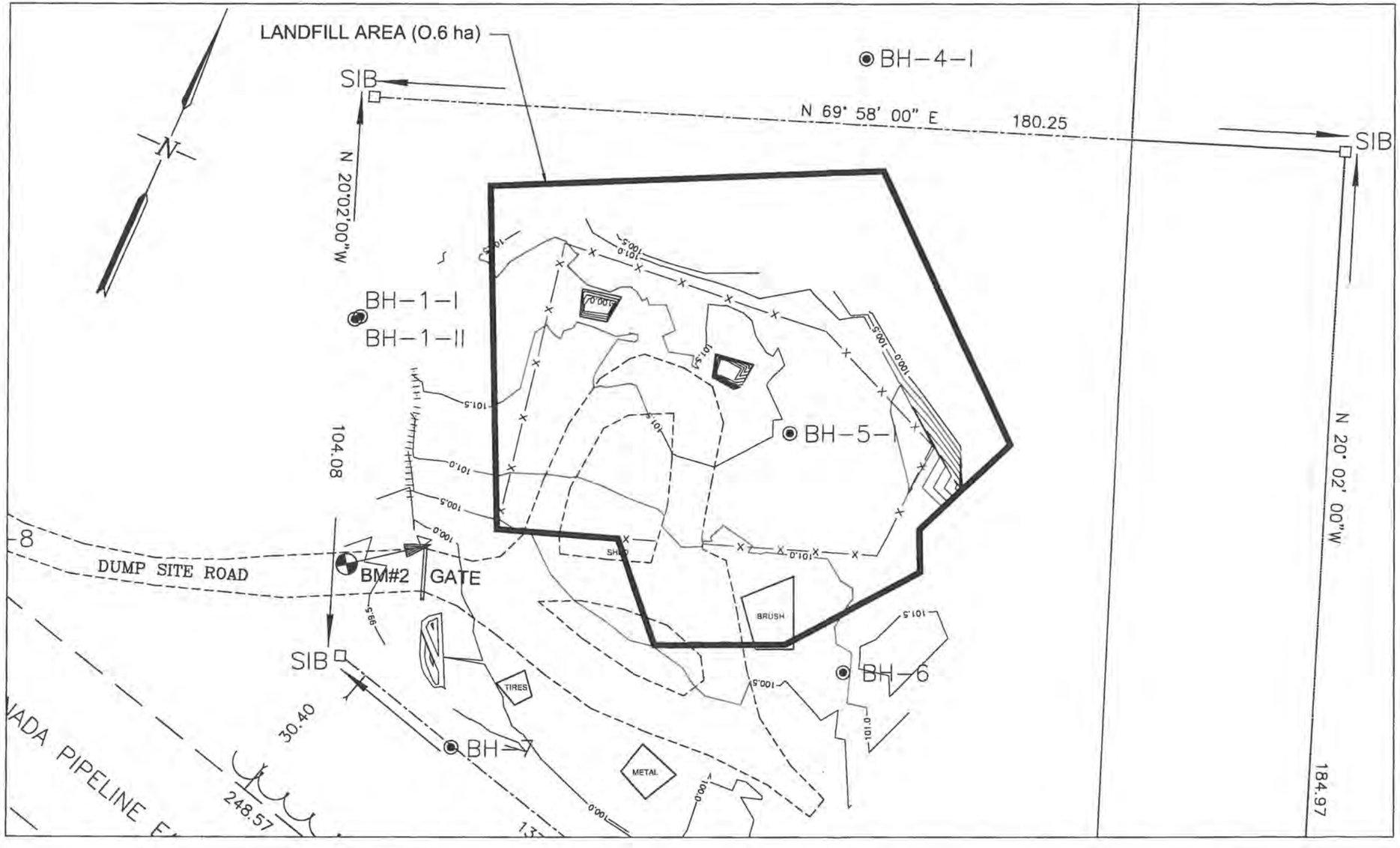
Report prepared by:
Jp2g Consultants Inc.
Engineers • Planners • Project Managers

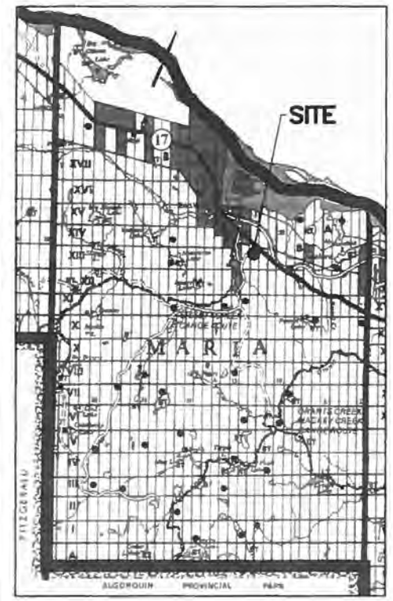
for Perry Larochelle
Technical Field Representative

Kevin Mooder, MCIP, RPP
VP Environmental Services

DRAWINGS

DRAWING NO. 1 EXISTING CONDITIONS PLAN 2011
DRAWINGS 2 TO 4, MAY 2002
PLAN 49R-13963, APRIL 2009





KEY PLAN
N.T.S.

LEGEND

- EXISTING TREE LINE
- 2011 CONTOURS
- BH-1-I BOREHOLE
- BENCH MARK
- SITE LIMITS AS PER ADAM KASPRZAK SURVEYING, LTD., MARCH 9, 2007 AND DRAFT REFERENCE PLAN

NORTH HALF OF
PT. LOTS 12&13, CONCESSION XIII
GEOGRAPHIC TOWNSHIP OF MARIA

BM #2
ASSUMED ELEV. 100.307
TOP OF THREADS ON LOWEST BOLT ON NORTHWEST SIDE OF NORTH STEEL GATE POST.

EXTENT OF FBAL:

AREA OF FBAL	±340 square meters
AVG. DEPTH OF WASTE (FBAL)	1.39 meters
VOLUME OF FBAL	±472 cubic meters

NOTES:
CONTOURS BASED ON JP2G CONSULTANTS, INC. NOVEMBER 18, 2011. BM#1 WAS DESTROYED AND WAS REPLACED BY BM#2.
THE VOLUME OF WASTE EXISTING BELOW GROUND IN DEC. 2005 WAS 7,644 CUBIC METERS. FILL BEYOND APPROVED LIMITS WAS CLOSED IN 2005/2006 ACCORDING TO TOWNSHIP RECORDS.

0m 10 20 30 40 50m

DISTANCES ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS
PEMBROKE · OTTAWA

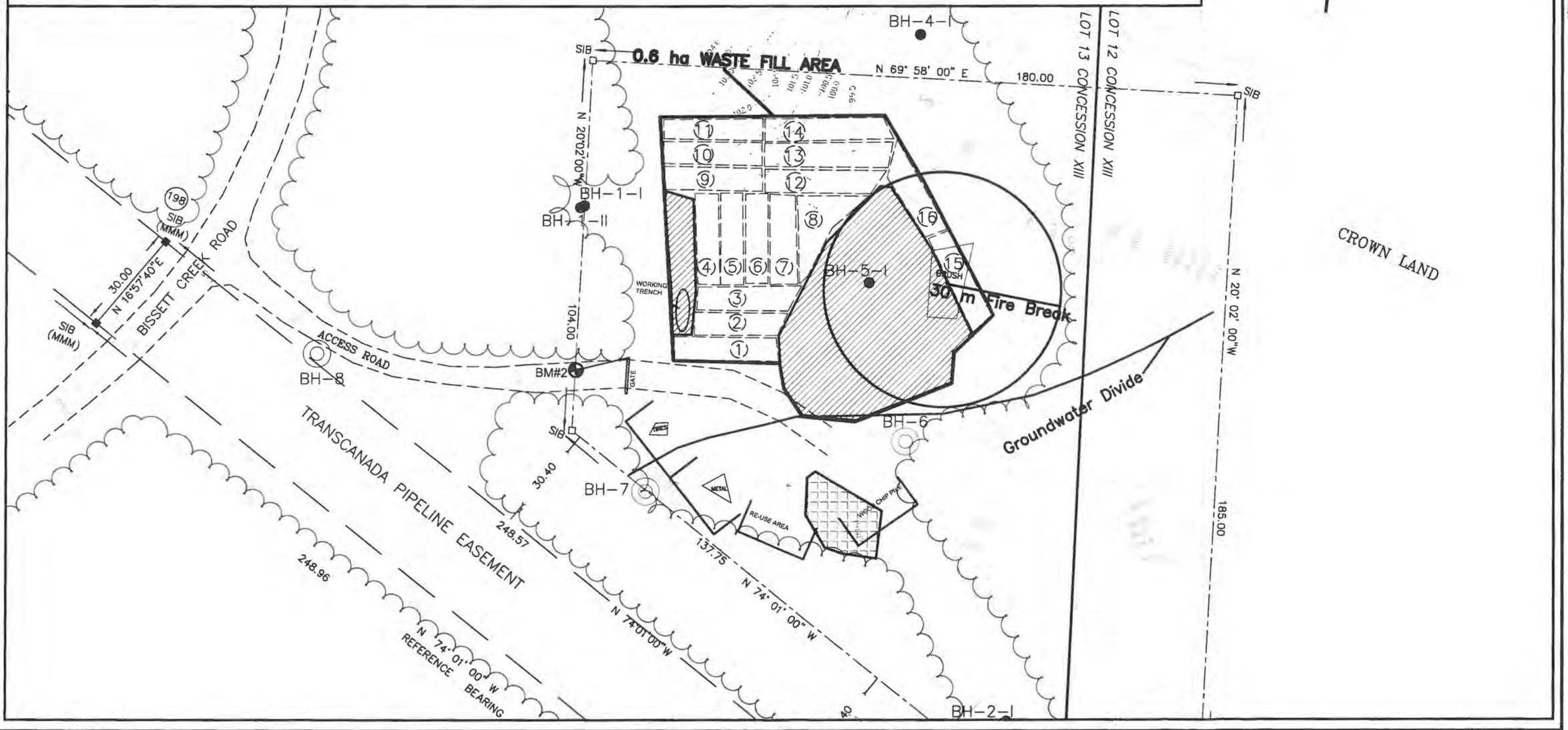
DESIGNED	LA
DRAWN	LA
CHECKED	KM
APPROVED	KM
SCALE	1:250

TOWNSHIP OF HEAD, CLARA & MARIA
BISSETT CREEK WASTE DISPOSAL SITE
EXISTING CONDITION PLAN 2011

DATE	MAY 2012
PROJECT	20060234
PLOTTED	MAY 31/2012
DRAWING	1

NOTES:

1. An area segregated by logs should be established for metal, tires and re-use area as shown.
2. A 30 metre fire break must be established should the Township desire to burn clean brush.
3. Trenches are to be excavated to a depth of 2.9 metres and in the order as shown.
4. Intermediate cover (0.3 m) should be placed over trenches when they have been filled. The cover should slope to the southwest to promote desired drainage on the site.
5. Refer to sheet #1 for legend.



No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.

ENGINEERS · PLANNERS · PROJECT MANAGERS
PEMBROKE · OTTAWA

DESIGNED	KJS
DRAWN	KJS
CHECKED	BW
APPROVED	BW
SCALE	HORIZ. 1:500

TOWNSHIP OF HEAD, CLARA & MARIA
BISSETT CREEK WASTE DISPOSAL SITE

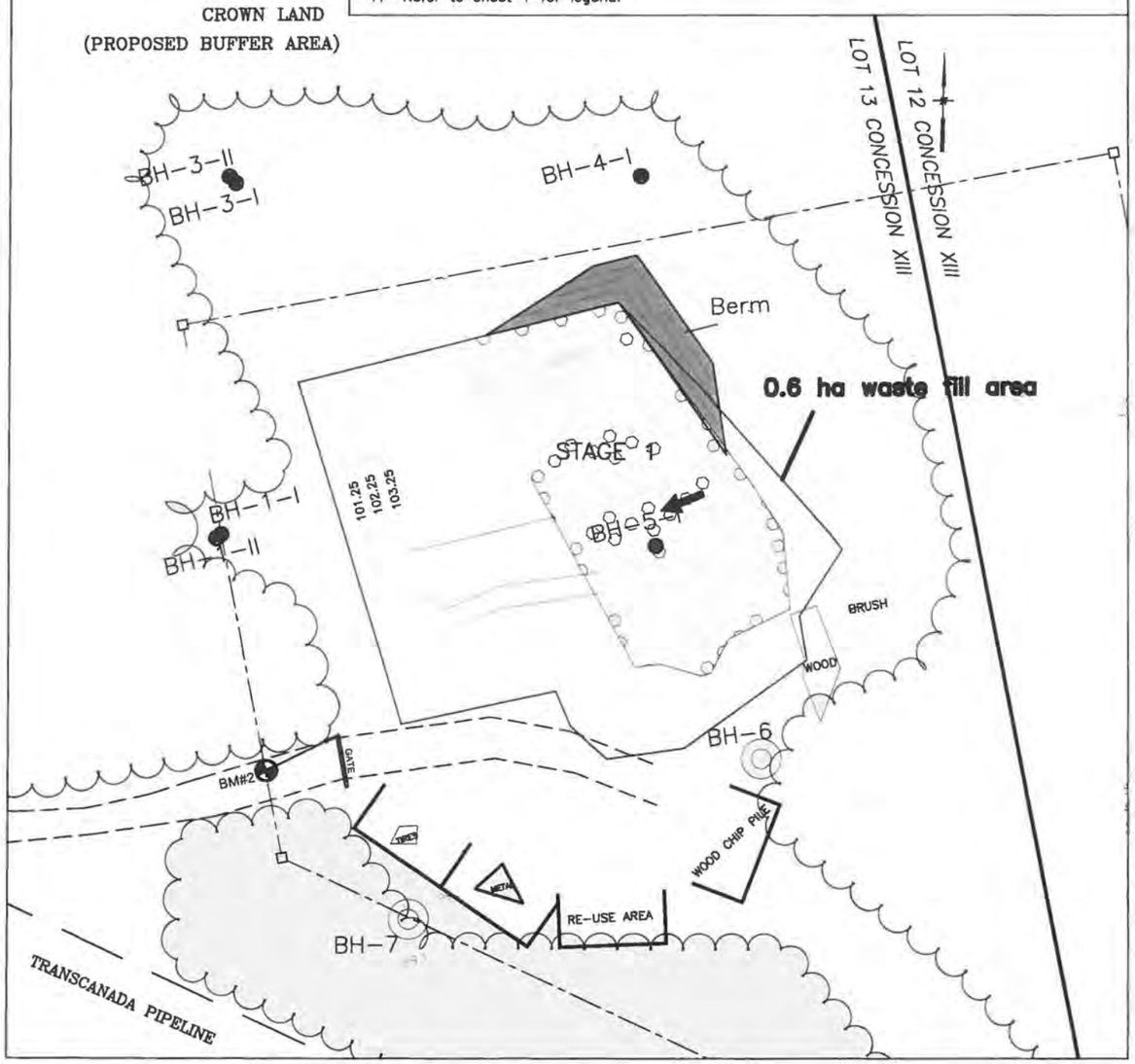
TRENCH LAYOUT

DATE	MAY 2002
PROJECT	2006023B
PLOTTED	May 17/2002
DRAWING	2 of 4

EXIST_BISSETT_2.dwg

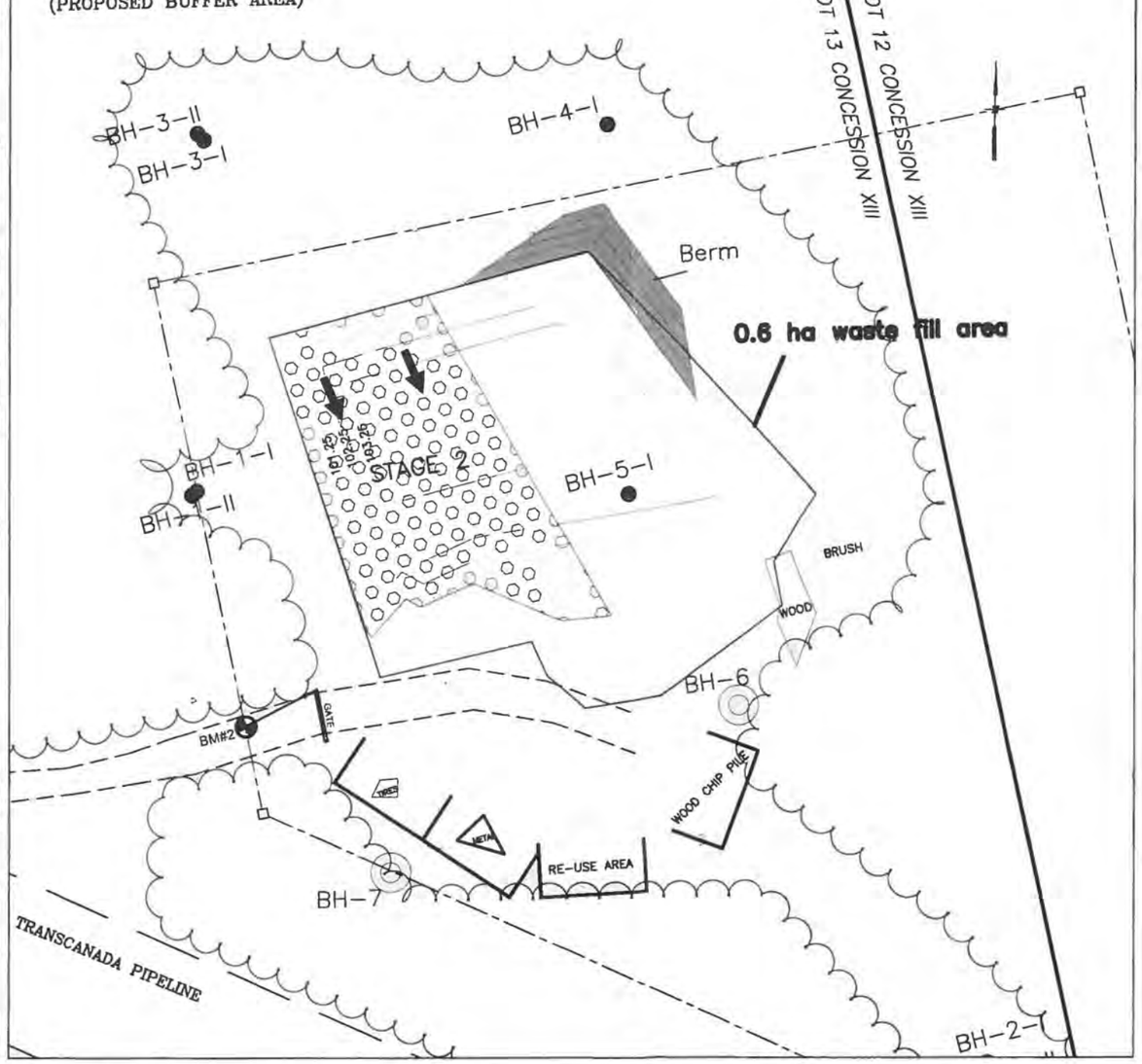
STAGE 1

1. A 2 metre high berm is to be constructed as shown, prior to landfilling activities beginning.
2. Waste is to be landfilled to the height as shown.
3. As work progresses, borehole BH-5-1 must be extended above future height of waste and should be protected by 30 inch well tiles.
4. See Figure 3 and Figure 4 for an illustration showing typical filling operations. These figures are located in the Site Development and Operations Plan.
5. The tipping face should not exceed 10 metres in length.
6. Final cover is to be applied progressively as shown on Drawing 4.
7. Refer to sheet 1 for legend.



STAGE 2

1. Waste is to be landfilled to the height as shown.
2. See Figure 3 and Figure 4 for an illustration showing typical filling operations. These figures are located in the Site Development and Operations Plan.
3. The tipping face should not exceed 10 metres in length.
4. Final cover is to be applied progressively as shown on Drawing 4.
5. Refer to sheet 1 for legend.



No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.

ENGINEERS · PLANNERS · PROJECT MANAGERS
PEMBROKE · OTTAWA

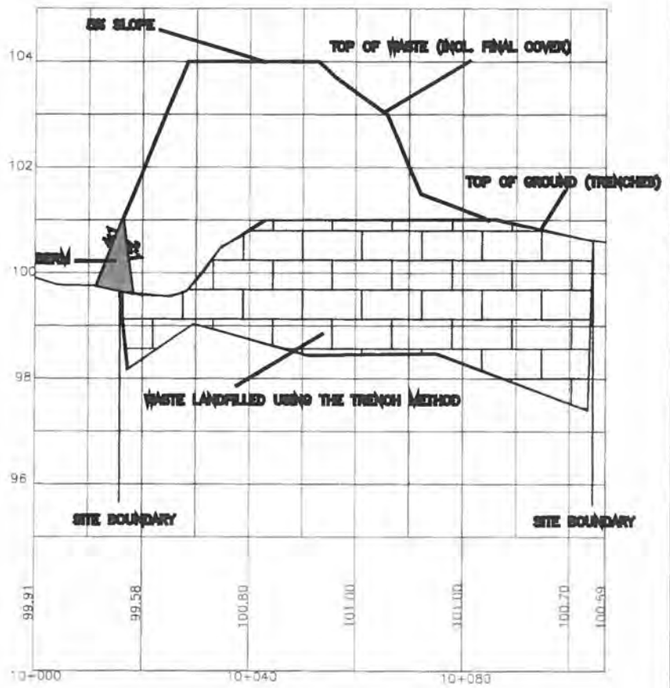
DESIGNED	KJS
DRAWN	KJS
CHECKED	MAB
APPROVED	MAB
SCALE	HORIZ. 1:500

TOWNSHIP OF HEAD, CLARA & MARIA
BISSETT CREEK WASTE DISPOSAL SITE

LANDFILL PHASING AND SEQUENCING (AREA METHOD)

DATE	MAY 2002
PROJECT	20080238
PLOTTED	May 17/2002
DRAWING	3 of 4

SECTION A–A1



HORIZ. 1:500

VERTI. 1:50

No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.

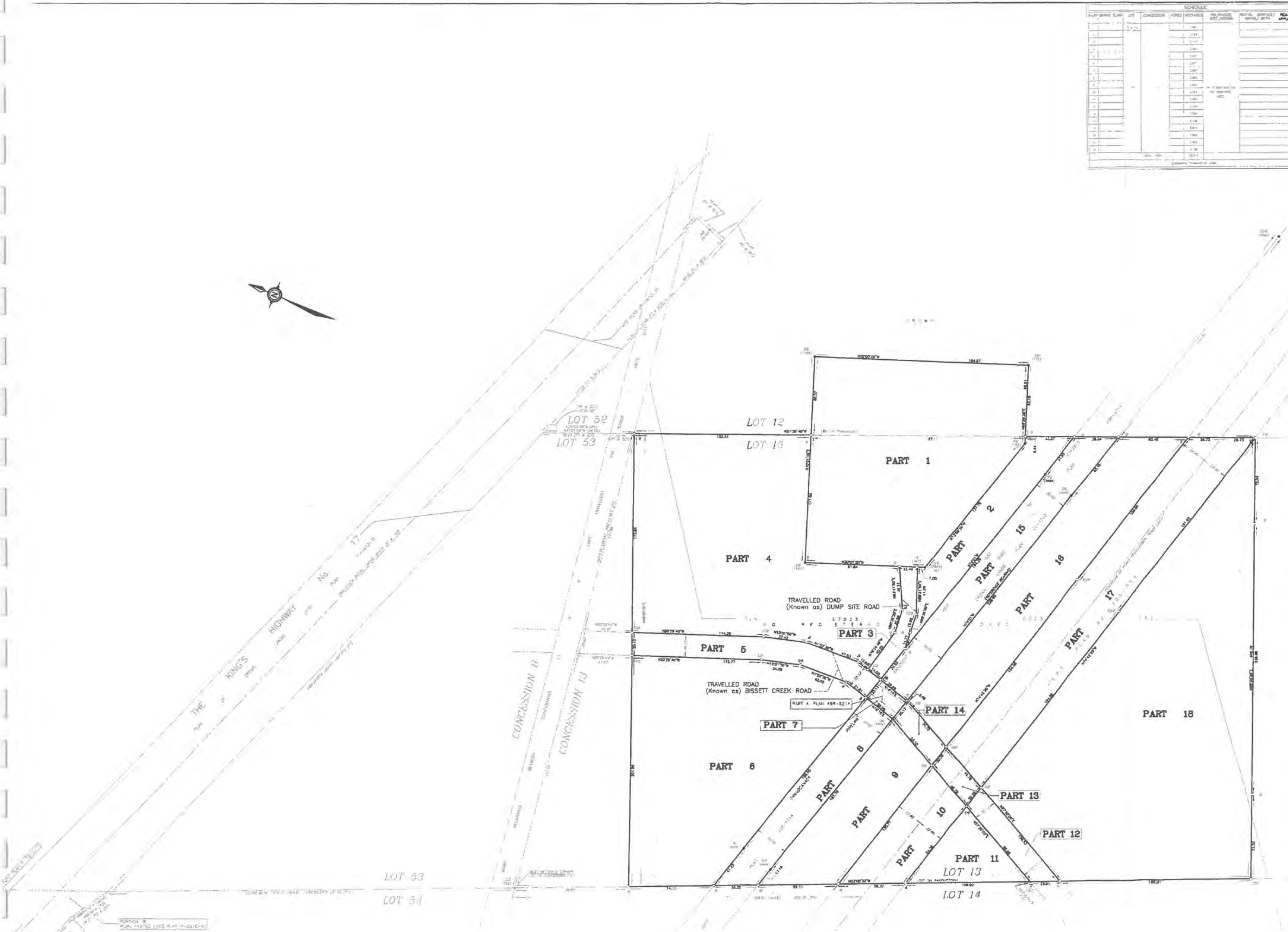
ENGINEERS · PLANNERS · PROJECT MANAGERS
PEMBROKE · OTTAWA

DESIGNED	KJS
DRAWN	KJS
CHECKED	MAB
APPROVED	MAB
SCALE	HORIZ. 1:500

TOWNSHIP OF HEAD, CLARA & MARIA
BISSETT CREEK WASTE DISPOSAL SITE

FINAL CONTOUR AND SECTION

DATE	MAY 2002
PROJECT	20060238
PLOTTED	May 17/2002
DRAWING	4 of 4



PLAN 49R – 16963

RECEIVED AND DEPOSITED

April 21, 2009 (date)

L. deBruyn AO

LAND REGISTRAR FOR THE REGISTRY DIVISION OF RENFREW (No. 49)

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE REGISTRY ACT

DATE: APRIL 14, 2009.

ADAM KASPRZAK

PERMISSION TO DEPOSIT THIS PLAN OF SURVEY OF CROWN LAND WAS GIVEN BY THE SURVEYOR GENERAL OF ONTARIO ON THE 3rd DAY OF APRIL, 2009.

PLAN OF SURVEY
LOCATION CL– 14461
OF PART OF
LOTS 12 & 13
CONCESSION 13
GEOGRAPHIC TOWNSHIP OF MARIA
TOWNSHIP OF HEAD, CLARA & MARIA
COUNTY OF RENFREW
SCALE 1 : 1000

ADAM KASPRZAK SURVEYING LTD.

BEARING NOTE:

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO PART OF THE SOUTHERLY LIMIT OF PART 5, AS SHOWN ON PLAN 49R-6214, HAVING A BEARING OF N74°01'00"W.

DISTANCE NOTE:

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE REGISTRY ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 3rd DAY OF APRIL, 2009.
3. THIS PLAN AND FIELD NOTES WERE PREPARED FROM AN ACTUAL SURVEY PERFORMED UNDER MY PERSONAL SUPERVISION AND I WAS PRESENT ON THE SITE DURING THE PROGRESS OF THIS SURVEY.

DATE: APRIL 14, 2009.

ADAM KASPRZAK
ONTARIO LAND SURVEYOR

LEGEND

- IB – IRON BAR
- SIB – STANDARD IRON BAR
- SSIB – SHORT STANDARD IRON BAR
- MF – MONUMENT FOUND
- MS – MONUMENT SET
- RIB – ROUND IRON BAR
- FENCE
- (WIT) – WITNESS
- (OU) – ORIGIN UNKNOWN
- CM – CONCRETE MONUMENT
- (MTO) – MINISTRY OF TRANSPORTATION OF ONTARIO
- (MMM) – MARSHALL MACKLIN & MONAGHAN O.L.S.

APPENDIX A

TOWNSHIP RECORDS
2010/2011

2010 DISPOSAL SITE STATISTICS

2010	STONECLIFFE	Deliverd to site	BISSETT	Delivered to Site	RECYCABLES	MonthlyTotals	
DEC P/U	387		142		75		
DEC DEL		165		112		**806**	December
NOV P/U	195		96				
NOV DEL		38		19	42	**348**	November
OCT P/U	281		88		54		
OCT DEL		178		113		**660**	October
SEP P/U	385		120		68		
SEP DEL		253				**758**	September
AUG P/U	302		192	275			
AUG DEL		499		713	106	**1981**	August
JULY P/U	387		166				
JULY DEL		930		363	98	**1846**	July
JUN P/U	322		148				
JUN DEL		414		325	72	**1209**	June
MAY P/U	312		162				
MAY DEL		380		181	81	**1035**	May
APR P/U	304		144				
APR DEL		93		31	55	**572**	April
MAR P/U	250		126				
MAR DEL		87		13	51	**476**	March
FEB P/U	248		135		66		
FEB DEL						**383**	February
JAN P/U	257		158		68		
JAN DEL		91		29		**535**	January
TOTAL BAGS	**3630**	**3128**	**1677**	**2174**	**836**	**10609**	
				10609			

2010		STONECLIFFE Private	STONECLIFFE Business	BISSETT CREEK Private	BISSETT CREEK Business	TOTALS
JANUARY						
Fri	1	4	0	0	0	4
Sat	2	0	0	0	0	0
Sun	3	0	0	0	0	0
Mon	4	0	0	0	0	0
Tue	5	0	0	1	0	1
Wed	6	0	0	0	0	0
Thu	7	3	0	0	0	3
Fri	8	0	0	0	0	0
Sat	9	3	0	0	0	3
Sun	10	0	0	0	0	0
Mon	11	0	0	0	0	0
Tue	12	0	0	1	0	1
Wed	13	0	0	0	0	0
Thu	14	0	0	0	0	0
Fri	15	0	0	0	0	0
Sat	16	4	0	1	0	5
Sun	17	0	0	0	0	0
Mon	18	0	0	0	0	0
Tue	19	0	0	0	0	0
Wed	20	0	0	0	0	0
Thu	21	2	0	0	0	2
Fri	22	0	0	0	0	0
Sat	23	5	0	0	0	5
Sun	24	0	0	0	0	0
Mon	25	0	0	0	0	0
Tue	26	0	0	1	0	1
Wed	27	0	0	0	0	0
Thu	28	6	0	0	0	6
Fri	29	0	0	0	0	0
Sat	30	3	0	0	0	3
Sun	31	0	0	0	0	0
Totals		30	0	4	0	34
February						
Sun	1	0	0	0	0	0
Mon	2	0	0	0	0	0
Tue	3	0	0	0	0	0
Wed	4	1	0	0	0	1
Thu	5	0	0	0	0	0
Fri	6	3	0	1	0	4
Sat	7	0	0	0	0	0
Sun	8	0	0	0	0	0
Mon	9	0	0	1	0	1
Tue	10	0	0	0	0	0
Wed	11	1	0	0	0	1
Thu	12	0	0	0	0	0
Fri	13	6	0	1	0	7
Sat	14	0	0	0	0	0
Sun	15	0	0	0	0	0

Mon	16	0	0	1	0	1
Tue	17	0	0	0	0	0
Wed	18	2	0	0	0	2
Thu	19	0	0	0	0	0
Fri	20	5	0	0	0	5
Sat	21	0	0	0	0	0
Sun	22	0	0	0	0	0
Mon	23	0	0	0	0	0
Tue	24	0	0	0	0	0
Wed	25	1	0	0	0	1
Thu	26	0	0	0	0	0
Fri	27	1	0	1	0	2
Sat	28	0	0	0	0	0
Sun	29	0	0	0	0	0
Totals		**20**	**0**	**5**	**0**	**25**
March						
Mon	1	0	0	0	0	0
Tue	2	0	0	2	0	2
Wed	3	0	0	0	0	0
Thu	4	4	0	0	0	4
Fri	5	0	0	0	0	0
Sat	6	3	0	0	0	3
Sun	7	0	0	0	0	0
Mon	8	0	0	0	0	0
Tue	9	0	0	0	0	0
Wed	10	0	0	0	0	0
Thu	11	5	0	0	0	5
Fri	12	0	0	0	0	0
Sat	13	3	0	2	0	5
Sun	14	0	0	0	0	0
Mon	15	0	0	0	0	0
Tue	16	0	0	0	0	0
Wed	17	0	0	0	0	0
Thu	18	3	0	0	0	3
Fri	19	0	0	0	0	0
Sat	20	5	0	3	0	8
Sun	21	0	0	0	0	0
Mon	22	0	0	0	0	0
Tue	23	0	0	0	0	0
Wed	24	0	0	0	0	0
Thu	25	6	0	0	0	6
Fri	26	0	0	0	0	0
Sat	27	4	0	0	0	4
Sun	28	0	0	0	0	0
Mon	29	0	0	0	0	0
Tue	30	0	0	0	0	0
Wed	31	0	0	0	0	0
Totals		**33**	**0**	**7**	**0**	**40**
April						
Thu	1	3	0	0	0	3
Fri	2	0	0	0	0	0
Sat	3	8	0	0	0	8

Sun	4	0	0	0	0	0
Mon	5	0	0	0	0	0
Tue	6	0	0	3	0	3
Wed	7	0	0	0	0	0
Thu	8	5	0	0	0	5
Fri	9	0	0	0	0	0
Sat	10	6	0	0	0	6
Sun	11	0	0	0	0	0
Mon	12	0	0	0	0	0
Tue	13	3	0	0	0	3
Wed	14	0	0	0	0	0
Thu	15	7	0	0	0	7
Fri	16	0	0	0	0	0
Sat	17	7	0	0	0	7
Sun	18	0	0	0	0	0
Mon	19	0	0	0	0	0
Tue	20	2	0	0	0	2
Wed	21	0	0	0	0	0
Thu	22	4	0	0	0	4
Fri	23	0	0	0	0	0
Sat	24	6	0	3	0	9
Sun	25	0	0	0	0	0
Mon	26	0	0	0	0	0
Tue	27	0	0	4	0	4
Wed	28	0	0	0	0	0
Thu	29	6	0	0	0	6
Fri	30	0	0	0	0	0
Totals		57	0	10	0	67
MAY						
Sat	1	12	0	5	0	17
Sun	2	0	0	0	0	0
Mon	3	0	0	0	0	0
Tue	4	0	0	5	0	5
Wed	5	0	0	0	0	0
Thu	6	6	0	0	0	6
Fri	7	0	0	0	0	0
Sat	8	5	0	5	0	10
Sun	9	0	0	0	0	0
Mon	10	0	0	0	0	0
Tue	11	0	0	4	0	4
Wed	12	0	0	0	0	0
Thu	13	15	0	0	0	15
Fri	14	0	0	0	0	0
Sat	15	16	1	4	0	21
Sun	16	0	0	0	0	0
Mon	17	0	0	0	0	0
Tue	18	0	0	2	0	2
Wed	19	0	0	0	0	0
Thu	20	5	0	0	0	5
Fri	21	25	0	6	0	31
Sat	22	0	0	0	0	0
Sun	23	0	0	0	0	0

Mon	24	0	0	0	0	0
Tue	25	0	0	6	2	8
Wed	26	0	0	0	0	0
Thu	27	9	2	0	0	11
Fri	28	0	0	0	0	0
Sat	29	7	1	6	0	14
Sun	30	0	0	0	0	0
Mon	31	0	0	0	0	0
Totals		100	4	43	2	149
June						
Tue	1	0	0	2	2	4
Wed	2	0	0	0	0	0
Thu	3	10	1	0	0	11
Fri	4	0	0	0	0	0
Sat	5	9	1	4	1	15
Sun	6	0	0	0	0	0
Mon	7	0	0	0	0	0
Tue	8	0	0	3	2	5
Wed	9	0	0	0	0	0
Thu	10	8	1	0	0	9
Fri	11	0	0	0	0	0
Sat	12	8	1	4	0	13
Sun	13	0	0	0	0	0
Mon	14	0	0	0	0	0
Tue	15	0	0	2	1	3
Wed	16	0	0	0	0	0
Thu	17	6	1	0	0	7
Fri	18	0	0	0	0	0
Sat	19	6	2	0	0	8
Sun	20	0	0	0	0	0
Mon	21	0	0	0	0	0
Tue	22	0	0	2	2	4
Wed	23	0	0	0	0	0
Thu	24	9	4	0	0	13
Fri	25	0	0	0	0	0
Sat	26	8	1	3	0	12
Sun	27	0	0	0	0	0
Mon	28	0	0	0	0	0
Tue	29	0	0	2	1	3
Wed	30	0	0	0	0	0
Totals		64	12	22	9	107
July						
Thu	1	0	0	0	0	0
Fri	2	2	2	0	0	4
Sat	3	25	2	8	0	35
Sun	4	0	0	0	0	0
Mon	5	0	0	0	0	0
Tue	6	0	0	2	1	3
Wed	7	0	0	0	0	0
Thu	8	3	3	0	0	6
Fri	9	0	0	0	0	0
Sat	10	26	2	5	0	33

Sun	11	0	0	0	0	0
Mon	12	0	0	0	0	0
Tue	13	0	0	2	3	5
Wed	14	0	0	0	0	0
Thu	15	6	3	0	0	9
Fri	16	0	0	0	0	0
Sat	17	18	2	3	0	23
Sun	18	0	0	0	0	0
Mon	19	0	0	0	0	0
Tue	20	0	0	5	0	5
Wed	21	0	0	0	0	0
Thu	22	7	3	0	0	10
Fri	23	0	0	0	0	0
Sat	24	25	2	5	2	34
Sun	25	0	0	0	0	0
Mon	26	0	0	0	0	0
Tue	27	0	0	6	2	8
Wed	28	0	0	0	0	0
Thu	29	4	3	0	0	7
Fri	30	0	0	0	0	0
Sat	31	20	4	5	0	29
Totals		136	26	41	8	211
August						
Sun	1	0	0	0	0	0
Mon	2	0	0	0	0	0
Tue	3	0	0	2	1	3
Wed	4	0	0	0	0	0
Thu	5	6	3	0	0	9
Fri	6	0	0	0	0	0
Sat	7	20	2	6	1	29
Sun	8	0	0	0	0	0
Mon	9	0	0	0	0	0
Tue	10	0	0	4	3	7
Wed	11	0	0	0	0	0
Thu	12	9	4	0	0	13
Fri	13	0	0	0	0	0
Sat	14	12	2	6	0	20
Sun	15	0	0	0	0	0
Mon	16	0	0	0	0	0
Tue	17	0	0	2	3	5
Wed	18	0	0	0	0	0
Thu	19	6	1	0	0	7
Fri	20	0	0	0	0	0
Sat	21	8	3	4	0	15
Sun	22	0	0	0	0	0
Mon	23	0	0	0	0	0
Tue	24	0	0	2	3	5
Wed	25	0	0	0	0	0
Thu	26	5	1	0	0	6
Fri	27	0	0	0	0	0
Sat	28	10	2	2	1	15
Sun	29	0	0	0	0	0

Mon	30	0	0	0	0	0
Tue	31	0	0	2	3	5
Totals		76	18	30	15	139
September						
Wed	1	0	0	0	0	0
Thurs	2	14	5	0	0	19
Fri	3	0	0	0	0	0
Sat	4	4	1	3	0	8
Sun	5	0	0	0	0	0
Mon	6	0	0	0	0	0
Tues	7	0	0	3	2	5
Wed	8	0	0	0	0	0
Thurs	9	10	1	0	0	11
Fri	10	0	0	0	0	0
Sat	11	5	1	4	0	10
Sun	12	0	0	0	0	0
Mon	13	0	0	0	0	0
Tues	14	0	0	0	2	2
Wed	15	0	0	0	0	0
Thurs	16	4	0	0	0	4
Fri	17	0	0	0	0	0
Sat	18	5	0	2	0	7
Sun	19	0	0	0	0	0
Mon	20	0	0	0	0	0
Tues	21	0	0	2	2	4
Wed	22	0	0	0	0	0
Thurs	23	7	1	0	0	8
Fri	24	0	0	0	0	0
Sat	25	4	0	3	0	7
Sun	26	0	0	0	0	0
Wed	27	0	0	0	0	0
Thurs	28	0	0	2	2	4
Fri	29	0	0	0	0	0
Sat	30	7	0	0	0	7
Totals		60	9	19	8	96
October						
Fri	1	0	0	0	0	
Sat	2	13	0	0	0	
Sun	3	0	2	3	0	
Mon	4	0	0	0	0	
Tues	5	0	0	1	2	
Wed	6	0	0	0	0	
Thurs	7	5	1	0	0	
Fri	8	0	0	0	0	
Sat	9	9	1	4	0	
Sun	10	0	0	0	0	
Mon	11	0	0	0	0	
Tues	12	0	0	2	2	
Wed	13	0	0	0	0	
Thurs	14	6	1	0	0	
Fri	15	0	0	0	0	
Sat	16	8	0	1	1	

Sun	17	0	0	0	0
Mon	18	0	0	0	0
Tues	19	0	0	2	1
Wed	20	0	0	0	0
Thurs	21	5	0	0	0
Fri	22	0	0	0	0
Sat	23	3	0	0	0
Sun	24	0	0	0	0
Mon	25	0	0	0	0
Tues	26	0	0	1	0
Wed	27	0	0	0	0
Thurs	28	0	0	0	0
Fri	29	0	0	0	0
Sat	30	6	0	0	0
Sun	31	0	0	0	0
Totals					
November					
Mon	1	0	0	0	0
Tues	2	0	0	0	0
Wed	3	0	0	0	0
Thurs	4	0	0	0	0
Fri	5	0	0	0	0
Sat	6	6	0	2	0
Sun	7	0	0	0	0
Mon	8	0	0	0	0
Tues	9	0	0	0	0
Wed	10	0	0	0	0
Thurs	11	5	0	0	0
Fri	12	0	0	0	0
Sat	13	9	0	1	0
Sun	14	0	0	0	0
Mon	15	0	0	0	0
Tues	16	0	0	0	0
Wed	17	0	0	0	0
Thurs	18	0	0	0	0
Fri	19	0	0	0	0
Sat	20	0	0	0	0
Sun	21	0	0	0	0
Mon	22	0	0	0	0
Tues	23	0	0	1	0
Wed	24	0	0	0	0
Thurs	25	7	0	0	0
Fri	26	0	0	0	0
Sat	27	0	0	0	0
Sun	28	0	0	0	0
Mon	29	0	0	0	0
Tues	30	0	0	0	0
Wed	31	0	0	0	0

calculating the volume of material that was actually landfilled and/or diverted to assit with Jp2g in completion of bi-annual reports for MOE and for annual Municipal Datacall for recycling.

weight of garbage - 1 bag = 33 gal or 127 litres. 1 l = .00130795062 yd3. 127l= .166109 yd3. therefore 1 bag =.166109 cubic yards

# of bags collected x .166109 = result1; result 1 x .205 (from wdo 2008 guide) = tonnes by weight.

The following yard waste conversions are based on 2.13 cubic yards per load per truck based on dimensions of 5.5x7x1.5 ft of pickup

2010

For last column L- Landfilled; R - Re Totals

Weight Formula based on WDO 2008 Guide

	TOTALS		Tonnes			
Stonecliffe - total bags	6758	1122.564622	**230.1257**			
Bissett - total bags	3851	639.685759	**131.1356**			
YARD WASTE				kg	TONNES	
Pine Needles	8	# of loads (load =2.13 yrd3) x 2.13 = cubic yards @ 600lbs per cubic yard x 600	10224 lbs	4647.273	4.637528	
Brush (burned)	86	# of loads (load =2.13 yrd3) x 2.13 = cubic yards @ 300lbs per cubic yard x 300	54954 lbs	24979.09	24.92672	
Leaves/Hay/Grass	18.5	# of loads (load =2.13 yrd3) x 2.13 = cubic yards @ 300lbs per cubic yard x 301	11821.5 lbs	5373.409	5.362142	
Ashes	5.2				0	
TIRES	88	9.09 kg	1759.824 lbs	799.92	0.798243	
WHITE GOODS		**From the WDO 2008 guide and GAP**			0	
Refrigerators	14	267 lbs or 121.4 kg	3738 lbs	1699.091	1.695528	
Stove/Ovens/Ranges	5	181.1 lbs or 82.3 kg	905.5 lbs	411.5909	0.410728	
Freezers	11	195 lbs or 87.7 kg	2145 lbs	975	0.972956	
Washers/Dishwashers	3	177lbs or 80.5 kg	531 lbs	241.3636	0.240858	
Dryers	4	130 lbs or 59.1 kg	520 lbs	236.3636	0.235868	
Air Conditioners	1	64.2 lbs or 29.2 kg	64.2 lbs	29.18182	0.029121	3.585058
Small Appliances - mixers, fans, toasters, etc.	13	questimate of 25 lbs or 11.3 kg	325 lbs	147.7273	0.147418	
Microwaves	11	50 lbs or 22.7 kg	550 lbs	250	0.249476	0.396893
COMPUTERS	6				0	

Monitors	4		22.95 kg	201.96 lbs	91.8	0.091608
Processing Units			10 kg	0 lbs	0	0
Printers						0
ELECTRONICS						0
Televisions	15		33.18 kg	1094.94 lbs	497.7	0.496656
DVDs, VCRs, Stereos	6		7.9 kg	104.28 lbs	47.4	0.047301
TOYS, LEISURE & SPORTS EQUIPMENT (Treadmills, skis, skates, sewing machines, bikes, large toys, etc.)	3					0
ELECTICAL & ELECTRONIC TOOLS						0
Vacuums, Power tools, Power washers etc.	5					0
TEXTILES (carpets, clothes, rugs, drapes etc.)	33.5	# of loads at 250 uncompacted lbs per cubic yards x 2.13 cubic yards per load	17838.75 lbs		8108.523	8.091521
SCRAP METAL		# of loads x 1575 lbs per cubic yard X 2.13 cubic yards per load	0 lbs		0	0
BBQs	28					0
CONSTRUCTION MATERIAL (mixed)	17					0
Clean Wood	3					0
Treated wood	29	# of loads x 244 lbs per cubic yard x 2.13 cubic yards per load	15071.88 lbs		6850.855	6.83649
Drywall	4.3					0
Asphalt shingles	3					0
Brick & concrete						0
Cupboards, shelves, counter tops	3					0
windows	33					0
doors	1					0
Bathroom fixtures - toilet, tubs, showers, etc.	15					
FURNITURE		**Combined the numbers of couches, mattresses etc. and used 5 per load and a weight of 244 lbs per cubic yard and 2.13 cubic yards per load**	0 lbs		0	0
Couch, love seats, large chairs	22					
Bed frames and headboards	3					

Mattresses & Box springs	33					
Other furniture - tables, charis, dressers, lawn furniture/chairs etc.	35	# of loads x 244 lbs per cubic yard x 2.13 cubic yards per load	18190.2 lbs	8268.273	8.250936	
	0					
NOTES	0					
Car Seat	2					
Screen door	3					
shingles	8					
rakes	2					
golf cart	2					
umberella	2					
air mattress	1					
dish tray	1					
kitty litter tray	1					
rail road ties	2					
pots	4					
foam mattress	1					
rocking chair	1					
lamp	1					
boxes of books	2					
boxes of dishes	2.1					
weedwacker	1					
picnic table	1					
plastic chair	1					
extension cords	1					
minnow nets	5					
stuffed toys						
3 Blankets						
Byfold Doors		NOTE: Recycler took 30 bags of recycling				
Starofoam (box)						

2011 DISPOSAL SITE STATISTICS

2011	STONECLIFFE	Deliverd to site	Tipping Tickets	BISSETT	Dellvered to Site	Tipping Tickets	RECYCABLES	MonthlyTotals	
DEC P/U	266			120				**386**	
DEC DEL		130			29		65	**159**	December
NOV P/U	241			145				**386**	
NOV DEL		146			99		93	**245**	November
OCT P/U	256			163			131	**419**	
OCT DEL		249			311		4	**560**	October
SEP P/U	424			149			164	**573**	
SEP DEL		287	75		284			**646**	September
AUG P/U	408			272			132	**680**	
AUG DEL		432	365		756	100		**1653**	August
JULY P/U	419			143			116	**562**	
JULY DEL		616	240		550	25		**1431**	July
JUN P/U	404			137			121	**541**	
JUN DEL		278	60		302			**640**	June
MAY P/U	308			162			96	**470**	
MAY DEL		296	60		278			**634**	May
APR P/U	265			95			64	**360**	
APR DEL		164			49			**213**	April
MAR P/U	327			140			84	**467**	
MAR DEL		109			36			**145**	March
FEB P/U	263			0			74	**263**	
FEB DEL		78			0			**78**	February
JAN P/U	214			86			52	**300**	
JAN DEL		133			48			**181**	January
TOTAL BAGS	**3795**	**2918**	**800**	**1612**	**2742**	**125**	**1196**	**11992**	**Bags garbage total**

	Stonecliffe			**7513**	**Bissett**		**4479**	**1196**	**Recycling**
Bags	11992								
from recycle	235								
Total	**12227**	2031.01474	Cubic yards (bags times .166109 to obtain cubic yards)						
		416.358022	tonnes of garbage (cubic yards times .205 to obtain tonnes by weight)						

2011		STONECLIFFE Private	STONECLIFFE Business	BISSETT CREEK Private	BISSETT CREEK Business	TOTALS
JANUARY						
Sat	1	0	0	0		0
Sun	2	0	0	0		0
Mon	3	0	0	0		0
Tue	4	0	0	0		0
Wed	5	0	0	0		0
Thu	6	6	1	0		7
Fri	7	0	0	0		0
Sat	8	4	0	4		8
Sun	9	0	0	0		0
Mon	10	0	0	0		0
Tue	11	0	1	1		2
Wed	12	0	0	0		0
Thu	13	5	0	0		5
Fri	14	0	0	0		0
Sat	15	8	0	4		12
Sun	16	0	0	0		0
Mon	17	0	0	0		0
Tue	18	0	0	3		3
Wed	19	0	0	0		0
Thu	20	7	0	0		7
Fri	21	0	0	0		0
Sat	22	8	0	3		11
Sun	23	0	0	0		0
Mon	24	10	0	0		10
Tue	25	0	0	4		4
Wed	26	0	0	0		0
Thu	27	7	0	0		7
Fri	28	0	0	0		0
Sat	29	8	0	4		12
Sun	30	0	0	0		0
Mon	31	0	0	0		0
Totals		63	2	23		88
February						
Tuesday	1	0	0	3	0	3
Wednesday	2	0	0	0	0	0
Thur	3	5	0	0	0	5
Fri	4	0	0	0	0	0
Sat	5	9	0	3	0	12
Sun	6	0	0	0	0	0
Mom	7	0	0	0	0	0
Tuesday	8	0	0	4	0	4
Wed	9	0	0	0	0	0
Thur	10	6	0	0	0	6
Fri	11	0	0	0	0	0
Sat	12	6	0	3	0	9
Sun	13	0	0	0	0	0
Mon	14	0	0	0	0	0
Tuesday	15	0	0	2	0	2

Wed	16	0	0	0	0	0
Thur	17	5	0	0	0	5
Fri	18	0	0	0	0	0
Sat	19	6	0	3	0	9
Sun	20	0	0	0	0	0
Mon	21	0	0	0	0	0
Tuesday	22	0	0	4	0	4
Wed	23	0	0	0	0	0
Thur	24	4	0	0	0	4
Fri	25	0	0	0	0	0
Sat	26	7	0	2	0	9
Sun	27	0	0	0	0	0
Mon	28	0	0	0	0	0
Totals		**48**	**0**	**24**	**0**	**72**
March						
Tue	1	0	0	2	0	2
Wed	2	0	0	0	0	0
Thu	3	6	0	0	0	6
Fri	4	0	0	0	0	0
Sat	5	5	0	0	0	5
Sun	6	0	0	0	0	0
Mon	7	0	0	0	0	0
Tue	8	0	0	2	0	2
Wed	9	0	0	0	0	0
Thu	10	7	0	0	0	7
Fri	11	0	0	0	0	0
Sat	12	10	0	2	0	12
Sun	13	0	0	0	0	0
Mon	14	0	0	0	0	0
Tue	15	0	0	2	0	2
Wed	16	0	0	0	0	0
Thu	17	6	0	0	0	6
Fri	18	0	0	0	0	0
Sat	19	11	0	2	0	13
Sun	20	0	0	0	0	0
Mon	21	0	0	0	0	0
Tue	22	0	0	2	0	2
Wed	23	0	0	0	0	0
Thu	24	8	0	0	0	8
Fri	25	0	0	0	0	0
Sat	26	2	0	7	0	9
Sun	27	0	0	0	0	0
Mon	28	0	0	0	0	0
Tue	29	0	0	1	0	1
Wed	30	4	0	0	0	4
Thurs	31	0	0	0	0	0
Totals		**59**	**0**	**20**	**0**	**79**
April						
Fri	1	0	0	0	0	0
Sat	2	9	0	1	0	10
Sun	3	0	0	0	0	0
Mon	4	0	0	0	0	0

Tue	5	0	0	5	0	5
Wed	6	0	0	0	0	0
Thu	7	3	0	0	0	3
Fri	8	0	0	0	0	0
Sat	9	14	0	2	0	16
Sun	10	0	0	0	0	0
Mon	11	0	0	0	0	0
Tue	12	0	0	1	0	1
Wed	13	0	0	0	0	0
Thu	14	6	0	0	0	6
Fri	15	0	0	0	0	0
Sat	16	16	0	2	0	18
Sun	17	0	0	0	0	0
Mon	18	0	0	0	0	0
Tue	19	0	0	4	0	4
Wed	20	0	0	0	0	0
Thu	21	3	0	0	0	3
Fri	22	0	0	0	0	0
Sat	23	18	0	3	0	21
Sun	24	0	0	0	0	0
Mon	25	0	0	0	0	0
Tue	26	0	0	4	0	4
Wed	27	0	0	0	0	0
Thu	28	7	0	0	0	7
Fri	29	0	0	0	0	0
Sat	30	12	0	0	0	12
Totals		88	0	22	0	110
May						
Sun	1	0	0	0	0	0
Mon	2	0	0	0	0	0
Tue	3	0	0	5	0	5
Wed	4	0	0	0	0	0
Thu	5	9	0	0	0	9
Fri	6	0	0	0	0	0
Sat	7	12	0	3	0	15
Sun	8	0	0	0	0	0
Mon	9	0	0	0	0	0
Tue	10	0	0	9	0	9
Wed	11	0	0	0	0	0
Thu	12	10	0	0	0	10
Fri	13	0	0	0	0	0
Sat	14	12	0	7	0	19
Sun	15	0	0	0	0	0
Mon	16	0	0	0	0	0
Tue	17	0	0	5	0	5
Wed	18	0	0	0	0	0
Thu	19	19	0	0	0	19
Fri	20	0	0	0	0	0
Sat	21	0	0	4	0	4
Sun	22	0	0	0	0	0
Mon	23	0	0	0	0	0
Tue	24	0	0	7	2	9

Wed	25	0	0	0	0	0
Thu	26	10	1	0	0	11
Fri	27	0	0	0	0	0
Sat	28	16	0	4	1	21
Sun	29	0	0	0	0	0
Mon	30	0	0	0	0	0
Tue	31	0	0	5	2	7
Totals		88	1	49	5	143
June		0	0	0	0	0
Wed	1	0	0	0	0	0
Thu	2	12	2	0	0	14
Fri	3	0	0	0	0	0
Sat	4	12	1	4	0	17
Sun	5	0	0	0	0	0
Mon	6	0	0	0	0	0
Tue	7	0	0	7	2	9
Wed	8	0	0	0	0	0
Thu	9	8	2	0	0	10
Fri	10	0	0	0	0	0
Sat	11	12	0	4	0	16
Sun	12	0	0	0	0	0
Mon	13	0	0	0	0	0
Tue	14	0	0	3	1	4
Wed	15	0	0	0	0	0
Thu	16	12	1	0	0	13
Fri	17	0	0	0	0	0
Sat	18	15	0	0	0	15
Sun	19	0	0	0	0	0
Mon	20	0	0	0	0	0
Tue	21	0	0	6	3	9
Wed	22	0	0	0	0	0
Thu	23	6	1	0	0	7
Fri	24	0	0	0	0	0
Sat	25	18	1	2	0	21
Sun	26	0	0	0	0	0
Mon	27	0	0	0	0	0
Tue	28	0	0	5	3	8
Wed	29	0	0	0	0	0
Thurs	30	11	2	0	0	13
Totals		106	10	31	9	156
July						
Fri	1	0	0	0	0	0
Sat	2	14	2	4	0	20
Sun	3	0	0	0	0	0
Mon	4	0	0	0	0	0
Tue	5	0	0	4	4	8
Wed	6	0	0	0	0	0
Thu	7	8	3	0	0	11
Fri	8	0	0	0	0	0
Sat	9	21	2	4	1	28
Sun	10	0	0	0	0	0
Mon	11	0	0	0	0	0

Tue	12	0	0	5	3	8
Wed	13	0	0	0	0	0
Thu	14	12	3	0	0	15
Fri	15	0	0	0	0	0
Sat	16	17	25	1	0	43
Sun	17	0	0	0	0	0
Mon	18	0	0	0	0	0
Tue	19	0	0	4	4	8
Wed	20	0	0	0	0	0
Thu	21	9	4	0	0	13
Fri	22	0	0	0	0	0
Sat	23	23	3	3	0	29
Sun	24	0	0	0	0	0
Mon	25	0	0	0	0	0
Tue	26	0	0	6	4	10
Wed	27	0	0	0	0	0
Thu	28	8	4	0	0	12
Fri	29	0	0	0	0	0
Sat	30	24	3	5	1	33
Sun	31	0	0	0	0	0
Totals		136	49	36	17	238
August						
Mon	1	0	0	0	0	0
Tue	2	0	0	12	4	16
Wed	3	15	3	0	0	18
Thu	4	12	2	5	0	19
Fri	5	0	0	0	0	0
Sat	6	0	0	0	0	0
Sun	7	0	0	0	0	0
Mon	8	0	0	0	0	0
Tue	9	0	0	5	4	9
Wed	10	0	0	0	0	0
Thu	11	9	2	0	0	11
Fri	12	17	3	3	1	24
Sat	13	0	0	0	0	0
Sun	14	0	0	0	0	0
Mon	15	0	0	0	0	0
Tue	16	0	0	0	4	4
Wed	17	0	0	0	0	0
Thu	18	10	3	0	0	13
Fri	19	0	0	0	0	0
Sat	20	26	2	7	0	35
Sun	21	0	0	0	0	0
Mon	22	0	0	0	0	0
Tue	23	0	0	3	3	6
Wed	24	0	0	0	0	0
Thu	25	12	2	0	0	14
Fri	26	0	0	0	0	0
Sat	27	24	3	0	2	29
Sun	28	0	0	0	0	0
Mon	29	0	0	0	0	0
Tue	30	0	0	0	0	0

Wed	31	0	0	0	0	0
Totals		125	20	35	18	198
September						
Thurs	1	10	1	22	1	34
Fri	2	0	0	0	0	0
Sat	3	22	1	0	0	23
Sun	4	0	0	0	0	0
Mon	5	0	0	0	0	0
Tues	6	0	0	5	4	9
Wed	7	0	0	0	0	0
Thurs	8	9	2	0	0	11
Fri	9	0	0	0	0	0
Sat	10	15	1	6	0	22
Sun	11	0	0	0	0	0
Mon	12	0	0	0	0	0
Tues	13	0	0	5	1	6
Wed	14	0	0	0	0	0
Thurs	15	8	2	0	0	10
Fri	16	0	0	0	0	0
Sat	17	14	1	5	0	20
Sun	18	0	0	0	0	0
Mon	19	0	0	0	0	0
Tues	20	0	0	4	1	5
Wed	21	0	0	0	0	0
Thurs	22	6	1	0	0	7
Fri	23	0	0	0	0	0
Sat	24	11	1	5	0	17
Sun	25	0	0	0	0	0
Mon	26	0	0	0	0	0
Tues	27	0	0	4	2	6
Wed	28	0	0	0	0	0
Thru	29	11	1	0	0	12
Fri	30	0	0	0	0	0
Totals		106	11	56	9	182
October						
Sat	1	0	0	0	0	0
Sun	2	8	1	3	0	12
Mon	3	0	0	0	0	0
Tues	4	0	0	5	2	7
Wed	5	0	0	0	0	0
Thurs	6	7	1	0	0	8
Fri	7	0	0	0	0	0
Sat	8	18	1	3	0	22
Sun	9	0	0	0	0	0
Mon	10	0	0	0	0	0
Tues	11	0	0	4	3	7
Wed	12	0	0	0	0	0
Thurs	13	6	1	0	0	7
Fri	14	0	0	0	0	0
Sat	15	17	3	0	0	20
Sun	16	0	0	0	0	0
Mon	17	0	0	0	0	0

Tues	18	0	0	10	1	11
Wed	19	0	0	0	0	0
Thurs	20	5	0	0	0	5
Fri	21	0	0	0	0	0
Sat	22	16	0	7	0	23
Sun	23	0	0	0	0	0
Mon	24	0	0	0	0	0
Tues	25	0	0	3	0	3
Wed	26	0	0	0	0	0
Thurs	27	15	0	0	0	15
Fri	28	0	0	0	0	0
Sat	29	15	0	3	0	18
Sun	30	0	0	0	0	0
Mon	31	0	0	0	0	0
Totals		107	7	38	6	158
November						
Tues	1	0	0	3	0	3
Wed	2	0	0	0	0	0
Thurs	3	4	0	0	0	4
Fri	4	0	0	0	0	0
Sat	5	13	0	2	0	15
Sun	6	0	0	0	0	0
Mon	7	0	0	0	0	0
Tues	8	0	0	4	0	4
Wed	9	0	0	0	0	0
Thurs	10	6	0	0	0	6
Fri	11	0	0	0	0	0
Sat	12	14	0	3	0	17
Sun	13	0	0	0	0	0
Mon	14	0	0	0	0	0
Tues	15	0	0	4	0	4
Wed	16	0	0	0	0	0
Thurs	17	6	0	0	0	6
Fri	18	0	0	0	0	0
Sat	19	13	0	2	0	15
Sun	20	0	0	0	0	0
Mon	21	0	0	0	0	0
Tues	22	0	0	2	1	3
Wed	23	0	0	0	0	0
Thurs	24	7	0	0	0	7
Fri	25	0	0	0	0	0
Sat	26	11	0	2	0	13
Sun	27	0	0	0	0	0
Mon	28	0	0	0	0	0
Tues	29	0	0	5	0	5
Wed	30	0	0	0	0	0
Totals		74	0	27	1	102
December						
Thurs	1	3	0	0	0	3
Fri	2	0	0	0	0	0
Sat	3	6	0	2	0	8
Sun	4	0	0	0	0	0

Mon	5	0	0	0	0	0
Tues	6	0	0	2	0	2
Wed	7	0	0	0	0	0
Thurs	8	5	0	0	0	5
Fri	9	0	0	0	0	0
Sat	10	6	0	1	0	7
Sun	11	0	0	0	0	0
Mon	12	0	0	0	0	0
Tues	13	0	0	4	0	4
Wed	14	0	0	0	0	0
Thrus	15	6	0	0	0	6
Fri	16	0	0	0	0	0
Sat	17	8	0	2	0	10
Sun	18	0	0	0	0	0
Mon	19	0	0	0	0	0
Tues	20	0	0	2	0	2
Wed	21	0	0	0	0	0
Thurs	22	3	0	0	0	3
Fri	23	0	0	0	0	0
Sat	24	7	0	1	0	8
Sun	25	0	0	0	0	0
Mon	26	0	0	0	0	0
Tues	27	0	0	0	0	0
Wed	28	0	0	1	0	1
Thrus	29	7	0	0	0	7
Fri	30	5	0	1	0	6
Sat	31	0	0	0	0	0
Totals		56	0	16	0	72

Annual form to be completed to assist in calculating the volume of material that was actually landfilled and/or diverted to assit with Jp2g in completion of bi-annual reports for MOE and for annual Municipal Datacall for recycling - data collected from form F605.

ITEM	STONECLIFFE SITE		BISSETT SITE	
2011	MATERIAL IN	MATERIAL OUT	MATERIAL IN	MATERIAL OUT
For last column L- Landfilled; R - Removed by recycler; U - reused by ratepayer; B - Burned				
YARD WASTE				
Pine Needles	7		1	
Brush	64	3	15	
Leaves/Hay/Grass				
Ashes	45	23	6	6
TIRES	107		20	
WHITE GOODS				
Refrigerators	9	6	10	9
Stove/Ovens/Ranges	7	7	2	2
Freezers	7	5	3	3
Washers/Dishwashers	11	9	3	3
Dryers	6	5	1	1
Air Conditioners	6	6	2	2
Small Appliances - mixers, fans, toasters, etc.	52	52	19	19
Microwaves	5	5	1	1
COMPUTERS				
Monitors			2	2
Processing Units	3			
Printers	2	1	2	2
ELECTRONICS				
Televisions	22	3	9	1
DVDs, VCRs, Stereos	13	4	4	2
TOYS, LEISURE & SPORTS EQUIPMENT (Treadmills, skis, skates, sewing machines, bikes, large toys, etc.)	11		2	1
ELECTICAL & ELECTRONIC TOOLS	2		1	
Vacuums, Power tools, Power washers etc.	8	8	4	4
TEXTILES (carpets, clothes, rugs, drapes etc.)	24	13	8	1
SCRAP METAL	1280kg	230	989kg	220
BBQs	18	4	5	1
CONSTRUCTION MATERIAL (mixed)	27	27	4	4
Clean Wood	3 lds	3		
Treated wood	650kg	650kg	165kg	165kg
Drywall	545kg	545kg	5 sheet	5
Asphalt shingles	2		2	

Brick & concrete				
Cupboards, shelves, counter tops	5		4	
windows				
doors				
Bathroom fixtures - toilet, tubs, showers, etc.	11	2	3	
FURNITURE				
Couch, love seats, large chairs	33	16	8	1
Bed frames and headboards	1	1	1	1
Mattresses & Box springs	20	11	8	
Other furniture - tables, charis, dressers, lawn furniture/chairs etc.	47	2	6	
VEHCILE ACCIDENT				
BURNT OR DUMPED CONTENTS	4			

NOTES				
Door	1			
Foam	2			
Cardboard	2			
dresser	6			
fire wood	4			
cement laudry tub	1			
stroller	1			
highchair	1			
Plastic Pipe			1 load	
lawn mowers	2			
Boats	4	1	3	
hot water tank	1		1	
canoe	1	1		
window	1	1		
tarps	2			
Bear hides	2			
Pallets			4	
tarps	1	1		
Fire places			1	
hot water tank	1	1		
clean wood	2 loads			
kitchen chairs	4			

Cumulative totals	QUANITITY DISPOSED OF - in minus out	DISPOSAL METHOD
QUANITITY DISPOSED OF		
	8	
3	76	B
	0	
29	51	L
	127	
16	4	R
9	0	R
8	2	R
12	2	R
8	1	R
	0	R
71	0	R
6	0	R
		R
2	0	R
	3	
1	1	R
	27	R
7	11	6R 1U
	12	1U
	3	1U
12	12	L
11	21	10-L 1-R
810	2269	R
	18	4R 1U
31	31	L
3 loads	0	B
815kg	815 kg	L
600 kg	600 kg	L
	4	

	0	
9	9	L
	0	
	0	
	12	1-R, 6-L1-U
24	24	R
2	2	L
	17	11-R
	51	1-R 23-L
	0	
	4	
		crushed
		U
		U
		U
1	U	
		1-u
		1-u
		2-L
		2-L
		4-U
1		L
1		R

APPENDIX B

MOE CORRESPONDENCE
2010/2011

Ontario

Ministry of the Environment
Ministère de l'Environnement

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Head, Clara and Maria Mailing Address: 15 Township Hall Rd, Stonecliffe, Ontario, Canada, K0J 2L0 Physical Address: 15 Township Hall Rd, Head, Clara and Maria, Township, County of Renfrew, Ontario, Canada, K0J 2K0 Telephone: (613)586-2526, FAX: (613)586-2596, email: twpshcm@webhart.net Client #: 5050-4WZLAU, Client Type: Municipal Government		
Inspection Site Address:	Bissett Creek Waste Disposal Site Address: Part of North Half of Lot 13, Concession 13, Head, Clara and Maria, Township, County of Renfrew District Office: Ottawa GeoReference: ,		
Contact Name:	Melinda Reith	**Title:**	Clerk-Treasurer
Contact Telephone:	(613)586-2526 ext	**Contact Fax:**	613-586-2596
Last Inspection Date:	2006/12/04		
Inspection Start Date:	2010/06/15	**Inspection Finish Date:**	2010/06/15
Region:	Eastern		

1.0 INTRODUCTION

The purpose of the inspection was to assess the site for compliance with the Environmental Protection Act, O.Regulation 347, and Certificate of Approval No. A412406. One Certificate of Approval violation relating to land acquisition was identified.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):
A412406

2.1 FINANCIAL ASSURANCE:
Not applicable.

2.2 APPROVED AREA OF THE SITE:
The approved landfilling area (footprint) is 0.6 hectares within a total site area of 2.0 hectares.

2.3 APPROVED CAPACITY:
Certificate Condition 13, states the theoretical maximum volumetric capacity for the waste disposal site is 18,502 cubic metres.

2.4 ACCESS CONTROL:
The site was open to the public during the inspection. There was an attendant on-site. The site is equipped with gates, locks and displays a sign with operating hours and emergency contact number. The landfill is also equipped with a bear fence which has successfully deterred bears from the landfill since its installation.

2.5 COVER MATERIAL:

The site is currently using the trench method of landfilling. Some litter was observed beyond the footprint area. The attendant informed that housekeeping is ongoing to prevent wind blown litter.

2.6 WASTE BURNING:

No waste burning at the time of inspection. In 2008/2009 an estimated 78 loads (22 tonnes) of brush was burned at the site.

2.7 GROUNDWATER/SURFACEWATER IMPACT:

The 2008-2009 Monitoring Report - Bissett Creek Landfill, dated May 2010 is currently under review by the ministry's technical support section.

The hydrogeologic aspects of the 2006/2007 Annual Report were reviewed by ministry Hydrogeologist, Shawn Kinney. The following memo dated June 7, 2010 should be reviewed by the Township. Mr. Kinney recommends that if the site owners are unable to acquire a sufficient Contaminant Attenuation Zone, alternate leachate management methods will be required.

Bissett Creek WDS - 2006-07 AMR 2010 Hydro-g Review.pdf

2.8 LEACHATE CONTROL SYSTEM:

No leachate control system in place.

2.9 METHANE GAS CONTROL SYSTEM:

No methane gas control system in place.

2.10 OTHER WASTES:

Only solid non-hazardous wastes were observed being deposited at the site.

Waste diversion efforts are summarized in the 2008/2009 annual report.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

Condition 17 requires the purchase, registration and survey of additional land from the MNR.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

Yes

Specifics: Non compliance with Condition 17 was identified in regards to land acquisition.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

By **July 22, 2010** - The site owners shall submit to the undersigned a report detailing timelines for achieving compliance with Condition 17. Please be mindful that if the site owners are unable to acquire a sufficient Contaminant Attenuation Zone by **August 1, 2010** the ministry will require the site owners to prepare a detailed leachate management plan that will achieve Guideline B-7 conformance.

6.0 OTHER INSPECTION FINDINGS

N/A

7.0 INCIDENT REPORT

Applicable
5382-86EJ88

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	**Lance Larkin**
District Office:	**Ottawa District Office**
Date:	**2010/06/22**
Signature	

REVIEWED BY:
District Supervisor:

Name:	**Paul Kehoe**
District Office:	**Ottawa District Office**
Date:	**2010/06/23**
Signature:	

File Storage Number: SI RE MR C13 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

July 29, 2010

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

lance.larkin@ontario.ca

Attention: Mr. Lance Larkin
Sr. Environmental Officer

Re: Bissett Creek Landfill Site
Certificate No. A412406
Our Project No. 2006023K

Dear Sir:

We acknowledge receipt of the Site Implementation Report dated June 23, 2010 filed with the Township on July 7, 2010.

In regards to Section 5.0 Action Required, please accept this letter on behalf of the Township to report on:

- detailed timelines for achieving compliance with Condition 17 by July 22, 2010, and
- a detailed leachate management plan that will achieve Guideline B-7 conformance by August 1, 2010

Condition 17

Under amended Certificate A412406 dated November 27, 2003 the Township was to submit to the Director for Approval:

- a completed plan of survey
- documents showing land ownership
- copy of registration of plan of survey

As reported in the Biannual Reports, ongoing correspondence with MOE has advised that this timeline could not be met. Prior to the issuance of the recent Site Inspection Report, the attached email correspondence provides the current status of the Crown land transfer.

- K. Mooder to L. Larkin June 22/10
- L. Larkin to K. Mooder June 23/10
- Township to L. Larkin June 29/10
- L. Larkin to Township June 29/10
- P. Soulliere to L. Larkin July 2/10
- L. Larkin to Township July 7/10

In consultation with the Township Solicitor Condition 17 will be satisfied by August 22, 2010.

Leachate Management Plan

Since the initial hydrogeological investigations in 2000 and in accordance with the Site Development and Operations Plan, May 2002 the site is designed to operate based on natural attenuation involving the establishment of a CAZ.

As detailed in the 2008/2009 Bi-Annual Report dated May 2010 there is a very weak leachate plume detected which poses no immediate threat to surface or groundwater resources. The MNR continues their efforts to establish the CAZ to comply with Guideline B-7, so we respectfully submit that there is no requirement to investigate and report on potential engineered solutions.

Trusting this is satisfactory.

Yours very truly,
Jp2g Consultants Inc.
Engineers $ Planners $ Project Managers

Kevin J. Mooder, MCIP, RPP

KJM/dr

Encl.

c.c.: - Melinda Reith
twpshcm@xplornet.com

Larkin, Lance (ENE)

From: Soulliere, Pat (MNR)
Sent: July 2, 2010 10:33 AM
To: Larkin, Lance (ENE); 'Townships of Head Clara & Maria'
Cc: 'Kevin Mooder'; 'tom.geisler@ontario.ca'
Subject: RE: RE: Head Clara Maria Waste Sites

Lance,

As we discussed:

The sale of the lands on which the landfill & containment attenuation zone are located are in the process of taking place and have been offered to the municipality. That said the sale of Crown Lands is more complicated than a sale of most private lots since the Crown has a number of issues to deal with prior to any sale taking place:

1) Environmental assessment – This has been completed

2) Survey – Since these lands currently don't exist in legal registration there must be a registered survey approved by the Ontario Surveyor General then registered – completed

3) The Crown must ensure others with interest in the lands have these interests secured- in this case there is a hydro line across the property and a easement must be put in place before the sale. Currently there are negotiations between the Province and Ontario Hydro regarding the terms on easements granted by the Province. Until this is settled the easement cannot be granted

4) The sale can then take place. This process also takes some time as the Crown is creating a parcel of land (the process is the issuance of Letters Patent) not a transfer of existing parcel.

The dates in the earlier correspondence of August of this year are not possible at this time and out of the hands of the holder of the Certificate of Approval. The Ministry of Natural Resources will work to sell these properties as soon as we can but will not be able to avoid any steps this would potential cause the Province future liabilities.

I will issue the Municipality a Land Use Permit under the Public Lands Act for the use of these lands for the area surveyed. This LUP will be for the purpose of a Waste Disposal Site and include the attenuation zone.

If you have any questions pleas call

Pat Soulliere

Lands & Waters Technical Specialist

Madawaska Area/Pembroke District

phone- (613) 732-5587

fax- (613) 732-2972

From: Larkin, Lance (ENE)
Sent: June 29, 2010 3:25 PM
To: 'Townships of Head Clara & Maria'
Cc: Kevin Mooder; Soulliere, Pat (MNR); tom.geisler@ontario.ca; Larkin, Lance (ENE)
Subject: RE: RE: Head Clara Maria Waste Sites

Hello Melinda,

The township must own the land of the contamination attenuation zone to be in compliance.

If you have any questions or concerns, please do not hesitate to contact me at 613-521-3450 ext. 229

From: Townships of Head Clara & Maria [mailto:twpshcm@xplornet.com]
Sent: June 29, 2010 2:55 PM
To: Larkin, Lance (ENE)
Cc: Kevin Mooder; Soulliere, Pat (MNR); tom.geisler@ontario.ca
Subject: Re: RE: Head Clara Maria Waste Sites

Mr. Larkin

I have been in contact with the MNR in Pembroke and the file is currenlty with their Peterborough office. Mr. Pat Soulliere out of Pembroke is currenlty working to expidite this matter however; he has enquired if I would ask of you whether, in the event that the land transfer can not be completed within the designated time frame, an amended LUP for the entire surveyed area would suffice until the process can be concluded?

If you could provide some direction it would be appreciated.

Sincerely

Melinda Reith
United Townships of Head, Clara & Maria

> ----- Original Message -----
> **From:** Larkin, Lance (ENE)
> **To:** Kevin Mooder
> **Cc:** twpshcm@xplornet.com
> **Sent:** Wednesday, June 23, 2010 8:42 AM
> **Subject:** RE: RE: Head Clara Maria Waste Sites
>
> Thanks Kevin,
>
> Perhaps you can ask MNR to expedite their review highlighting that without the land approvals, the Township may be subject to a Provincial Officer's Order as early as August 22, 2010.
>
> I tried calling Mr. Giesler this morning but there was no answer and no voice mail.
>
> Lance Larkin

From: Kevin Mooder [mailto:kmooder@jp2g.com]
Sent: June 22, 2010 4:46 PM
To: Larkin, Lance (ENE)
Cc: twpshcm@xplornet.com
Subject: Fwd: RE: Head Clara Maria Waste Sites

Lance,
I spoke to Ruth Morin today and she advised that your office is requesting that Condition 17 of Certificate A412406 be satisfied for the Bissett Creek (Maria Twp) Site ASAP. Please find attached my recent correspondence with the MNR in this regard, and to my knowledge the transfer of ownership has not been finalized. I would advise that the registered survey plans for this site and the Deux Rivieres (Clara Twp) Site Certificate A412407 have been filed with MNR since April 2009.
If you wish to contact Mr Giesler directly his phone number is 613-732-5537. As I am on the road for most of the week, if you wish to discuss further please leave a message on my cell phone 613-282-0268 and I will call you back when I get a chance.

Kevin Mooder
Jp2g Consultants Inc.
Engineers - Planners - Project Managers
1150 Morrison Drive, Suite 410
Ottawa, Ontario K2H 8S9
Tel: (613) 828-7800
Fax: (613) 828-2600

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

August 6, 2010

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

Attention: Mr. Lance Larkin
Sr. Environmental Officer

Re: Bissett Creek Landfill Site
Certificate No. A412406
Our Project No. 2006023K

Dear Lance:

Enclosed find the Township lawyers' submission to the Director to satisfy Condition 17 of the Certificate.

Pending the completion of the land transfer process, we will ensure the Certificate is amended to reflect the new site boundaries and complete the Certificate of Requirement.

Trusting this is satisfactory.

Yours very truly,
Jp2g Consultants Inc.
Engineers $ Planners $ Project Managers

Kevin J. Mooder, MCIP, RPP

KJM/dr

Encl.

c.c.: - Melinda Reith

HUCKABONE • O'BRIEN • INSTANCE • BRADLEY • LYLE • LLP

LAWYERS

F. Allan Huckabone, Q.C. (Retired)
Matthew J. Bradley
Dwight Montgomery

Delbert A. O'Brien, Q.C., Juris D. (Retired)
Tracy Lyle

M.Wm. Instance
Mark Huckabone

August 5th, 2010

Please Reply To PEMBROKE Location
E-Mail: williaml@hsolawyers.com
Direct Line: 613-735-2345
Ext. 322

COPY

Ministry of the Environment
2 St. Clair Blvd West
Floor 12A
Toronto, Ontario
M4V 1L5

Attention: Tessaye Gebrezghi, Director

Dear Mr. Gebrezghi:

RE: BISSETT CREEK LANDFILL SITE
CERTIFICATE NO. A412406

Please be advised that I am the solicitor for the Corporation of the United Townships of Head, Clara and Maria. I understand that certain conditions from the above noted Certificate of Approval have not yet been met in particular I refer to Section 17 of the Certificate.

In order to meet the conditions I am enclosing herein the completed Plan of Survey which was registered as Plan 49R-16963 on April 21, 2009. I believe this satisfies condition 17 (I) and (III). With respect to Section 17 (II), I enclose herein the Parcel Register for PIN 57028-0008 (R). You will note that the PIN is still in the registry system and does not show an owner of the property. As a result it would appear that the property is Crown Land. The Crown Patent was not registered on title.

We hope that the above satisfies the conditions. If you wish any further documentation regarding ownership, please advise me as soon as possible. We would have to request documentation from the Government regarding the Crown Patent.

Yours very truly,

M.W. Instance

MWI/cm

cc: Kevin Mooder

Ontario

Ministry of the Environment
Ministère de l'Environnement

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Head, Clara and Maria Mailing Address: 15 Township Hall Rd, Stonecliffe, Ontario, Canada, K0J 2E0 Physical Address: 15 Township Hall Rd, Head, Clara and Maria, Township, County of Renfrew, Ontario, Canada, K0J 2K0 Telephone: (613)586-2526, FAX: (613)586-2596, email: twpshcm@webhart.net Client #: 5050-4WZLAU, Client Type: Municipal Government		
Inspection Site Address:	Bissett Creek Waste Disposal Site Address: 93 Bissett Creek Rd Part of North Half of Lot 13 Concession 13, Head Clara and Maria, Township, County of Renfrew District Office: Ottawa GeoReference: ,		
Contact Name:	Melinda Reith	**Title:**	CAO
Contact Telephone:	(613)586-2526 ext	**Contact Fax:**	
Last Inspection Date:	2010/06/15		
Inspection Start Date:	2011/08/03	**Inspection Finish Date:**	2011/08/03
Region:	Eastern		

1.0 INTRODUCTION

The purpose of the inspection was to assess the site for compliance with the Environmental Protection Act, O.Regulation 347, and Certificate of Approval No. A412406. There is an ongoing violation relating to land acquisition for a contaminant attenuation zone.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):
A412406

2.1 FINANCIAL ASSURANCE:

Specifics:
n/a

2.2 APPROVED AREA OF THE SITE:

Specifics:
The approved landfilling area (footprint) is 0.6 hectares within a total site area of 2.0 hectares.

2.3 APPROVED CAPACITY:

Specifics:
Certificate Condition 13 states the theoretical maximum volumetric capacity for the waste disposal site is 18,502 cubic metres.

2.4 ACCESS CONTROL:

Specifics:

The site was closed to the public during the inspection. The site is equipped with gates, locks and displays a sign with operating hours and an emergency contact number. The landfill is also equipped with a bear fence which has successfully deterred bears from the landfill since its installation.

2.5 COVER MATERIAL:

Specifics:
The site is currently using the trench method of landfilling. The type of cover material used is sand.

2.6 WASTE BURNING:

Specifics:
No waste burning at the time of inspection.

Condition (18) of the Certificate states that no burning of wastes shall be permitted at the Site with the exception of controlled burning of brush and other clean wood wastes as may be necessary from time to time and at the discretion of the Site operator. Any controlled burning of brush and other clean wood wastes shall be undertaken in accordance with MOE Guideline C-7, *Burning at Landfill Sites* and Section 4.21, *Open Burning of Waste* , excerpted from the MOE *Guidance Manual for Landfill Sites Receiving Municipal Waste (C-8-1)* dated November 1993. The Owner shall also refer to applicable guidelines, policies and regulations issued by the Ministry of Natural Resources and local by-laws.

2.7 GROUNDWATER/SURFACEWATER IMPACT:

Specifics:
The ministry's groundwater and surfacewater reviews for the site are pending. Pursuant to the Environmental Protection Act, the Township is responsible for preventing any potential adverse effects.

One monitoring well located near the middle of the site was observed to be locked.

2.8 LEACHATE CONTROL SYSTEM:

Specifics:
No leachate control system in place.

2.9 METHANE GAS CONTROL SYSTEM:

Specifics:
No methane gas control system in place.

2.10 OTHER WASTES:

Specifics:
No hazardous wastes observed at the site. A lot of recyclable material was observed in the fill area. The Town should investigate opportunities that will find a more suitable home for recyclables.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The last inspection report noted that Condition (17) requires the purchase, registration and survey of additional land from the MNR.

The attached July 2, 2010 email from the MNR explains the steps that are necessary to process the land transaction:

July 2 email from MNR.pdf

On July 5, 2011, emailed the MNR's Pat Soulliere, Lands & Waters Technical Specialist, Madawaska Area/ Pembroke District requesting an update on the land transaction.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
Yes

Specifics:
Certificate of Approval No. A412406, Notice 4 states the following under Condition (17):

By December 31, 2006, the Owner shall submit to the Director for approval:
i) a completed plan of survey for the property showing the landfill area and the Site area including the buffer and lands
purchased or to be purchased from the Ministry of Natural Resources;
ii) documents showing land ownerships of surveyed property, and
iii) a copy of registration of plan of survey.

The Town is in non-compliance with the above condition pursuant to the Ontario Environmental Protection Act, section 186(3).

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

1. By September 1, 2011, submit an electronic copy of the completed plan of survey for the property showing the landfill area and the Site area including the buffer and lands purchased or to be purchased from the Ministry of Natural Resources.

6.0 OTHER INSPECTION FINDINGS

No other inspection findings.

7.0 INCIDENT REPORT

Applicable
5382-86EJ88

8.0 ATTACHMENTS

03-08-11_1615.jpg; 03-08-11_1616.jpg; 03-08-11_1617.jpg; 03-08-11_1618.jpg

PREPARED BY:
Environmental Officer:
Name: **Lance Larkin**
District Office: **Ottawa District Office**
Date: **2011/08/05**
Signature

REVIEWED BY:
District Supervisor:
Name: **Tara MacDonald**
District Office: **Ottawa District Office**
Date: **2011/08/09**

Signature:

File Storage Number: SI RE MR C13 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Kevin Mooder

From: Kevin Mooder <kmooder@jp2g.com>
Sent: Thursday, September 01, 2011 1:44 PM
To: 'Larkin, Lance (ENE)'; twpshcm@xplornet.com
Subject: RE: Bissett Creek WDS Inspection A412406
Attachments: 2006023C - Plan of Survey - Lot 12&13, Concession 13, Geographic Township of Maria.PDF

Lance,
On behalf of the municipality and in consultation with Melinda Reith, Clerk I provide the following:

- A draft copy of the survey plan was filed with your office April 2, 2007
- As requested attached find a copy of 49R-16963 registered in April 2009

Kevin J. Mooder, MCIP, RPP
Senior Planner, Vice-President
Environmental Services

Jp2g Consultants Inc.
1150 Morrison Drive, Suite 410
Ottawa, ON K2H 8S9
Tel: (613) 828-7800
Fax: (613) 828-2600
E-mail: kmooder@jp2g.com

From: Larkin, Lance (ENE) [mailto:Lance.Larkin@ontario.ca]
Sent: Friday, August 12, 2011 4:01 PM
To: twpshcm@xplornet.com
Cc: Kevin Mooder
Subject: Bissett Creek WDS Inspection A412406

Please review the attached.

Thank you.

Lance Larkin

Senior Environmental Officer
Ministry of the Environment, Ottawa District Office
2430 Don Reid Drive, Ottawa, ON K1H 1E1
tel: 613-521-3450 ext. 229, fax: 613-521-5437
toll free: 1 800-860-219

Agent principal de l'environnement
Ministère de l'Environnement, District d'Ottawa
2430, promenade Don Reid, Ottawa (Ontario) K1H 1E1
tél. : 613-521-3450 poste 229, téléc. : 613-521-5437
sans frais. : 1-800-860-2195

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

November 11, 2011

Ministry of Environment
EAAB
Floor 12A, 2 St. Clair Avenue West
Toronto, ON M4V 1L5

Attention: Tesfaye Gebrezghi, P.Eng.
Supervisor Waste

Re: Bissett Creek Landfill Site
Certificate No. A412406
Corporation of the United Townships of Head Clara & Maria
Our Project No. 2006023L

Dear Sir:

Under the current Certificate of Approval No. A412406 last amended July 19, 2006 the site is described as a 0.6 ha Waste Disposal Site (Landfill) within a total site area of 2.0 ha. The amendment was issued approving the continued operation of the site, and acknowledged that the municipality was in the process of purchasing the lands for the waste disposal site and a contaminant attenuation zone from the Crown.

As required under Condition 17 enclosed find the following for Director approval:

- Plan of Survey Plan 49R-16963 registered April 21, 2009
- letters of Patent dated August 31, 2011 indicating Parts 1-18 inclusive are owned by the municipality subject to various covenants and easements

In this regard the site may best be described as a 0.6 ha landfilling area within a total site area of 2.881 ha (Part 1 49R-16963) and a buffer/CAZ of 19.337 ha (Parts 2-18 inclusive 49R-16963). Trusting an amended Certificate will be issued to reflect the site description.

Yours very truly,
Jp2g Consultants Inc.
Engineers • Planners • Project Managers

Kevin Mooder, MCIP RPP
Sr. Project Manager

KJM/dr

c.c.: - Melinda Reith, Clerk
- Lance Larkin, MOE Ottawa

APPENDIX C

COMPLIANCE SUMMARY
2010/2011

Certificate No. A412406 last amended July 19, 2006
Compliance Summary Table

	Condition (summary text)	Statement of Compliance
1.	Definitions 1.1 to 1.9.	Understood
2.	Site shall be designed and operated in accordance with the documents listed in Schedule "A" and with the conditions of the Certificate.	Understood
3.	Requirements under the EPA RSO 1990	Understood
4.	Requirements of the Certificate are severable	Understood
5.	The Applicant shall ensure compliance with all terms and conditions of the Certificate	Understood
6a.	The Applicant shall furnish forthwith, upon request of the MOE, any information requested with respect to compliance with the Certificate	Understood
6b.	After providing the information, without action by the Ministry shall not be construed as an approval, etc.	Understood
7.	The Applicant shall allow Ministry personnel or authorized representatives to carry out inspections	Understood
8.	Correspondence refer to Provisional Certificate of Approval No. A412406	Understood
9.	Applicant to notify Director of changes within 30 days	Understood
10.	In the event of any change in ownership the Applicant shall inform the owner in writing of the Certificate	Understood
11.	Information made available in accordance with the provisions of the Freedom of Information and Protection of Privacy Act	Understood
12.	Records required by the Certificate to be kept on Owner's premises for a minimum of 2 years	Understood
13.	The theoretical maximum volumetric capacity or the site is 18,502m^3	Understood
14.	The site to be developed and operated in accordance with Item 8 Schedule "A"	In compliance
15.	The Owner shall ensure all wastes are managed and disposed of in accordance with O. Reg. 347	Understood
16.	By March 31, 2004 the Owner shall submit to the Director for approval, plans for the area designated Fill Beyond Approved Limits	Jp2g filed March 23, 2004
17.	By July 31, 2004 the Owner shall submit to the Director for approval: i) completed plan of survey ii) documents showing land ownership iii) copy of registration of plan of survey	Completed November 2011
18.	No burning of wastes permitted with the exception of controlled burning of brush and other clean wood wastes as per MOE Guideline C-7 and Section 4.21 MOE Guideline Manual (C-8-1)	Understood
19.	Monitoring shall be undertaken in accordance with Section 9.0 Item 8 and Section 6 of Item 9 Schedule "A"	Understood
20.	By May 31, 2006 and every 2 years thereafter the Owner shall submit to the District Manager a report of operation and monitoring results	In compliance
21.	In the event of off-site exceedances of water quality criteria, the MOE shall notify the District Manager within 2 weeks	Understood
22.	The monitoring program outlined in Section 10 of Item 8 and Items 10 and 11 of Schedule "A" may be revised by the District Manager at their discretion. The Owner may request in writing to the District Manager changes to the program	Understood
23.	At least one (1) year prior to closure of the site, the Owner shall submit a closure, post-closure monitoring, maintenance and reporting program to the Director	Understood

Part 2

2010/2011 Monitoring Report

AECOM

Jp2g Consultants Inc.

2010/2011 Monitoring Report – Bissett Creek Landfill Site

Report

Environment AECOM

Jp2g Consultants Inc.

2010/2011 Monitoring Report – Bissett Creek Landfill Site

Prepared by:

AECOM
300 – 300 Town Centre Boulevard 905 477 8400 tel
Markham, ON, Canada L3R 5Z6 905 477 1456 fax
www.aecom.com

Project Number:

60246826 – 6.1

Date:

May, 2012

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("Consultant") for the benefit of the client ("Client") in accordance with the agreement between Consultant and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents Consultant's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to Consultant which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

Consultant agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but Consultant makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by Consultant represent Consultant's professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since Consultant has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, Consultant, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by Consultant and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

Consultant accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of Consultant to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

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

AECOM
300 – 300 Town Centre Boulevard
Markham, ON, Canada L3R 5Z6
www.aecom.com

905 477 8400 tel
905 477 1456 fax

May 29, 2012

Mr. Kevin Mooder
Jp2g Consultants Inc.
1150 Morrison Drive
Suite 410
Ottawa, ON K2H 8S9

Dear Mr. Mooder:

Project No: **60246826 – 6.1**

Regarding: **2010/2011 Monitoring Report – Bissett Creek Landfill Site**

We are pleased to provide you with a copy of the 2010/2011 Monitoring Report for the Bissett Creek Landfill Site.

The Bissett Creek Landfill is functioning as a natural attenuation site. There are indications of slight landfill impacts in the groundwater downgradient from the site. The surface water samples show no impact from the landfill.

We trust this report meets your requirements at this time. If you have any question please contact the undersigned at extension 378.

Sincerely,
AECOM Canada Ltd.

Spencer Bootsma, B.Sc.
Environmental Scientist

MEW:mm
Encl.

AECOM Signatures

Report Prepared By:

Spencer Bootsma, B.Sc.
Environmental Scientist

Report Reviewed By:

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

Table of Contents

List of Tables

Figures

Appendices

1. Introduction

The Bissett Creek Landfill Site is a relatively small landfill situated in a remote area. The site is located in the north half of Part Lots 12 and 13, Concession XIII in the Township of Maria, approximately 2 km southeast of the Community of Bissett Creek. The site location is shown on Figure 1. The site occupies a 2 ha parcel of land, 0.6 ha of which was authorized to be used as a waste disposal fill area under MOE Certificate of Approval A412406 (last amended July 19, 2006). The Township acquired the Contaminant Attenuation Zone (CAZ) shown on Figure 1 in August 2011. This report satisfies Conditions 19 and 20 of the C of A for landfill reporting.

Gartner Lee Limited (GLL) began field investigations on the site in 2000, including a hydrogeologic assessment and 2000-2001 groundwater monitoring study (GLL, 2002) completed in May 2002. AECOM Canada Ltd. (formerly Gartner Lee Limited) has completed the reporting for this monitoring since 2002. Groundwater and surface water monitoring programs have occurred annually at the site since 2002. The current and historical monitoring results show that the site has very little impact on the environment. With the establishment of the CAZ in 2011, and the very minor nature of possible leachate effects at downgradient monitor nest 1, the site is interpreted as being in compliance with Guideline B-7 at the CAZ boundary. No surface water influences by the landfill were noted in 2010-2011.

2. Site Setting

The physical setting of the landfill has been documented in previous reports (GLL, 2002). A brief summary is provided here.

The site is relatively remote, located in the Ottawa River valley area, some 2 km south of the Ottawa River and north of Algonquin Park. It lies on the southwest flank of a low hill and drains southwest towards Bissett Creek, approximately 1 km away. Regionally, the area is covered by 1 to 10 m of fine to medium grained sand and silt, underlain by a silty sand till. These shallow stoney and sandy soils are deposited over knobs and ridges of low permeability Precambrian bedrock (Chapman and Putnam, 1984). The bedrock in the area is part of the Grenville Province of the Canadian Shield, which is characterized by an abundance of metamorphosed granite gneisses.

Gartner Lee (2002) describes the local geologic setting in detail. The gneissic bedrock lies between 6 m and 15 m below ground surface, dipping at about 8% to the southwest towards Bissett Creek. Locally, the overburden thins to the northeast and is composed primarily of sand overlying a sand till. Several boreholes intersected discontinuous stringers of sand and gravel.

The nearest domestic well is located approximately 1.25 km northwest of the site near the Community of Bissett Creek. This well is not downgradient from the landfill. Groundwater moves predominantly horizontally in the sandy overburden. Where the bedrock is locally fractured, there is likely horizontal flow in the direction of Bissett Creek. There are no water well users downgradient of the site.

3. Methodology

Groundwater level measurements were collected from all existing monitors on April 27, 2010 and June 22, 2011 to assess groundwater flow directions. These groundwater elevations are summarized in Appendix A. Groundwater quality samples were collected from the monitors (1-I, 1-II, 2-I, 2-II, 3-I, 3-II, 4-I, 5-I, 6, 7 and 8) on April 28, 2010 and June 22, 2011. Groundwater quality results are presented in Appendix B. Photos of the monitoring locations are provided in Appendix D.

Two surface water stations with staff gauge installations are located downgradient of the site. Surface water elevation measurements are presented in Appendix A. SW1 is located in a wetland depression northwest of the site and SW2 is located in an intermittent tributary of Bissett Creek, southwest of the site (Figure 1). The surface water stations were sampled on April 28, 2010 and June 22, 2011. Surface water quality data are presented in Appendix C. Photos of the surface water stations are provided in Appendix D.

Groundwater and surface water level measurements and sample collection were conducted by an experienced Jp2g technician using field methodologies established by AECOM. All laboratory analyses were conducted by Exova Accutest Laboratories Limited in Ottawa, Ontario. Water samples were placed immediately in a chilled cooler for transport to the laboratory. The samples were delivered to the laboratory within 24 hours of collection. Field measurements of pH, electrical conductivity and water temperature were collected at the time of sampling and are presented along with historical measurements in Appendix B.

4. Groundwater Flow

Groundwater level measurements from all monitors are presented in Appendix A, along with all historical water level data collected at the site. Groundwater measurements collected during the April 2010 monitoring event are presented in Figure 2, and those from the June 2011 monitoring event are presented in Figure 3. The water table contours were drawn using elevations from the eight wells screened in either the sand and gravel overburden or the underlying silty sand till.

In general, the water level elevations from 2001 to 2011 show that the water table fluctuates from season to season and from year to year. A local groundwater divide runs in a roughly northeast to southwest direction across the site. This feature is created by the hill to the northeast of the site, and likely extends southwest to the confluence of the intermittent tributary with Bissett Creek (Figure 1). The groundwater elevation data from 2001 to 2011 show that this groundwater divide drifts in a north-south direction across the site from year to year and season to season. In 2010, the groundwater divide was located to south of the fill area. In 2011, the groundwater divide passed through the southern portion of the fill area. Shifts in the groundwater divide are common in flat water table conditions such as at this site, and are likely due to annual fluctuations in the amount of recharge and the amount of precipitation received at the site. Groundwater flow in the overburden beneath the bulk of the waste was directed primarily towards the northwest in 2010/2011, which is consistent with previous years except in 2002 and 2005, where it was found to be directed toward the southwest. Groundwater chemistry supports the flow regime, which is interpreted to be predominantly toward the northwest, as evidence of the landfill effects have been primarily found at monitoring location 1.

Based on the monitoring data, water levels are always within the surficial sand at monitors 6 and 7, in the sand and gravel at monitors 1-II and 8, and in the lower silty sand till at monitor 2-II. Water levels are usually within the bedrock at monitor 4-I where the bedrock is most shallow. At monitor 3-II, water levels are usually within the surficial sand. The water table fluctuates between the sand and the till at monitor 5-I. Historically, the water table at monitor 5-I fluctuates between the sand and the till.

It is important to know whether the water table mounds up into the waste in order to determine if groundwater flow is contributing leachate production. The elevation of the bottom of the waste in the main fill area ranges from to 100.1 m above datum at the western edge of the fill area to 97.3 m along the southwestern edge of the fill area. In 2010 and 2011, water table elevations were recorded at monitor 5-I of 94.65 m and 96.05 m above datum, respectively, and indicate that the water table does not appear to mound up into the waste.

5. Groundwater Quality

The groundwater quality results are tabulated and presented in Appendix B. The monitoring network at the site consists of 11 groundwater monitors at eight locations. Four monitors are screened within the fine surficial sand (monitors 3-II, 5-I, 6, 7), two are screened within the sand and gravel (monitors 1-II, 8), one is screened lower within the silty sand till (monitor 2-II), one across the till/bedrock contact (monitor 4-I) and three are screened within the granitic bedrock (monitors 1-I, 2-I, 3-I). The groundwater monitors were sampled on April 28, 2010 and June 22, 2011. The locations of these monitors are shown on Figure 1.

Water quality results from monitors 3-I (bedrock) and 4-I (overburden) are used to represent background groundwater quality. The water quality results obtained since monitoring began in 2000 at these two monitoring wells are presented as a concentration range for each sampling parameter. Monitor 5-I, screened beneath the fill, represents leachate quality. All other monitors were sampled to assess potential leachate effects. The tables in the sections below present the water quality results for the leachate indicator parameters only. The full suite of parameter results is tabulated in Appendix B. Each monitor will be discussed separately below.

5.1 Comparison of Leachate to Background Groundwater Quality

Monitor 5-I is installed beneath the waste at this site and is used to represent leachate quality. Leachate chemistry, as determined by monitor 5-I, is summarized in Table 1 below. For the sake of comparison, as discussed earlier, the background water quality (as characterized by overburden monitor 4-I and bedrock monitor 3-I) is also shown on Table 1, along with applicable Ontario Drinking Water Standards (ODWS).

Table 1. Comparison of Background Groundwater Quality to ODWS and Leachate

Parameter	ODWS	Background Overburden Monitor 4-I*	Background Bedrock Monitor 3-I	Leachate Concentration (Monitor 5-I) 2000-2009	Leachate Concentration (Monitor 5-I) April 2010	Leachate Concentration (Monitor 5-I) June 2011
Sodium (mg/L)	200	3 – 18	<2 – 6	4 - 22	12	3
Chloride (mg/L)	250	1 – 3	<1 – 3	<1 - 4	2	1
Potassium (mg/L)		1 – 5	<1 – 2	<1 - 2	2	1
Alkalinity (mg/L)	30 – 500	**15** – 68	**13 – 26**	**24** - 64	56	**26**
TDS (mg/L)	500	31 – 114	27 – 56	51 - 160	107	46
Iron (mg/L)	0.3	0.01 – 0.15	<0.03 – 0.14	<0.01 - 0.14	0.09	0.06
COD (mg/L)		<5 – 48	<5 – 15	<5 - 13	5	10
Nitrate (mg/L)	10	<0.10 – 0.13	<0.10 - 0.73	< 0.10 – **10.1**	4.03	0.57

*Note: * For background overburden, 2006 to 2009 data are excluded from range. Bold values are not within ODWS limits.*

Table 1 shows that alkalinity is lower than the ODWS range for both overburden and bedrock background water quality, which is consistent with other sites in this Township. The background overburden concentration range excludes data from 2006 to 2009. This is due to elevated leachate parameters during this period, the reason for which is unclear. Except for iron, concentrations of leachate parameters were similar to historical values during 2010 and 2011.

Leachate strength at the site is very weak, as would be expected in a landfill of this small size. During the reporting period, alkalinity was below the ODWS range in 2011 at monitor 5-I. All other parameters were within their respective ODWS limits. With the exception of nitrate, all landfill indicator parameters in Table 1 for leachate at monitor 5-I were similar to overburden background groundwater quality.

5.2 Groundwater Monitors Closest to Waste

Monitors 6 and 7 are located close to the waste. In 2010 and 2011, monitor 7 was located close the groundwater divide, and was not downgradient of the waste. Monitor 6 was located downgradient of a portion of the waste in 2011 but was not downgradient of the fill area in 2010. Table 2 summarizes the groundwater quality from these two monitors and the background overburden and leachate quality.

Table 2. Water Quality – Monitors 6 and 7

Parameter	ODWS	Background Overburden*	Monitor 6		Monitor 7		Leachate Concentration (Monitor 5-I)
			2010	*2011*	*2010*	*2011*	
Sodium (mg/L)	200	3 - 18	3	4	<2	<2	3 - 22
Chloride (mg/L)	250	1 - 3	1	1	2	1	<1 - 4
Potassium (mg/L)		1 - 5	1	1	1	<1	<1 - 2
Alkalinity (mg/L)	30 – 500	**15** - 68	**29**	30	**9**	**8**	**24** - 64
TDS (mg/L)	500	31 - 114	45	43	23	20	46 - 160
Iron (mg/L)	0.3	0.01 – 0.15	0.27	0.3	0.1	0.15	<0.01 - 0.14
COD (mg/L)		<5 - 48	<5	20	<5	20	<5 - 13
Nitrate (mg/L)	10	<0.10 – 0.13	0.16	<0.1	0.1	<0.1	< 0.10 – **10.1**

*Note: * For background overburden concentrations, 2005 to 2009 data are excluded from range. Bold values are not within ODWS limits.*

Monitor 6 shows leachate indicator parameter concentrations that are similar to the background range in 2010 and 2011 except for iron which was higher. Monitor 6 is interpreted as not being affected by leachate in 2010 and 2011. With the exception of alkalinity, all analytical results were within the ODWS limits at this location.

Monitor 7 shows leachate indicator parameter concentrations that are similar or lower than background for 2010 and 2011. As monitor 7 was located near the groundwater divide and was not downgradient of the waste in 2010 or 2011, it is interpreted not to be affected by the landfill during this time.

5.3 Periphery Monitors

Monitor nest 2 lies approximately 90 m southwest of the main fill area and contains a bedrock piezometer (2-I) and an overburden standpipe (2-II). Table 3 presents the groundwater quality at monitor 2-I, screened within the bedrock.

Table 3. Water Quality – Bedrock Monitor 2-I

Parameter	ODWS	Background Bedrock	2-I		Leachate Concentration (monitor 5-I)
			2010	*2011*	
Sodium (mg/L)	200	<2 - 6	<2	<2	3 - 22
Chloride (mg/L)	250	<1 - 3	1	<1	<1 - 4
Potassium (mg/L)		<1 - 2	<1	<1	<1 - 2
Alkalinity (mg/L)	30 – 500	**13 - 26**	**24**	**26**	**24** - 64
TDS (mg/L)	500	27 - 56	36	36	46 - 160
Iron (mg/L)	0.3	<0.03 – 0.14	**0.32**	0.09	<0.01 - 0.14
COD (mg/L)		<5 - 15	<5	5	<5 - 13
Nitrate (mg/L)	10	<0.10 - 0.73	<0.1	<0.1	< 0.10 – **10.1**

Note: Bold values are not within ODWS limits.

As shown in Table 3, all leachate indicator parameters for monitor 2-I in the bedrock are within the range of background concentrations with the exception of iron in 2010. The water quality at this location does not indicate the presence of landfill effects during the reporting period.

Table 4 presents the groundwater quality at monitor 2-II, screened within the silty sand till overburden. This location was downgradient of a portion of the waste in 2011 but not in 2010 due to the position of the groundwater divide, as shown in Figures 2 and 3.

Table 4. Water Quality – Overburden Monitor 2-II

Parameter	ODWS	Background Overburden*	2-II		Leachate Concentration (monitor 5-I)
			2010	*2011*	
Sodium (mg/L)	200	3 – 18	<2	<2	3 - 22
Chloride (mg/L)	250	1 – 3	<1	1	<1 - 4
Potassium (mg/L)		1 – 5	<1	<1	<1 - 2
Alkalinity (mg/L)	30 – 500	**15** – 68	**7**	**20**	**24** - 64
TDS (mg/L)	500	31 – 114	28	26	46 - 160
Iron (mg/L)	0.3	0.01 – 0.15	0.27	0.15	<0.01 - 0.14
COD (mg/L)		<5 – 48	<5	20	<5 - 13
Nitrate (mg/L)	10	<0.10 – 0.13	<0.1	<0.1	< 0.10 – **10.1**

*Note * For background overburden concentrations, 2006 to 2009 data are excluded from range. Bold values are not within ODWS limits.*

In 2010 and 2011, all leachate indicator parameters for monitor 2-II in the overburden were within or below the range of background concentrations for overburden groundwater except for iron in 2010. Monitor 2-II does not appear to be affected by leachate during the reporting period.

Monitor nest 3 is located on the north side of the groundwater divide, approximately 90 m northwest of the main fill area. This nest contains a bedrock piezometer (3-I) and an overburden standpipe (3-II). As previously discussed, monitor 3-I is used to represent bedrock background water quality. Overburden monitor 3-II is interpreted to be not downgradient of the waste based groundwater elevation data collected in 2010 and 2011. Monitor 8 is located approximately 130 m west of the main fill area, between the access road to the site and the TransCanada pipeline easement. In 2010 and 2011, monitor 8 was interpreted not to be downgradient of the waste. Table 5 presents a summary of the water quality results for monitors 3-II and 8-I.

Table 5. Water Quality – Monitor 3-II and 8-I

Parameter	ODWS	Background Overburden*	3-II		8-I		Leachate Concentration (monitor 5-I)
			2010	*2011*	*2010*	*2011*	
Sodium (mg/L)	200	3 - 18	4	<2	<2	12	3 - 22
Chloride (mg/L)	250	1 - 3	3	2	2	14	<1 - 4
Potassium (mg/L)		1 - 5	<1	1	<1	<1	<1 - 2
Alkalinity (mg/L)	30 – 500	**15** - 68	**20**	**14**	**13**	**8**	**24** - 64
TDS (mg/L)	500	31 - 114	44	31	31	51	46 - 160
Iron (mg/L)	0.3	0.01 – 0.15	0.19	0.09	0.12	0.13	<0.01 - 0.14
COD (mg/L)		<5 - 48	<5	15	<5	25	<5 - 13
Nitrate (mg/L)	10	<0.10 – 0.13	0.65	0.26	0.85	0.49	< 0.10 – **10.1**

*Note * For background overburden concentrations, 2006 to 2009 data are excluded from range. Bold values are not within ODWS limits.*

For monitor 3-II, all leachate indicator parameters are within or below the range of historic background concentrations, except for iron in 2010 and nitrate. Historically this monitor has never been within a downgradient flowpath from the fill area and is interpreted to be unaffected by leachate.

At monitor 8-I, leachate indicator parameters (sodium, chloride and nitrate) are or have been elevated compared to background, but are not interpreted to be landfill related. The elevated sodium and chloride concentrations are likely the result of road salt effects, as monitor 8-I is located adjacent to the site access road. The elevated nitrate may also be related to activities occurring along the access road. Further support to this discussion, is that monitor 8-I is not located within a downgradient flowpath from the waste, as shown in Figures 2 and 3.

5.4 Downgradient Monitor Location 1

Monitor nest 1 is located approximately 60 m northwest of the main fill area, and consists of a bedrock piezometer (1-I) and a standpipe in the overburden sand and gravel (1-II). Table 6 summarizes the groundwater quality at the bedrock monitor at this location.

Table 6. Bedrock Water Quality – Monitor 1-I

Parameter	ODWS	Background Bedrock	1-I		Leachate Concentration (Monitor 5-I)
			2010	*2011*	
Sodium (mg/L)	200	<2 - 6	8	9	3 - 22
Chloride (mg/L)	250	<1 - 3	13	11	<1 - 4
Potassium (mg/L)		<1 - 2	2	2	<1 - 2
Alkalinity (mg/L)	30 – 500	**13 - 26**	105	133	**24** - 64
TDS (mg/L)	500	27 - 56	226	248	46 - 160
Iron (mg/L)	0.3	<0.03 – 0.14	0.09	<0.03	<0.01 - 0.14
COD (mg/L)		<5 - 15	<5	15	<5 – 13
Nitrate (mg/L)	10	<0.10 - 0.73	7.52	7.20	< 0.10 – **10.1**

Note: Bold values are not within ODWS limits

Monitor nest 1 is located downgradient of the waste. Compared to bedrock background water quality, leachate indicator parameters sodium, chloride, alkalinity, TDS, and nitrate are elevated for 2010 and 2011 in Monitor 1-I. However, there were no exceedances of ODWS for this period. Since the leachate indicator parameter concentrations are slightly elevated and the monitor is located within the downgradient flow pathway from the waste, this monitor may be showing possible minor leachate effects.

Water quality sampling results for leachate indicator parameters from overburden monitor 1-II are summarized in Table 7 below.

Table 7. Water Quality – Overburden Monitor 1-II

Parameter	ODWS	Background Overburden*	1-II		Leachate Concentration (monitor 5-I)
			2010	*2011*	
Sodium (mg/L)	200	3 - 18	<2	2	3 – 22
Chloride (mg/L)	250	1 - 3	1	3	<1 – 4
Potassium (mg/L)		1 - 5	<1	<1	<1 – 2
Alkalinity (mg/L)	30 – 500	**15** - 68	**10**	**14**	**24** – 64
TDS (mg/L)	500	31 - 114	21	35	46 – 160
Iron (mg/L)	0.3	0.01 – 0.15	0.10	0.07	<0.01 - 0.14
COD (mg/L)		<5 - 48	5	15	<5 – 13
Nitrate (mg/L)	10	<0.10 – 0.13	0.16	1.13	< 0.10 – **10.1**

*Note: * For background overburden concentrations, 2005 to 2009 data are excluded from range.*
Bold values are not within ODWS limits

All leachate indicator parameters measured at monitor 1-II are similar to the range of background concentrations with the exception of nitrate which was elevated in both 2010 and 2011. Alkalinity for 2010 and 2011 was below the ODWS range. As discussed previously, low alkalinity concentrations are characteristic for the site. Since monitor nest 1 is located downgradient of the waste, the elevated nitrate values may be related to possible minor leachate effects at 1-II.

5.5 Groundwater Quality Summary

The monitoring results to date have shown that this small site generates a relatively dilute leachate. This is consistent with the small existing waste footprint and the fact that the waste sits above the water table. Monitors 2-I, 2-II, 3-I, 3-II, 4-I, 6, 7 and 8 appear to be unaffected by the landfill. Monitor 8 appears to be influenced by road salt. Leachate at the site is characterized by monitor 5-I, which is screened beneath the waste. Monitoring locations 1-I and 1-II, located downgradient of the landfill, may be showing possible minor leachate effects.

5.6 Groundwater Compliance

A site is considered to be in compliance with regard to MOE Guideline B-7 when parameter concentrations are within maximum concentration levels (C_m) at the site boundaries or edge of the Contaminant Attenuation Zone (CAZ). C_m was calculated using the equation $C_m = C_b + F(C_{ODWS} - C_b)$ for overburden and bedrock groundwater quality, where F is a constant (0.5 for aesthetic parameters and 0.25 for health related parameters), C_{ODWS} is the maximum acceptable ODWS value and C_b is the highest measured concentration between 2000 and 2009 for the background bedrock monitor 3-I and the background overburden monitor 4-I. The historic range for iron and manganese at monitor 4-I only included data up to 2005 due to elevated iron after this time, as discussed in Section 5.1. Where concentrations were below the laboratory detection limit, the detection limit was assumed as the parameter concentration (to be conservative). Where background concentrations naturally exceed the ODWS, the allowable concentration (C_m) is set at the background value (C_b), which infers that no additional loading is permitted. Guideline B-7 was applied in Table 8 to the 2010 and 2011 water quality results for monitors 1-I, 1-II, 2-I, 2-II, 3-II, 7 and 8 to determine the degree of potential impairment of the groundwater at and just beyond the property boundaries.

Table 8. Guideline B-7 Calculated Maximum Parameter Concentrations

Parameter	C_{ODWS}	Factor (F)	Bedrock		Overburden	
			C_b	C_m	C_b	C_m
Nitrate (mg/L)	10	0.25	0.42	2.82	0.13	2.60
Boron (mg/L)	5	0.25	0.05	1.29	0.02	1.27
Sodium (mg/L)	200	0.5	6	103	18	109
Chloride (mg/L)	250	0.5	2	126	3	127
Sulphate (mg/L)	500	0.5	15	258	22	261
Manganese (mg/L)	0.05	0.5	0.04	0.06	0.06	0.06
Iron (mg/L)	0.3	0.5	0.14	0.22	0.08	0.19
TDS (mg/L)	500	0.5	56	278	129	315

Maximum concentrations (C_m) are compared to the groundwater quality results for the periphery and downgradient bedrock monitors in Table 9 and the overburden monitors in Table 10.

Table 9. Comparison Bedrock Concentrations to MOE Guideline B-7 (Reasonable Use) Maximum Concentrations

Parameters		C_m	1-I		2-I	
			2010	*2011*	*2010*	*2011*
Health Related Parameters	Nitrate (mg/L)	2.82	**7.52**	**7.20**	<0.10	<0.10
	Boron (mg/L)	1.29	0.01	0.02	<0.01	<0.01
Aesthetic Parameters	Sodium (mg/L)	103	8	9	<2	<2
	Chloride (mg/L)	126	13	11	1	<1
	Sulphate (mg/L)	258	21	22	4	5
	Manganese (mg/L)	0.06	0.03	0.02	0.03	0.03
	Iron (mg/L)	0.22	0.09	<0.03	**0.32**	0.09
	TDS (mg/L)	278	226	248	36	36

Note: Bold values are not within ODWS limits

Table 10. Comparison Overburden Concentrations to MOE Guideline B-7 (Reasonable Use) Maximum Concentrations

Parameters		Cm	1-II		2-II		3-II		7		8	
			2010	*2011*	*2010*	*2011*	*2010*	*2011*	*2010*	*2011*	*2010*	*2011*
Health Related Parameters	Nitrate (mg/L)	2.60	0.16	1.13	<0.10	<0.10	0.65	0.26	0.10	<0.10	0.85	0.49
	Boron (mg/L)	1.27	<0.01	0.03	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01
Aesthetic Parameters	Sodium (mg/L)	109	<2	2	<2	<2	4	<2	<2	<2	<2	12
	Chloride (mg/L)	127	1	3	<1	1	3	2	2	1	2	14
	Sulphate (mg/L)	261	4	4	12	4	7	7	7	5	5	5
	Manganese (mg/L)	0.06	0.03	0.03	0.03	0.02	0.02	0.02	0.02	<0.01	<0.01	0.03
	Iron (mg/L)	0.19	0.1	0.07	**0.27**	0.15	0.19	0.09	0.10	0.15	0.12	0.13
	TDS (mg/L)	315	21	35	28	26	44	31	23	20	31	51

Note: Bold values are not within ODWS limits

The only exceedances of Guideline B-7 limits are at monitors 1-I (bedrock) for nitrate, and monitors 2-I (bedrock) and 2-II (overburden) for iron. These exceedances are not considered a concern at this time, as there are no domestic wells located downgradient of the site, the nitrate levels at 1-I are below the ODWS and have been decreasing since 2007, and a large CAZ has been established for the site. Given the distance of downgradient monitor nest 1 from the CAZ boundary, and the very minor nature of the landfill effects at this monitoring location, the site is interpreted as being in compliance with Guideline B7 at the CAZ boundary.

6. Surface Water Quality

The two downgradient surface water stations with staff gauge installations were monitored in April 2010 and June 2011 (Figure 1). SW1 is located in a wetland depression northwest of the site. Good wetland vegetative growth was observed during the visits in 2010 and 2011 at SW1 with no staining or stress apparent, indicating no obvious leachate influences. SW2 is located in an intermittent tributary of Bissett Creek, southwest of the site. Good vegetative growth was observed during the visits in 2010 and 2011 with no signs of stress on the vegetation located in and around the tributary, indicating no obvious leachate influences.

Flow measurements were completed at SW1 and SW2 during each monitoring event. Measurements were taken using a graduated container and a stopwatch. SW1 was dry in 2010. In 2011, water was present at SW1, but no measurable flow was recorded. Flow at SW2 was about 1.5 L/s and 3 L/s in 2010 and 2011, respectively.

Table 11 summarizes the water quality at SW1 and SW2 for leachate indicator parameters along with a comparison to the Provincial Water Quality Objectives (PWQO). As there was no background surface water to be sampled, the surface water quality was also compared to background overburden water quality.

Table 11. Water Quality – SW1 and SW2

Parameter	PWQO	Background Overburden*	SW1		SW2		Leachate Concentration (monitor 5-I)
			2010	*2011*	*2010*	*2011*	
Sodium (mg/L)		3 - 18	Dry	<2	<2	<2	3 - 22
Chloride (mg/L)		1 - 3		1	1	1	<1 - 4
Potassium (mg/L)		1 - 5		2	<1	<1	<1 - 2
Alkalinity (mg/L)		15 - 68		<5	8	12	24 - 64
TDS (mg/L)		31 - 114		21	25	25	46 - 160
Iron (mg/L)	0.3	0.01 – 0.15		0.20	**0.44**	**0.80**	<0.01 - 0.14
COD (mg/L)		<5 - 48		120	23	60	<5 - 13
Nitrate (mg/L)		<0.10 – 0.13		<0.10	0.11	<0.10	< 0.10 – 10.1

Note: For background overburden concentrations, 2005 to 2009 data are excluded from range; Bold values exceed the PWQO

At SW1, COD and iron levels were elevated compared to the background overburden values. The elevated COD and iron levels are likely due to natural conditions since SW1 is located in a stagnant wetland. All other landfill indicator parameters are lower or within the range of background overburden concentrations, thus indicating no leachate influence.

At SW2, iron and COD (2011 only) levels were elevated compared to the background overburden values. The elevated COD levels are likely due to natural conditions since SW2 is located downstream from a wetland. The iron concentrations at SW2 exceeded the PWQO. Elevated iron concentrations do not appear to be related to the landfill, as iron concentrations are frequently elevated in Precambrian bedrock settings and the concentrations at SW2 are much higher than in the leachate. There are no other exceedances of the PWQO at either surface water sampling location.

Based on the weak strength of the leachate produced, in addition to the distances of the wetland depression (SW1) and the intermittent tributary (SW2) to the fill area, the landfill is not expected to have adverse effects on the surface water quality at either location and no mitigative measures are recommended at this time.

7. Proposed 2012-2013 Monitoring Program

The proposed 2012-2013 monitoring program will include late spring or early summer water level measurements at the existing groundwater monitors. Surface water locations have occasionally been found dry in the past when sampling was attempted later on in the summer season. It is highly recommended that at least one sampling event occur sometime in the spring in order to take advantage of higher flows. The proposed 2012-2013 monitoring program is the same as the 2010-2011 program.

The 2012-2013 monitoring program is presented in Table 12, as per Condition 19 of the C of A, other than the recommendation to conduct a spring sampling event every other year.

Table 12. Proposed 2012-2013 Groundwater Monitoring Program

	Location	Task	Frequency	Analytical Parameters
Groundwater	All existing monitors and staff gauges	Measure groundwater levels	One (Spring 2012 and Summer 2013)	
	1-I, 1-II, 2-I, 2-II, 3-I, 3-II, 4-I, 5-I, 6, 7, 8	Groundwater sampling	One (Spring 2012 and Summer 2013)	Major and minor ions (Ca, Na, Cl, SO_4, B, K, Mg) Trace metals (Fe, Mn, Cu, Sr) Nitrogen species (NO_3, NO_2, NH_3, TKN) General parameters (alkalinity, COD, phenols, ion balance, total dissolved solids) Field measurements of pH, conductivity and water temperature
	SW1, SW2	Surface water sampling	One (Spring 2012 and Summer 2013)	Major and minor ions (Ca, Na, Cl, SO_4, total phosphorus, B, K, Mg) Trace metals (Fe, Mn, Cu, Cd, Sr, Zn) Nitrogen species (NO_3, NO_2, NH_3, TKN) General parameters (alkalinity, COD, phenols, ion balance, total dissolved solids, total suspended solids) Field measurements of DO, pH, conductivity and water temperature

Note: All groundwater samples to be filtered in the field within 24 hours of collection. Metal samples to be filtered prior to preservation in the field. Laboratory detection limit should be to ODWS. Surface water samples are not filtered and the laboratory detection limit should be to PWQO.

As discussed in Section 1, the Township acquired the buffer lands for the Contaminant Attenuation Zone in August 2011. In 2002, Gartner Lee Limited provided the following discussion:

> *"Once the final design is approved, it will be possible to revise the monitoring program to reflect the presence of the CAZ. We will recommend that two new monitoring installations be constructed to serve as compliance points at the downgradient end of the CAZ.. (GLL, 2002). Water quality sampling on site would then be restricted to ongoing sampling of the leachate, to document changing leachate strength. All other monitors would not require sampling, unless an unanticipated adverse condition developed. Water levels would continue to be collected at all monitors and staff gauges. This recommendation will have to be vetted with the MOE prior to implementing it."*

Given the very minor possible leachate effects at the site, it is proposed that the following trigger be used to initiate the installation of additional compliance monitors at the CAZ boundary: Consideration should be given to establishing additional compliance monitors at the CAZ boundary if groundwater sampling results from a monitoring event show that leachate indicator parameters chloride (mobile anion), boron and nitrate (health related) all exceed the ODWS at a groundwater monitoring location and the exceedances are attributed to the landfill.

8. Conclusions and Recommendations

Based on the above discussion of results, we provide the following conclusions:

a) The Bissett Creek Landfill is functioning as a natural attenuation site. Groundwater flow at the site is characterized by a groundwater divide that runs roughly northeast-southwest through the site, with flow directed away from it toward the northwest and southeast.

b) Elevated iron and manganese concentrations at background overburden monitor 4-I continued during the 2010-2011 monitoring period, however they have decreased substantially from the historical maximum recorded in 2008.

c) Possible very slight leachate impacts may be present at groundwater monitor nest 1, located downgradient of the waste. Leachate strength is very weak, as would be expected for a site of this small size.

d) The Guideline B-7 limits are exceeded in the bedrock by nitrate at monitor 1-I (concentrations are below the ODWS), and by iron at monitors 2-I (bedrock) and 2-II (overburden). This does not represent a threat to human health given the remote location of this site and large CAZ.

e) Surface water samples show no influence from the landfill. This is expected due to the considerable distance between the landfill and the surface water locations, and dilute leachate.

Based on the above discussion, we recommend the following:

a) Continued monitoring in 2012-2013 as per Table 12. The monitoring program recommended for 2012-2013 is similar to the 2010-2011 program.

9. References

AECOM Canada Limited, 2009:
Bissett Creek Landfill Site, 2008-2009 Monitoring Report, prepared for Jp2g Consultants Inc., 60147234 – 6.1.

Chapman, L.J. and D.F. Putnam, 1984:
The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2.

Gartner Lee Limited, 2008:
Bissett Creek Landfill Site, 2006-2007 Monitoring Report, prepared for Jp2g Consultants Inc., GLL 80-071.

Gartner Lee Limited, 2006:
Bissett Creek Landfill Site, 2004-2005 Monitoring Report, prepared for Jp2g Consultants Inc., GLL 60-427.

Gartner Lee Limited, 2004:
Bissett Creek Landfill Site, 2003 Monitoring Report, prepared for Jp2g Consultants Inc., GLL 23-836.

Gartner Lee Limited, 2003:
Bissett Creek Landfill Site, 2002 Monitoring Report, prepared for Jp2g Consultants Inc., GLL 22-753.

Gartner Lee Limited, 2002:
Bissett Creek Landfill Site, Hydrogeology and 2000-2001 Monitoring Report, prepared for Jp2g Consultants Inc., GLL 21-431.

Jp2g Consultants Inc., 2001:
Site Capacity Assessment: Bissett Creek Waste Disposal Site, for the Township of Head, Clara and Maria, Project No. 2006023, letter dated April 25, 2001.

Ontario Ministry of the Environment and Energy, 1994:
Water Management Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of the Environment and Energy, July 1994. Reprinted January 1995.

Ontario Ministry of the Environment Water Initiatives, 2000:
Ontario Drinking Water Standards (ODWS), August 2000.

Ontario Ministry of the Environment, 2003:
Technical Support Document for Ontario Drinking Water – Standards, Objectives and Guidelines, June 2003.

Ontario Ministry of the Environment, Water Resources Branch, 1986:
The Incorporation of the Reasonable Use Concept into the Groundwater Management Activities of the Ministry of the Environment.

Figures

LEGEND

- Borehole Location and Designation
- Surface Water Sampling Locations
- Containment Attenuation Zone (CAZ) for the Site

N

SITE PLAN

FIGURE 1

Bissett Creek Landfill Site
for
Jp2g Consultants Inc.

AECOM

Project 60246826-6.1
(2008\Final\Images\Bissett-SP.cdr)

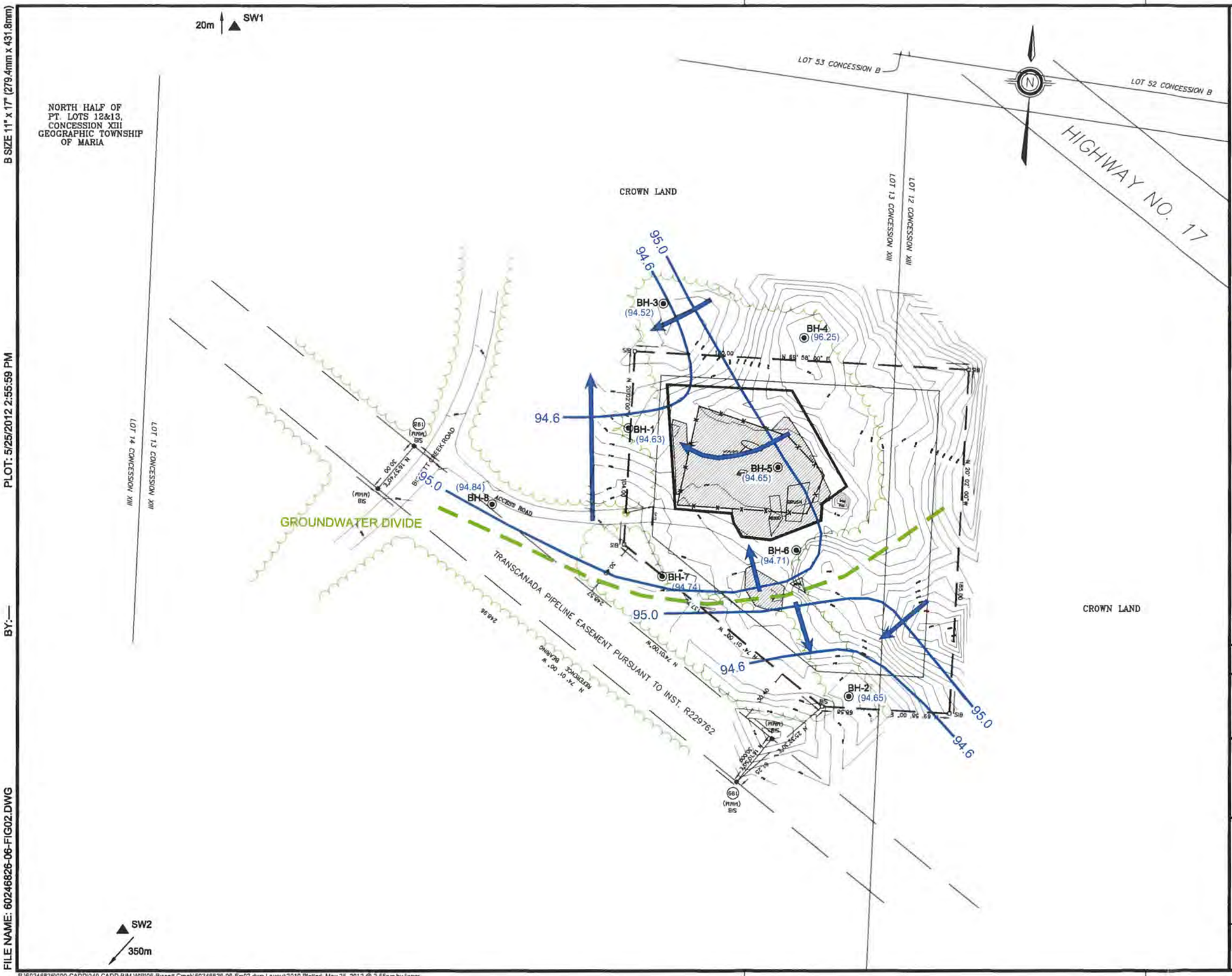
Scale 1:5,000

B SIZE 11" x 17" (279.4mm x 431.8mm)

PLOT: 5/25/2012 2:55:59 PM

BY:—

FILE NAME: 60246826-06-FIG02.DWG



Legend

- EXISTING WASTE FILL AREA WITHIN FOOTPRINT
- EXISTING TREE LINE
- EXISTING CONTOURS
- BH-1 BOREHOLE
- BENCH MARK
- SITE BOUNDARY
- FINAL FOOTPRINT
- (95.19) WATER TABLE ELEVATION (APRIL, 2010)
- 96.0 WATER TABLE CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- SW1 SURFACE WATER MONITORING LOCATION
- GROUNDWATER DIVIDE
- BEAR FENCE

0 10 20 40 60 80 m
1 : 2000

Note:
Baseplan taken from JP2G Consultants Inc.

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

AECOM

Jp2g Consultants Inc.
Bissett Creek Waste Disposal Site

Groundwater Flow April 2010

PROJECT NUMBER	DATE	FIGURE
60246826-6.1	May 2012	2

P:\60246826\000-CADD\040 CADD-BIM WIP\06-Bissett Creek\60246826-06-Fig02.dwg Layout:2010 Plotted: May 25, 2012 @ 2:55pm by jiangr

B SIZE 11" x 17" (279.4mm x 431.8mm)

PLOT: 5/25/2012 3:05:02 PM

BY:—

FILE NAME: 60246826-06-FIG02.DWG

20m

SW1

NORTH HALF OF
PT. LOTS 12&13,
CONCESSION XIII
GEOGRAPHIC TOWNSHIP
OF MARIA

LOT 53 CONCESSION B

LOT 52 CONCESSION B

HIGHWAY NO. 17

LOT 13 CONCESSION XIII

LOT 12 CONCESSION XIII

LOT 14 CONCESSION XIII

LOT 13 CONCESSION XIII

CROWN LAND

BISSETT CREEK ROAD

ACCESS ROAD

PIPELINE EASEMENT PURSUANT TO INST. R229762

GROUNDWATER DIVIDE

BH-1 (96.19)

BH-2 (95.90)

BH-3 (95.79)

BH-4 (96.72)

BH-5 (96.05)

BH-6 (96.04)

BH-7 (96.03)

BH-8 (95.76)

95.9

96.1

SW2

350m

Legend

- EXISTING WASTE FILL AREA WITHIN FOOTPRINT
- EXISTING TREE LINE
- EXISTING CONTOURS
- BH-1 BOREHOLE
- BENCH MARK
- SITE BOUNDARY
- FINAL FOOTPRINT
- (95.19) WATER TABLE ELEVATION (JUNE, 2011)
- 96.0 WATER TABLE CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- SW1 SURFACE WATER MONITORING LOCATION
- GROUNDWATER DIVIDE
- BEAR FENCE

0 10 20 40 60 80 m
1 : 2000

Note:
Baseplan taken from JP2G Consultants Inc.

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

AECOM

Jp2g Consultants Inc.
Bissett Creek Waste Disposal Site

Groundwater Flow June 2011

PROJECT NUMBER	DATE	FIGURE
60246826-6.1	May 2012	3

P:\60246826\000-CADD\040 CADD-BIM WIP\06-Bissett Creek\60246826-06-Fig02.dwg Layout:2011 Plotted: May 25, 2012 @ 3:05pm by jiangr

AECOM

Appendix A

Groundwater and Surface Water Elevations

Groundwater Elevations
Bissett Creek Landfill Site

AECOM

Monitor	Top of Pipe Elevation (Assumed Datum)	Ground Elevation (Assumed Datum)	Date	Water Depth From Top of Pipe (m)	Water elevation (Assumed Datum)
1-I	103.25	102.54	16-Oct-00	9.28	93.97
	103.25	102.54	17-May-01	8.73	94.52
	103.25	102.54	22-Aug-01	9.35	93.90
	103.25	102.54	12-Jun-02	8.18	95.07
	103.25	102.54	26-Aug-02	8.79	94.46
	103.25	102.54	18-Aug-03	9.00	94.25
	103.25	102.54	19-Aug-04	8.76	94.49
	103.25	102.54	30-May-05	8.40	94.85
	103.25	102.54	20-Jun-06	8.29	94.96
	103.25	102.54	10-May-07	8.30	94.95
	103.25	102.54	10-Sep-08	8.69	94.56
	103.25	102.54	23-Jul-09	8.77	94.48
	103.25	102.54	27-Apr-10	8.83	94.42
	103.25	102.54	22-Jun-11	8.03	95.22
1-II	103.29	102.58	16-Oct-00	8.62	94.67
	103.29	102.58	17-May-01	8.49	94.80
	103.29	102.58	22-Aug-01	8.75	94.54
	103.29	102.58	12-Jun-02	7.61	95.68
	103.29	102.58	26-Aug-02	8.04	95.25
	103.29	102.58	18-Aug-03	8.70	94.59
	103.29	102.58	19-Aug-04	8.52	94.77
	103.29	102.58	30-May-05	7.90	95.39
	103.29	102.58	20-Jun-06	7.66	95.63
	103.29	102.58	10-May-07	8.09	95.20
	103.29	102.58	10-Sep-08	8.07	95.22
	103.29	102.58	23-Jul-09	8.10	95.19
	103.29	102.58	27-Apr-10	8.66	94.63
	103.29	102.58	22-Jun-11	7.36	95.93
2-I	99.36	98.59	16-Oct-00	4.85	94.51
	99.36	98.59	17-May-01	4.53	94.83
	99.36	98.59	22-Aug-01	4.98	94.38
	99.36	98.59	12-Jun-02	3.81	95.55
	99.36	98.59	26-Aug-02	4.43	94.93
	99.36	98.59	18-Aug-03	4.59	94.77
	99.36	98.59	19-Aug-04	4.35	95.01
	99.36	98.59	30-May-05	4.30	95.06
	99.36	98.59	20-Jun-06	3.87	95.49
	99.36	98.59	10-May-07	4.14	95.22
	99.36	98.59	10-Sep-08	4.31	95.05
	99.36	98.59	23-Jul-09	4.38	94.98
	99.36	98.59	27-Apr-10	4.71	94.65
	99.36	98.59	22-Jun-11	3.56	95.80
2-II	99.30	98.58	16-Oct-00	4.70	94.60
	99.30	98.58	17-May-01	4.42	94.88
	99.30	98.58	22-Aug-01	4.82	94.48
	99.30	98.58	12-Jun-02	3.67	95.63
	99.30	98.58	26-Aug-02	4.15	95.15
	99.30	98.58	18-Aug-03	4.75	94.55
	99.30	98.58	19-Aug-04	4.57	94.73
	99.30	98.58	30-May-05	4.35	94.95
	99.30	98.58	20-Jun-06	3.70	95.60
	99.30	98.58	10-May-07	4.07	95.23
	99.30	98.58	10-Sep-08	4.14	95.16
	99.30	98.58	23-Jul-09	4.21	95.09
	99.30	98.58	27-Apr-10	4.65	94.65
	99.30	98.58	22-Jun-11	3.40	95.90

Groundwater Elevations
Bissett Creek Landfill Site

AECOM

Monitor	Top of Pipe Elevation (Assumed Datum)	Ground Elevation (Assumed Datum)	Date	Water Depth From Top of Pipe (m)	Water elevation (Assumed Datum)
3-I	104.42	103.78	16-Oct-00	9.83	94.59
	104.42	103.78	17-May-01	9.72	94.70
	104.42	103.78	22-Aug-01	9.95	94.47
	104.42	103.78	12-Jun-02	8.80	95.62
	104.42	103.78	26-Aug-02	9.65	94.77
	104.42	103.78	18-Aug-03	9.52	94.90
	104.42	103.78	19-Aug-04	9.31	95.11
	104.42	103.78	30-May-05	9.10	95.32
	104.42	103.78	20-Jun-06	8.80	95.62
	104.42	103.78	10-May-07	9.28	95.14
	104.42	103.78	10-Sep-08	9.24	95.18
	104.42	103.78	23-Jul-09	9.29	95.13
	104.42	103.78	27-Apr-10	9.87	94.55
	104.42	103.78	22-Jun-11	8.57	95.85
3-II	104.53	103.80	16-Oct-00	9.98	94.55
	104.53	103.80	17-May-01	9.87	94.66
	104.53	103.80	22-Aug-01	10.09	94.44
	104.53	103.80	12-Jun-02	8.95	95.58
	104.53	103.80	26-Aug-02	9.41	95.12
	104.53	103.80	18-Aug-03	10.01	94.52
	104.53	103.80	19-Aug-04	9.80	94.73
	104.53	103.80	30-May-05	9.61	94.92
	104.53	103.80	20-Jun-06	8.96	95.57
	104.53	103.80	10-May-07	9.44	95.09
	104.53	103.80	10-Sep-08	9.38	95.15
	104.53	103.80	23-Jul-09	9.44	95.09
	104.53	103.80	27-Apr-10	10.01	94.52
	104.53	103.80	22-Jun-11	8.74	95.79
4-I	98.84	98.06	16-Oct-00	3.42	95.42
	98.84	98.06	17-May-01	2.45	96.39
	98.84	98.06	22-Aug-01	3.29	95.55
	98.84	98.06	12-Jun-02	1.97	96.87
	98.84	98.06	26-Aug-02	2.87	95.97
	98.84	98.06	18-Aug-03	3.19	95.65
	98.84	98.06	19-Aug-04	3.15	95.69
	98.84	98.06	30-May-05	2.11	96.73
	98.84	98.06	20-Jun-06	2.18	96.66
	98.84	98.06	10-May-07	2.12	96.72
	98.84	98.06	10-Sep-08	2.74	96.10
	98.84	98.06	23-Jul-09	2.79	96.05
	98.84	98.06	27-Apr-10	2.59	96.25
	98.84	98.06	22-Jun-11	2.12	96.72
5-I	101.85	101.06	16-Oct-00	7.16	94.69
	101.85	101.06	17-May-01	7.02	94.83
	101.85	101.06	22-Aug-01	7.28	94.57
	101.85	101.06	12-Jun-02	6.10	95.75
	101.85	101.06	26-Aug-02	6.55	95.30
	101.85	101.06	18-Aug-03	7.17	94.68
	101.85	101.06	19-Aug-04	6.92	94.93
	101.85	101.06	30-May-05	6.75	95.10
	101.85	101.06	20-Jun-06	6.09	95.76
	101.85	101.06	10-May-07	6.60	95.25
	101.85	101.06	10-Sep-08	6.52	95.33
	101.85	101.06	23-Jul-09	6.60	95.25
	101.85	101.06	27-Apr-10	7.20	94.65
	101.85	101.06	22-Jun-11	5.80	96.05

Groundwater Elevations
Bissett Creek Landfill Site

AECOM

Monitor	Top of Pipe Elevation (Assumed Datum)	Ground Elevation (Assumed Datum)	Date	Water Depth From Top of Pipe (m)	Water elevation (Assumed Datum)
6	101.70	100.99	22-Aug-01	7.12	94.58
	101.70	100.99	12-Jun-02	5.95	95.75
	101.70	100.99	26-Aug-02	6.42	95.28
	101.70	100.99	18-Aug-03	7.04	94.66
	101.70	100.99	19-Aug-04	6.80	94.90
	101.70	100.99	30-May-05	6.48	95.22
	101.70	100.99	20-Jun-06	5.95	95.75
	101.70	100.99	10-May-07	6.38	95.32
	101.70	100.99	10-Sep-08	6.40	95.30
	101.70	100.99	23-Jul-09	6.48	95.22
	101.70	100.99	27-Apr-10	6.99	94.71
	101.70	100.99	22-Jun-11	5.66	96.04
7	100.19	99.47	22-Aug-01	5.52	94.67
	100.19	99.47	12-Jun-02	4.74	95.45
	100.19	99.47	26-Aug-02	5.15	95.04
	100.19	99.47	18-Aug-03	5.49	94.70
	100.19	99.47	19-Aug-04	5.34	94.85
	100.19	99.47	30-May-05	5.05	95.14
	100.19	99.47	20-Jun-06	4.39	95.80
	100.19	99.47	10-May-07	4.88	95.31
	100.19	99.47	10-Sep-08	4.81	95.38
	100.19	99.47	23-Jul-09	4.94	95.25
	100.19	99.47	27-Apr-10	5.45	94.74
	100.19	99.47	22-Jun-11	4.16	96.03
8	99.63	98.87	22-Aug-01	5.02	94.61
	99.63	98.87	12-Jun-02	4.01	95.62
	99.63	98.87	26-Aug-02	4.42	95.21
	99.63	98.87	18-Aug-03	4.65	94.98
	99.63	98.87	19-Aug-04	4.45	95.18
	99.63	98.87	30-May-05	4.57	95.06
	99.63	98.87	20-Jun-06	4.05	95.58
	99.63	98.87	10-May-07	4.30	95.33
	99.63	98.87	10-Sep-08	4.39	95.24
	99.63	98.87	23-Jul-09	4.46	95.17
	99.63	98.87	27-Apr-10	4.79	94.84
	99.63	98.87	22-Jun-11	3.87	95.76

Surface Water Elevations
Bissett Creek Landfill Site

AECOM

	TOP OF STAFF GAUGE (ASSUMED DATUM)	BOTTOM WATER COURSE	DATE	TOP OF WATER FROM BOTTOM OF STAFF GAUGE	TOP OF WATER ELEVATION (ASSUMED DATUM)
SW-1	95.39	94.37	16-Oct-00	dry	N/A
	95.39	94.37	17-May-01	dry	N/A
	95.39	94.37	22-Aug-01	dry	N/A
	95.39	94.37	12-Jun-02	0.42	94.79
	95.39	94.37	26-Aug-02	0.10	94.47
	95.39	94.37	18-Aug-03	dry	N/A
	95.39	94.37	19-Aug-04	dry	N/A
	95.39	94.37	30-May-05	0.13	94.50
	95.39	94.37	20-Jun-06	0.37	94.74
	99.63	98.87	10-May-07	0.27	99.14
	99.63	98.87	10-Sep-08	0.14	99.01
	99.63	98.87	23-Jul-09	0.11	98.98
	99.63	98.87	27-Apr-10	Dry	98.87
	99.63	98.87	22-Jun-11	0.36	99.23
SW-2	75.03	73.97	16-Oct-00	0.11	74.08
	75.03	73.97	17-May-01	0.07	74.04
	75.03	73.97	22-Aug-01	dry	N/A
	75.03	73.97	12-Jun-02	0.15	74.12
	75.03	73.97	26-Aug-02	0.02	73.99
	75.03	73.97	18-Aug-03	dry	N/A
	75.03	73.97	19-Aug-04	not measured	N/A
	75.03	73.97	30-May-05	0.12	74.09
	75.03	73.97	20-Jun-06	0.11	74.08
	75.03	73.97	10-May-07	0.10	74.07
	75.03	73.97	10-Sep-08	0.09	74.06
	75.03	73.97	23-Jul-09	0.00	>73.97
	75.03	73.97	27-Apr-10	below staff guage	>73.97
	75.03	73.97	22-Jun-11	below staff guage	>73.97

AECOM

Appendix B

Groundwater Quality

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 1-I				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40					
Chloride	250	15	17	23	22	25
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.21	0.24	1.69	4.29	7.59
Phosphate						
Sulphate	500	32	14	11	22	13
Calcium		19	19	27	34	40
Magnesium		4	3	5	5	8
Sodium	200	13	4	3	5	7
Potassium		2	1	1	2	2
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.04	0.020	<0.05	0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.004	<0.001	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab					250	310
Iron	0.30	**0.400**	0.090	0.010	<0.01	<0.01
Lead	0.010					
Manganese	0.050	**0.130**	0.040	0.007	<0.005	<.0.1
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.062	0.048	0.056	0.076	0.105
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	42	35	46	57	79
TKN		0.17	0.13	0.06	0.07	0.25
N-NH3 (Ammonia)		<0.02	0.020	<0.02	<0.02	0.03
Organic Nitrogen	0.15	**0.17**	0.11	≤0.06	≤0.07	**0.22**
Phenols		0.003	<0.001	<0.001	<0.001	<0.001
COD		16	11	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	168	124	128	163	201
Ion Balance		0.97	0.94	N/A	0.94	0.97
Field Measured						
Water Temp. (°C)	15.0	10.1	9.4	9.2	13.9	11.5
Conductivity (microS/cm)		200	175	181	332	254
pH (pH units)	6.5 - 8.5	7.90	7.60	7.56	7.10	6.86

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 1-I				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250	23	22	19	18	14
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	7.46	8.78	9.41	8.46	8.33
Phosphate						
Sulphate	500	11	12	14	20	36
Calcium		33	49	54	58	58
Magnesium		6	9	10	10	11
Sodium	200	5	7	7	9	11
Potassium		2	2	2	3	3
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01	0.01	<0.01	0.02
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.001	0.069	<0.001	<0.001	0.001
Conductivity (microS/cm) Lab		257	374	414	427	419
Iron	0.30	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	0.010					
Manganese	0.050	<0.01	<0.01	0.020	<0.01	0.040
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.094	0.149	0.151	0.175	0.154
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	63	105	128	141	138
TKN		<0.05	0.15	<0.05	<0.10	<0.10
N-NH3 (Ammonia)		<0.02	0.06	<0.02	<0.02	0.04
Organic Nitrogen	0.15	<0.05	0.09	<0.05	<0.10	<0.10
Phenols		<0.001	0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	167	243	269	278	272
Ion Balance		0.90	0.99	0.95	0.96	0.97
Field Measured						
Water Temp. (°C)	15.0	9.3	10.2	9.5	10.8	9.0
Conductivity (microS/cm)		264	275	341	391	354
pH (pH units)	6.5 - 8.5	7.24	6.02	7.52	6.41	7.00

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 1-I				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250	13	11			
N-NO2 (Nitrite)	1.00	0.19	<0.10			
N-NO3 (Nitrate)	10.00	7.52	7.20			
Phosphate						
Sulphate	500	21	22			
Calcium		48	48			
Magnesium		9	9			
Sodium	200	8	9			
Potassium		2	2			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.01	0.02			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	<0.001	0.002			
Conductivity (microS/cm) Lab		348	381			
Iron	0.30	0.090	<0.03			
Lead	0.010					
Manganese	0.050	0.030	0.020			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.126	0.143			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	105	133			
TKN		0.15	<0.10			
N-NH3 (Ammonia)		<0.02	<0.02			
Organic Nitrogen	0.15	≤ 0.15				
Phenols		<0.001	<0.001			
COD		<5	15.00			
DOC						
Total Phosphorous						
TDS	500	226	248			
Ion Balance		1.02	0.91			
Field Measured						
Water Temp. (°C)	15.0	8.6	9.1			
Conductivity (microS/cm)		349	282			
pH (pH units)	6.5 - 8.5	7.50	7.1			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 1-II				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40					
Chloride	250	2	1	3	2	3
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	3.56	9.95	3.29	0.27	1.75
Phosphate						
Sulphate	500.00	17	13	8	18	8
Calcium		10	12	10	5	9
Magnesium		3	4	3	2	2
Sodium	200.000	11	7	4	3	3
Potassium		1	2	1	1	1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.11	0.03	<0.05	0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	<0.001	0.001	<0.001	<0.001
Conductivity (microS/cm) Lab					57	73
Iron	0.300	0.06	0.02	<0.01	<0.001	<0.01
Lead	0.010					
Manganese	0.050	**0.390**	**0.250**	0.036	0.013	0.010
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.147	0.180	0.109	0.062	0.095
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	36	**17**	**23**	**17**	**19**
TKN		0.21	0.28	0.12	<0.05	0.19
N-NH3 (Ammonia)		0.070	0.060	<0.02	<0.02	0.09
Organic Nitrogen	0.15	0.140	**0.220**	>0.10	<0.05	0.10
Phenols		0.002	<0.001	<0.001	<0.001	<0.001
COD		14	8	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	120	100	61	37	48
Ion Balance		0.91	0.95	N/A	N/A	N/A
Field Measured						
Water Temp. (°C)	15.0	8.4	9.6	9.0	9.3	8.4
Conductivity (microS/cm)		120	140	75	70	57
pH (pH units)	6.5 - 8.5	7.25	**6.09**	**6.39**	6.86	6.80

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Dat
Bissett Creek Landfill Site

Monitor Number		BH 1-II				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250	2	2	1	4	2
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.85	1.83	0.42	1.77	1.52
Phosphate						
Sulphate	500.00	8	7	5	5	6
Calcium		4	7	4	7	6
Magnesium		1	2	<1	2	2
Sodium	200.000	2	2	<2	<2	<2
Potassium		<1	<1	<1	1	1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.01	0.02	0.01	<0.01	0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	0.066	0.002	<0.001	<0.001
Conductivity (microS/cm) Lab		50	83	42	77	66
Iron	0.300	<0.03	<0.03	0.03	<0.03	0.06
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.030	0.050
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.066	0.089	0.052	0.091	0.070
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**16**	**21**	**16**	**16**	**22**
TKN		<0.05	0.10	<0.05	<0.10	<0.10
N-NH3 (Ammonia)		<0.02	0.05	<0.02	<0.02	<0.02
Organic Nitrogen	0.15	<0.05	0.05		<0.10	<0.10
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	33	54	27	50	43
Ion Balance		N/A LC	N/A - LC	N/A-LC	N/A-LC	N/A-LC
Field Measured						
Water Temp. (°C)	15.0	8.7	10.9	9.5	9.0	8.8
Conductivity (microS/cm)		49	72	34	64	55
pH (pH units)	6.5 - 8.5	7.20	**6.27**	**8.55**	**6.27**	6.70

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Dat
Bissett Creek Landfill Site

Monitor Number		BH 1-II				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250	1	3			
N-NO2 (Nitrite)	1.00	0.150	<0.10			
N-NO3 (Nitrate)	10.00	0.16	1.13			
Phosphate						
Sulphate	500.00	4	4			
Calcium		3	5			
Magnesium		<1	1			
Sodium	200.000	<2	2			
Potassium		<1	<1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	0.03			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	0.001	<0.001			
Conductivity (microS/cm) Lab		32	54			
Iron	0.300	0.10	0.07			
Lead	0.010					
Manganese	0.050	0.030	0.030			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.035	0.058			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**10**	**14**			
TKN		<0.10	<0.10			
N-NH3 (Ammonia)		<0.02	0.11			
Organic Nitrogen	0.15		<0.10			
Phenols		<0.001	<0.001			
COD		5	15			
DOC						
Total Phosphorous						
TDS	500	21	35			
Ion Balance		N/A-LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	8.4	8.3			
Conductivity (microS/cm)		32	51			
pH (pH units)	6.5 - 8.5	7.10	7.7			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 2-I				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40					
Chloride	250	1	<1	<1	1	1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.57	0.41	0.21	0.16	0.16
Phosphate						
Sulphate	500.00	5	5	6	14	7
Calcium		9	7	9	8	7
Magnesium		4	2	3	2	2
Sodium	200	<2	<2	<2	<2	2
Potassium		1	1	2	<1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.02	0.01	<0.05	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	<0.001	0.003	<0.001	<0.001
Conductivity (microS/cm) Lab					63	60
Iron	0.300	0.17	0.010	**0.350**	<0.001	<0.01
Lead	0.010					
Manganese	0.050	<0.01	<0.01	**0.186**	<0.005	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.035	0.024	0.026	0.023	0.023
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	34	**25**	35	**28**	**26**
TKN		0.060	1.860	<0.05	<0.05	0.060
N-NH3 (Ammonia)		<0.02	0.070	<0.02	<0.02	<0.02
Organic Nitrogen	0.15	<0.06	**1.790**	<0.05	<0.05	<0.060
Phenols		0.002	<0.001	<0.001	0.001	<0.001
COD		11	11	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	60	40	48	41	39
Ion Balance		0.94	0.85	N/A	N/A	N/A
Field Measured						
Water Temp. (°C)	15.0	9.7	7.8	9.4	8.6	7.8
Conductivity (microS/cm)		75	60	68	90	53
pH (pH units)	6.5 - 8.5	8.03	6.90	7.81	8.43	7.48

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality D
Bissett Creek Landfill S

Monitor Number		BH 2-I				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250	2	<1	1	2	<1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	<0.10	<0.10	<0.10	<0.10	<0.10
Phosphate						
Sulphate	500.00	7	5	4	4	6
Calcium		6	6	6	7	5
Magnesium		2	2	2	2	1
Sodium	200	<2	<2	<2	<2	<2
Potassium		<1	<1	<1	1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	0.01	<0.01	<0.01	0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	0.084	0.003	<0.001	<0.001
Conductivity (microS/cm) Lab		49	58	55	62	60
Iron	0.300	<0.03	<0.03	<0.03	0.040	0.040
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.010	0.050
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.021	0.022	0.025	0.023	0.021
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**21**	**22**	**27**	**26**	**29**
TKN		0.140	<0.05	0.540	<0.10	<0.10
N-NH3 (Ammonia)		<0.02	0.04	<0.02	<0.02	<0.02
Organic Nitrogen	0.15	≤ 0.14	0.000	**≤ 0.540**	<0.10	<0.10
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	32	38	36	40	39
Ion Balance		N/A LC	N/A - LC	N/A-LC	N/A-LC	N/A-LC
Field Measured						
Water Temp. (°C)	15.0	7.8	8.6	7.8	8.7	7.2
Conductivity (microS/cm)		44	40	44	51	53
pH (pH units)	6.5 - 8.5	7.25	**6.31**	8.14	6.78	7.20

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality D
Bissett Creek Landfill S

Monitor Number		BH 2-I				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250	1	<1			
N-NO2 (Nitrite)	1.00	<0.10	<0.10			
N-NO3 (Nitrate)	10.00	<0.10	<0.10			
Phosphate						
Sulphate	500.00	4	5			
Calcium		7	6			
Magnesium		2	2			
Sodium	200	<2	<2			
Potassium		<1	<1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	<0.001			
Conductivity (microS/cm) Lab		55	56			
Iron	0.300	**0.320**	0.09			
Lead	0.010					
Manganese	0.050	0.030	0.030			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.021	0.020			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**24**	**26**			
TKN		<0.10	<0.10			
N-NH3 (Ammonia)		<0.02	<0.02			
Organic Nitrogen	0.15		<0.10			
Phenols		<0.001	<0.001			
COD		<5	5			
DOC						
Total Phosphorous						
TDS	500	36	36			
Ion Balance		N/A-LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	7.3	6.4			
Conductivity (microS/cm)		53	30			
pH (pH units)	6.5 - 8.5	7.10	6.9			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 2-II				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40					
Chloride	250.00	4	<1	1	3	1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.50	0.70	0.42	0.31	0.23
Phosphate						
Sulphate	500.00	15	5	8	25	8
Calcium		14	9	7	7	5
Magnesium		10	3	3	3	3
Sodium	200.000	12	<2	2	<2	2
Potassium		4	1	3	2	2
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.10	0.01	<0.05	0.01	0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	0.002	<0.001	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab					62	51
Iron	0.300	**2.42**	0.04	0.02	<0.01	0.01
Lead	0.010					
Manganese	0.050	**0.39**	**0.070**	<0.005	<0.005	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.086	0.031	0.028	0.028	0.025
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	70	33	**27**	**22**	**18**
TKN		0.34	0.28	0.06	<0.05	0.08
N-NH3 (Ammonia)		0.03	<0.02	<0.02	<0.02	0.11
Organic Nitrogen	0.15	**0.31**	**0.27**	<0.06	<0.05	0.00
Phenols		0.004	0.001	<0.001	<0.001	<0.001
COD		51	14	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	132	56	42	40	33
Ion Balance		1.16	0.89	N/A	N/A	N/A
Field Measured						
Water Temp. (°C)	15.0	9.0	7.6	9.4	9.3	8.9
Conductivity (microS/cm)		140	90	61	22	40
pH (pH units)	6.5 - 8.5	7.99	7.45	7.41	7.25	6.87

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 2-II				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250.00	2	3	2	1	2
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.12	<0.10	<0.10	0.17	<0.10
Phosphate						
Sulphate	500.00	7	6	4	4	6
Calcium		3	4	3	4	5
Magnesium		1	2	1	2	2
Sodium	200.000	<2	<2	<2	<2	<2
Potassium		<1	<1	<1	<1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.01	0.01	<0.01	<0.01	0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	0.670	0.001	<0.001	<0.001
Conductivity (microS/cm) Lab		42	45	37	53	54
Iron	0.300	<0.03	<0.03	0.07	0.11	0.18
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.030	0.050
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.021	0.022	0.022	0.022	0.020
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**16**	**14**	**17**	**20**	**23**
TKN		0.21	<0.05	0.20	<0.10	<0.10
N-NH3 (Ammonia)		0.07	0.06	<0.02	<0.02	<0.02
Organic Nitrogen	0.15	0.14	0.00	**≤ 0.200**	≤ 0.200	<0.10
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	27	29	24	35	35
Ion Balance		N/A LC	N/A - LC	N/A--LC	N/A--LC	N/A--LC
Field Measured						
Water Temp. (°C)	15.0	6.9	7.9	7.3	9.2	7.7
Conductivity (microS/cm)		37	30	28	44	44
pH (pH units)	6.5 - 8.5	6.90	7.33	**8.67**	6.76	7.40

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 2-II				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250.00	<1	1			
N-NO2 (Nitrite)	1.00	<0.10	<0.10			
N-NO3 (Nitrate)	10.00	<0.10	<0.10			
Phosphate						
Sulphate	500.00	12	4			
Calcium		3	3			
Magnesium		1	1			
Sodium	200.000	<2	<2			
Potassium		<1	<1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	<0.001			
Conductivity (microS/cm) Lab		43	40			
Iron	0.300	0.27	0.15			
Lead	0.010					
Manganese	0.050	0.030	0.020			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.013	0.016			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	7	20			
TKN		<0.10	<0.10			
N-NH3 (Ammonia)		<0.02	<0.02			
Organic Nitrogen	0.15	<0.10	<0.10			
Phenols		<0.001	<0.001			
COD		<5	20			
DOC						
Total Phosphorous						
TDS	500	28	26			
Ion Balance		N/A-LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	6.9	7.0			
Conductivity (microS/cm)		37	45			
pH (pH units)	6.5 - 8.5	7.20	6.9			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 3-I				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40					
Chloride	250.00	2	2	1	2	1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.42	0.30	0.18	0.24	0.14
Bromide						
Phosphate						
Sulphate	500	13	10	7	15	8
Calcium		7	6	5	5	4
Magnesium		4	2	3	2	2
Sodium	200	6	4	<2	2	2
Potassium		<1	<1	2	<1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.05	0.02	<0.05	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	0.001	<0.001	<0.001	<0.001	0.002
Conductivity (microS/cm) Lab					52	45
Iron	0.300	0.14	0.060	<0.01	<0.01	<0.01
Lead	0.010					
Manganese	0.050	0.030	<0.01	0.011	0.005	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.053	0.036	0.026	0.026	0.024
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**26**	**18**	**20**	**23**	**14**
TKN		0.080	<0.05	<0.05	<0.05	0.05
N-NH3 (Ammonia)		<0.02	<0.02	<0.02	<0.02	0.05
Organic Nitrogen	0.15	<0.08	0.07	<0.05	<0.05	0.00
Phenols		0.003	0.002	<0.001	<0.001	<0.001
COD		11	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	56	44	38	34	29
Ion Balance		1.07	0.99	N/A	N/A	N/A
Field Measured						
Water Temp. (°C)	15.0	7.7	8.6	8.7	8.9	8.5
Conductivity (microS/cm)		80	60	60	60	35
pH (pH units)	6.5 - 8.5	7.57	6.50	6.77	6.74	6.89

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 3-I				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250.00	<1	<1	1	1	<1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	<0.10	<0.10	<0.10	0.11	<0.10
Bromide						
Phosphate						
Sulphate	500	8	7	6	5	7
Calcium		4	4	4	4	5
Magnesium		1	1	1	1	2
Sodium	200	<2	<2	<2	<2	<2
Potassium		<1	<1	<1	<1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	0.085	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab		41	43	48	47	47
Iron	0.300	<0.03	<0.03	<0.03	<0.03	0.05
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.020	0.040
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.023	0.022	0.027	0.022	0.024
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	17	13	17	15	14
TKN		0.24	0.08	0.30	<0.10	<0.10
N-NH3 (Ammonia)		0.03	0.06	0.16	<0.02	<0.02
Organic Nitrogen	0.15	0.21	0.02	0.14	0.14	<0.10
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	27	28	31	31	31
Ion Balance		N/A LC	N/A - LC	N/A-LC	N/A-LC	N/A-LC
Field Measured						
Water Temp. (°C)	15.0	8.8	9.3	8.5	8.7	9.0
Conductivity (microS/cm)		40	31	39	39	43
pH (pH units)	6.5 - 8.5	7.74	6.90	8.33	6.68	7.90

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 3-I				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250.00	3	<1			
N-NO2 (Nitrite)	1.00	0.16	<0.10			
N-NO3 (Nitrate)	10.00	0.73	0.11			
Bromide						
Phosphate						
Sulphate	500	7	6			
Calcium		8	4			
Magnesium		2	1			
Sodium	200	3	<2			
Potassium		1	<1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.02	0.01			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	0.002			
Conductivity (microS/cm) Lab		74	45			
Iron	0.300	0.080	0.040			
Lead	0.010					
Manganese	0.050	0.030	<0.01			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.042	0.023			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**23**	**16**			
TKN		<0.10	<0.10			
N-NH3 (Ammonia)		<0.02	<0.02			
Organic Nitrogen	0.15		<0.10			
Phenols		<0.001	<0.001			
COD		<5	15			
DOC						
Total Phosphorous						
TDS	500	48	29			
Ion Balance		N/A - LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	8.2	7.8			
Conductivity (microS/cm)		80	37			
pH (pH units)	6.5 - 8.5	7.6	7.0			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 3-II				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40					
Chloride	250	1	1	1	2	2
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.210	0.360	<0.10	0.320	<0.10
Bromide						
Phosphate						
Sulphate	500	8	8	7	18	8
Calcium		6	5	4	5	4
Magnesium		2	2	2	2	2
Sodium	200	2	3	<2	3	2
Potassium		1	<1	3	2	1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.02	0.130	<0.05	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	0.003	0.004	<0.001	0.001	<0.001
Conductivity (microS/cm)					54	49
Iron	0.30	**0.58**	**0.54**	<0.01	<0.01	<0.01
Lead	0.010					
Manganese	0.050	0.03	0.010	<0.005	<0.005	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.046	0.039	0.030	0.037	0.028
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**19**	**18**	**20**	**16**	**17**
TKN		0.080	0.090	<0.05	0.07	0.11
N-NH3 (Ammonia)		<0.02	<0.02	<0.02	<0.02	0.08
Organic Nitrogen	0.15	<0.08	<0.090	<0.05	≤0.07	0.03
Phenols		0.002	0.002	<0.001	<0.001	<0.001
COD		14	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	48	52	30	35	32
Ion Balance		0.98	0.94	N/A	N/A	N/A
Field Measured						
Water Temp. (°C)	15.0	7.9	8.8	8.9	8.7	8.4
Conductivity (microS/cm)		60	60	48	44	32
pH (pH units)	6.5 - 8.5	7.64	**6.41**	7.92	6.81	6.89

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Dat
Bissett Creek Landfill Site

Monitor Number		BH 3-II				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250	3	<1	1	2	2
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.23	<0.10	<0.10	0.47	0.12
Bromide						
Phosphate						
Sulphate	500	8	7	6	5	7
Calcium		4	3	4	4	4
Magnesium		1	1	2	2	1
Sodium	200	3	<2	<2	<2	2
Potassium		<1	1	<1	1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.010	<0.01	<0.01	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	0.001	0.079	<0.001	<0.001	<0.001
Conductivity (microS/cm)		53	38	42	53	45
Iron	0.30	<0.03	<0.03	0.06	0.04	0.11
Lead	0.010					
Manganese	0.050	<0.01	<0.01	0.030	0.030	0.050
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.032	0.026	0.027	0.031	0.028
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**20**	**8**	**16**	**15**	**10**
TKN		0.11	<0.05	0.09	0.12	<0.10
N-NH3 (Ammonia)			0.04	<0.02	<0.02	<0.02
Organic Nitrogen	0.15		<0.05	≤ 0.09	≤ 0.09	≤ 0.09
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	10.00	<5
DOC						
Total Phosphorous						
TDS	500	35	25	27	35	29
Ion Balance		N/A LC	N/A - LC	N/A-LC	N/A-LC	N/A-LC
Field Measured						
Water Temp. (°C)	15.0	8.4	9.6	8.5	9.1	8.4
Conductivity (microS/cm)		46	26	33	44	41
pH (pH units)	6.5 - 8.5	8.60	7.52	8.44	6.80	7.60

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Dat
Bissett Creek Landfill Site

Monitor Number		BH 3-II				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250	3	2			
N-NO2 (Nitrite)	1.00	0.15	<0.10			
N-NO3 (Nitrate)	10.00	0.65	0.26			
Bromide						
Phosphate						
Sulphate	500	7	7			
Calcium		5	4			
Magnesium		2	2			
Sodium	200	4	<2			
Potassium		<1	1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.02	0.02			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.00	<0.001	<0.001			
Conductivity (microS/cm)		67	47			
Iron	0.30	0.19	0.090			
Lead	0.010					
Manganese	0.050	0.020	0.020			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.037	0.026			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**20**	**14**			
TKN		<0.10	<0.10			
N-NH3 (Ammonia)		<0.02	0.03			
Organic Nitrogen	0.15		<0.10			
Phenols		<0.001	<0.001			
COD		<5	15			
DOC						
Total Phosphorous						
TDS	500	44	31			
Ion Balance		N/A - LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	7.7	7.8			
Conductivity (microS/cm)		66	40			
pH (pH units)	6.5 - 8.5	7.2	7.40			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 4-I				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40	Sampled			Not enough	
Chloride	250	For	1	1	Water	3
N-NO2 (Nitrite)	1.00	Phenols	<0.10	<0.10	to	<0.10
N-NO3 (Nitrate)	10.00	Only	0.13	0.10	Sample	<0.10
Bromide						
Phosphate		Not				
Sulphate	500	Enough	19	22	Only Field	16
Calcium		Water	8	14	Parameters	11
Magnesium		For	4	7	Measured	5
Sodium	200	Other	8	18		8
Potassium		Parameters	3	5		3
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00		0.02	<0.05		<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000		0.003	0.005		0.002
Conductivity (microS/cm) Lab						127
Iron	0.30		0.08	0.01		0.02
Lead	0.010					
Manganese	0.050		**0.060**	0.032		<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium			0.048	0.064		0.058
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500		41	68		43
TKN			0.37	0.08		0.24
N-NH3 (Ammonia)			0.03	<0.02		0.24
Organic Nitrogen	0.15		**0.34**	>0.06		0.00
Phenols		0.007	<0.001	<0.001		<0.001
COD			48.0	5.0		<5
DOC						
Total Phosphorous						
TDS	500		96	114		83
Ion Balance			0.92	N/A		N/A
Field Measured						
Water Temp. (°C)	15.0	11.2	9.1	12.0	**22.2**	15.0
Conductivity (microS/cm)		360	380	438	242	110(127Lab)
pH (pH units)	6.5 - 8.5	7.77	7.57	7.92	6.97	7.37

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 4-I				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250	2	1	2	1	1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide						
Phosphate						
Sulphate	500	8	10	8	13	19
Calcium		3	5	6	17	7
Magnesium		1	2	2	5	2
Sodium	200	3	4	4	12	14
Potassium		1	3	2	8	4
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.002	0.007	0.003	0.001	0.003
Conductivity (microS/cm) Lab		47	70	77	199	137
Iron	0.30	<0.03	**1.00**	**1.19**	**12.40**	**1.67**
Lead	0.010					
Manganese	0.050	<0.01	**0.130**	**0.080**	**0.450**	**0.190**
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.021	0.033	0.033	0.100	0.045
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**19**	**22**	31	75	43
TKN		<0.05	0.13	0.25	<0.10	<0.10
N-NH3 (Ammonia)		<0.02	0.07	0.26	<0.02	<0.02
Organic Nitrogen	0.15	<0.05	0.06	0.00	<0.10	<0.10
Phenols		<0.001	<0.001	0.003	0.046	0.009
COD		<5	<5	5.0	65.0	6.0
DOC						
Total Phosphorous						
TDS	500	31	46	50	129	89
Ion Balance		N/A LC	N/A - LC	N/A - LC	N/A - LC	N/A - LC
Field Measured						
Water Temp. (°C)	15.0	8.3	10.7	7.0	12.1	11.9
Conductivity (microS/cm)		50 (47 Lab)	49	139	247	107
pH (pH units)	6.5 - 8.5	7.64	6.67	7.03	**6.39**	7.10

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 4-I				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250	2	1			
N-NO2 (Nitrite)	1.00	<0.10	<0.10			
N-NO3 (Nitrate)	10.00	<0.10	<0.10			
Bromide						
Phosphate						
Sulphate	500	10	8			
Calcium		5	3			
Magnesium		2	1			
Sodium	200	3	8			
Potassium		2	1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.002	0.002			
Conductivity (microS/cm) Lab		57	58			
Iron	0.30	0.15	0.14			
Lead	0.010					
Manganese	0.050	0.020	0.040			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.017	0.013			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**15**	**22**			
TKN		<0.10	<0.10			
N-NH3 (Ammonia)		<0.02	<0.02			
Organic Nitrogen	0.15	<0.10	<0.10			
Phenols		<0.001	<0.001			
COD		<5				
DOC			20			
Total Phosphorous						
TDS	500	37	38			
Ion Balance		N/A-LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	6.4	8.6			
Conductivity (microS/cm)		66	48			
pH (pH units)	6.5 - 8.5	7.20	7.2			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 5-I				
Date Sampled	ODWS	16-Oct-00	17-May-01	29-Aug-02	18-Aug-03	19-Aug-04
Parameters						
Fluoride	2.40					
Chloride	250	4	3	4	2	3
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	**10.10**	8.13	<0.10	3.68	1.80
Phosphate						
Sulphate	500	16	17	10	13	11
Calcium		18	14	7	8	6
Magnesium		5	4	1	2	2
Sodium	200	22	22	9	14	9
Potassium		2	2	1	2	1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.14	0.27	<0.05	0.10	0.07
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.003	0.002	0.026	0.014	0.013
Conductivity (microS/cm)Lab					126	91
Iron	0.30	0.14	0.07	<0.01	0.01	<0.01
Lead	0.010					
Manganese	0.050	**0.340**	**0.070**	0.038	0.019	0.010
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.184	0.165	0.086	0.090	0.072
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	64	59	28	34	**26**
TKN		0.71	0.35	0.24	0.19	0.28
N-NH3 (Ammonia)		0.33	<0.02	<0.02	<0.02	0.04
Organic Nitrogen	0.15	**0.38**	**≤0.35**	**≤0.24**	**≤0.19**	**0.24**
Phenols		0.003	0.002	<0.001	<0.001	<0.001
COD		11	13	5	<5	<5
DOC						
Total Phosphorous						
TDS	500	160	148	74	82	59
Ion Balance		1.28	0.93	N/A	N/A	N/A
Field Measured						
Water Temp. (°C)	15.0	10.1	9.5	10.7	9.7	9.4
Conductivity (microS/cm)		220	190	116	130	71
pH (pH units)	6.5 - 8.5	7.12	**6.22**	6.55	**6.03**	7.25

Notes:
All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 5-I				
Date Sampled	ODWS	30-May-05	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters						
Fluoride	2.40					
Chloride	250	<1	<1	1	1	<1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	1.07	0.79	1.63	1.66	1.86
Phosphate						
Sulphate	500	10	9	11	9	8
Calcium		4	5	10	6	5
Magnesium		1	1	3	2	1
Sodium	200	8	5	7	4	6
Potassium		<1	<1	1	1	1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.06	0.06	0.06	0.04	0.04
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.008	0.082	0.008	0.010	0.009
Conductivity (microS/cm)Lab		78	69	113	83	93
Iron	0.30	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.010	0.020
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.062	0.060	0.095	0.082	0.084
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**29**	**19**	38	**24**	30
TKN		<0.05	0.21	0.33	<0.10	<0.10
N-NH3 (Ammonia)		0.03	0.06	<0.02	<0.02	<0.02
Organic Nitrogen	0.15	<0.05		**≤ 0.33**	≤ 0.33	<0.10
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	51	45	74	54	61
Ion Balance		N/A LC	N/A - LC	N/A - LC	N/A - LC	N/A - LC
Field Measured						
Water Temp. (°C)	15.0	8.6	9.1	8.9	9.9	8.8
Conductivity (microS/cm)		72	51	101	73	70
pH (pH units)	6.5 - 8.5	**6.14**	**6.09**	6.85	**6.33**	6.70

Notes:
All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 5-I				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250	2	1			
N-NO2 (Nitrite)	1.00	0.26	<0.10			
N-NO3 (Nitrate)	10.00	4.03	0.57			
Phosphate						
Sulphate	500	9	8			
Calcium		15	6			
Magnesium		4	2			
Sodium	200	12	3			
Potassium		2	1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.06	0.04			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.002	0.005			
Conductivity (microS/cm)Lab		164	70			
Iron	0.30	0.09	0.06			
Lead	0.010					
Manganese	0.050	0.030	0.030			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.179	0.074			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	56	26			
TKN		0.15	<0.10			
N-NH3 (Ammonia)		0.02	<0.02			
Organic Nitrogen	0.15	0.13	<0.10			
Phenols		<0.001	<0.001			
COD		5	10			
DOC						
Total Phosphorous						
TDS	500	107	46			
Ion Balance		N/A - LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	8.5	8.2			
Conductivity (microS/cm)		164	56			
pH (pH units)	6.5 - 8.5	6.5	6.6			

Notes:
All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 6				
Date Sampled	ODWS	22-Aug-01	22-Aug-02	18-Aug-03	19-Aug-04	30-May-05
Parameters						
Fluoride	2.40					
Chloride	250	2	1	2	3	2
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.11	0.55	0.68	0.43	0.86
Phosphate						
Sulphate	500	10	11	21	12	20
Calcium		10	9	8	6	7
Magnesium		4	2	2	2	2
Sodium	200	4	5	3	4	6
Potassium		3	3	3	3	2
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.05	<0.01	<0.01	0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	<0.001	<0.001	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab				87	70	105
Iron	0.30	0.03	0.05	<0.01	0.02	<0.03
Lead	0.010					
Manganese	0.050	**0.460**	**0.258**	**0.113**	<0.01	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.057	0.048	0.055	0.054	0.071
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	39	34	**26**	**18**	**25**
TKN		0.31	0.08	0.28	0.26	0.08
N-NH3 (Ammonia)		<0.02	0.04	0.04	0.24	0.06
Organic Nitrogen	0.15	**0.31**	0.04	**0.24**	0.02	0.02
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		6	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	72	59	57	46	68
Ion Balance		1.02	N/A	N/A	N/A	N/A LC
Field Measured						
Water Temp. (°C)	15.0	10.2	9.5	10.1	9.2	8.6
Conductivity (microS/cm)		193	75	87	59	95
pH (pH units)	6.5 - 8.5	7.61	7.52	6.54	6.95	6.70

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 6				
Date Sampled	ODWS	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09	28-Apr-10
Parameters						
Fluoride	2.40					
Chloride	250	<1	2	2	2	1
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	0.14
N-NO3 (Nitrate)	10.00	<0.10	0.14	<0.10	<0.10	0.16
Phosphate						
Sulphate	500	8	8	5	6	5
Calcium		4	6	5	4	7
Magnesium		2	2	2	2	3
Sodium	200	3	2	<2	2	2
Potassium		1	2	2	2	1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.02	0.01	<0.01	<0.01	0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.083	0.002	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab		58	70	60	65	69
Iron	0.30	<0.03	<0.03	0.15	0.17	0.27
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.050	0.030
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.035	0.037	0.030	0.034	0.037
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**18**	**27**	**24**	**25**	**29**
TKN		<0.05	0.22	<0.10	<0.10	<0.10
N-NH3 (Ammonia)		0.06	0.04	<0.02	<0.02	<0.02
Organic Nitrogen	0.15	0.00	**0.18**	<0.10	<0.10	<0.10
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	38	46	39	42	45
Ion Balance		N/A - LC	N/A - LC	N/A - LC	N/A - LC	N/A - LC
Field Measured						
Water Temp. (°C)	15.0	10.5	8.0	9.5	7.7	7.6
Conductivity (microS/cm)		40	55	49	57	67
pH (pH units)	6.5 - 8.5	6.85	7.11	6.79	7.20	7.0

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 6				
Date Sampled	ODWS	22-Jun-11				
Parameters						
Fluoride	2.40					
Chloride	250	1				
N-NO2 (Nitrite)	1.00	<0.10				
N-NO3 (Nitrate)	10.00	<0.10				
Phosphate						
Sulphate	500	5				
Calcium		5				
Magnesium		2				
Sodium	200	4				
Potassium		1				
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01				
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	<0.001				
Conductivity (microS/cm) Lab		66				
Iron	0.30	0.30				
Lead	0.010					
Manganese	0.050	0.020				
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.033				
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	30				
TKN		0.14				
N-NH3 (Ammonia)		<0.02				
Organic Nitrogen	0.15	≤0.14				
Phenols		<0.001				
COD		20				
DOC						
Total Phosphorous						
TDS	500	43				
Ion Balance		N/A-LC				
Field Measured						
Water Temp. (°C)	15.0	7.9				
Conductivity (microS/cm)		52				
pH (pH units)	6.5 - 8.5	6.8				

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 7				
Date Sampled	ODWS	22-Aug-01	29-Aug-02	18-Aug-03	19-Aug-04	30-May-05
Parameters						
Fluoride	2.40					
Chloride	250	3	1	1	3	3
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	<0.10	<0.10	<0.10	<0.10	<0.10
Phosphate						
Sulphate	500	14	6	18	7	8
Calcium		8	3	4	3	2
Magnesium		2	<1	1	2	<1
Sodium	200	5	7	3	3	<2
Potassium		3	2	4	3	1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.05	<0.01	<0.1	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.001	<0.001	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab				43	33	34
Iron	0.30	0.02	0.01	<0.01	0.02	<0.03
Lead	0.010					
Manganese	0.050	**0.320**	**0.056**	**0.053**	0.020	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.092	0.037	0.047	0.036	0.040
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**25**	**18**	**13**	**10**	**10**
TKN		0.45	0.08	<0.05	0.27	0.09
N-NH3 (Ammonia)		<0.02	<0.02	<0.02	0.05	0.02
Organic Nitrogen	0.15	**≤0.45**	≤0.08	<0.05	**0.22**	0.07
Phenols		0.003	<0.001	<0.001	0.001	<0.001
COD		61	<5	<5	<5	
DOC						<5
Total Phosphorous						
TDS	500	60	25	28	22	22
Ion Balance		0.98	N/A	N/A	N/A	N/A LC
Field Measured						
Water Temp. (°C)	15.0	9.5	8.8	8.9	8.1	7.9
Conductivity (microS/cm)		165	33	59	26	30
pH (pH units)	6.5 - 8.5	7.16	7.56	6.78	7.43	7.40

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 7				
Date Sampled	ODWS	20-Jun-06	20-Jun-06	10-May-07	10-Sep-08	23-Jul-09
Parameters			BH 9 is a duplicate of BH 7			
Fluoride	2.40					
Chloride	250	<1	1	1	3	2
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	<0.10	<0.10	<0.10	<0.10	<0.10
Phosphate						
Sulphate	500	6	6	<1	5	6
Calcium		3	2	3	3	4
Magnesium		<1	<1	<1	<1	<1
Sodium	200	<2	<2	<2	<2	<2
Potassium		1	1	1	1	2
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.080	0.007	0.003	0.001	0.001
Conductivity (microS/cm) Lab		34	33	43	35	31
Iron	0.30	0.04	<0.03	<0.03	0.08	0.14
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.010	0.040
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.036	0.037	0.051	0.036	0.031
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	7	7	7	10	6
TKN		<0.05	0.08	0.24	<0.10	<0.10
N-NH3 (Ammonia)		0.05	0.05	0.05	<0.02	<0.02
Organic Nitrogen	0.15	0.00	0.03			<0.10
Phenols		<0.001	<0.01	<0.001	<0.001	<0.001
COD		<5	<5	<5	5	<5
DOC						
Total Phosphorous						
TDS	500	22	22	28	23	20
Ion Balance		N/A - LC	N/A - LC	N/A - LC	N/A - LC	N/A - LC
Field Measured						
Water Temp. (°C)	15.0	9.7		8.0	8.8	8.1
Conductivity (microS/cm)		22		33	27	34
pH (pH units)	6.5 - 8.5	7.35		7.22	6.63	8.20

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

AECOM

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 7				
Date Sampled	ODWS	28-Apr-10	22-Jun-11			
Parameters						
Fluoride	2.40					
Chloride	250	2	1			
N-NO2 (Nitrite)	1.00	<0.10	<0.10			
N-NO3 (Nitrate)	10.00	0.10	<0.10			
Phosphate						
Sulphate	500	7	5			
Calcium		3	2			
Magnesium		<1	<1			
Sodium	200	<2	<2			
Potassium		1	<1			
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01			
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	<0.001	0.005			
Conductivity (microS/cm) Lab		36	30			
Iron	0.30	0.10	0.15			
Lead	0.010					
Manganese	0.050	0.020	<0.01			
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.039	0.032			
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	9	8			
TKN		<0.10	<0.10			
N-NH3 (Ammonia)		<0.02	<0.02			
Organic Nitrogen	0.15	<0.10	<0.10			
Phenols		<0.001	<0.001			
COD		<5	20			
DOC						
Total Phosphorous						
TDS	500	23	20			
Ion Balance		N/A - LC	N/A-LC			
Field Measured						
Water Temp. (°C)	15.0	7.8	6.9			
Conductivity (microS/cm)		36	24			
pH (pH units)	6.5 - 8.5	7.00	6.9			

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Data
Bissett Creek Landfill Site

Monitor Number		BH 8				
Date Sampled	ODWS	22-Aug-01	29-Aug-02	18-Aug-03	19-Aug-04	30-May-05
Parameters						
Fluoride	2.40					
Chloride	250	77	16	21	55	37
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	2.51	0.65	1.32	2.13	0.82
Phosphate						
Sulphate	500	7	13	16	7	8
Calcium		15	<1	2	2	2
Magnesium		5	<1	<1	<1	<1
Sodium	200	35	23	20	40	26
Potassium		3	2	1	1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.05	<0.01	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	<0.001	<0.001	<0.001	<0.001	0.001
Conductivity (microS/cm) Lab				126	238	167
Iron	0.30	<0.01	0.01	<0.01	<0.01	<0.03
Lead	0.010					
Manganese	0.050	**0.200**	<0.005	<0.005	<0.01	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.152	0.013	0.024	0.036	0.028
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**19**	**17**	**13**	**13**	**10**
TKN		0.39	0.16	0.11	0.18	0.80
N-NH3 (Ammonia)		<0.02	<0.02	<0.02	0.07	<0.02
Organic Nitrogen	0.15	**≤0.39**	**≤0.16**	<0.11	0.11	**≤ 0.80**
Phenols		0.002	<0.001	<0.001	<0.001	<0.001
COD		58	<5	<5	<5	<5
DOC						
Total Phosphorous						
TDS	500	204	77	82	155	109
Ion Balance		0.96	N/A	N/A	N/A	N/A LC
Field Measured						
Water Temp. (°C)	15.0	13.1	12.0	13.4	11.3	9.0
Conductivity (microS/cm)		337	106	126	186	163
pH (pH units)	6.5 - 8.5	**6.34**	7.65	6.92	7.40	7.80

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Dat
Bissett Creek Landfill Site

Monitor Number		BH 8				
Date Sampled	ODWS	20-Jun-06	10-May-07	10-Sep-08	10-Sep-08	23-Jul-09
Parameters					BH 9 is a duplicate of BH 8	
Fluoride	2.40					
Chloride	250	53	8	78	74	49
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	0.92	1.03	1.77	1.76	1.71
Phosphate						
Sulphate	500	6	5	3	3	5
Calcium		4	2	5	4	4
Magnesium		<1	<1	1	1	<1
Sodium	200	33	9	45	47	30
Potassium		1	<1	2	1	2
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	0.04	<0.01	<0.01	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	0.045	0.003	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab		220	70	282	277	201
Iron	0.30	<0.03	<0.03	0.06	0.05	0.05
Lead	0.010					
Manganese	0.050	<0.01	<0.01	<0.01	0.010	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.057	0.026	0.069	0.066	0.046
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**<5**	**13**	**11**	**11**	**<5**
TKN		0.10	0.21	<0.10	<0.10	<0.10
N-NH3 (Ammonia)		0.07	0.21	<0.02	<0.02	<0.02
Organic Nitrogen	0.15	0.03	0.00	0.00	0.00	
Phenols		<0.001	<0.001	0.001	0.001	<0.001
COD		<5	<5	<5	5	<5
DOC						
Total Phosphorous						
TDS	500	143	46	183	180	131
Ion Balance		0.99		0.90	0.94	0.97
Field Measured						
Water Temp. (°C)	15.0	10.7	8.5	12.0	12.0	9.9
Conductivity (microS/cm)		157	56	251	251	190
pH (pH units)	6.5 - 8.5	**6.27**	7.19	6.57	6.57	6.60

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

Ground Water Quality Dat
Bissett Creek Landfill Site

Monitor Number		BH 8				
Date Sampled	ODWS	23-Jul-09	28-Apr-10	28-Apr-10	22-Jun-11	22-Jun-11
Parameters		BH 9 is a duplicate of BH 8		BH 9 is a duplicate of BH 8		BH 9 is a duplicate of BH 8
Fluoride	2.40					
Chloride	250	49	2	2	14	14
N-NO2 (Nitrite)	1.00	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	10.00	1.73	0.85	0.93	0.49	0.52
Phosphate						
Sulphate	500	5	5	5	5	5
Calcium		4	4	4	1	1
Magnesium		<1	1	1	<1	<1
Sodium	200	30	<2	3	12	13
Potassium		2	<1	<1	<1	<1
Aluminum	0.100					
Barium	1.00					
Beryllium						
Boron	5.00	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.005					
Chromium	0.050					
Cobalt						
Copper	1.000	<0.001	0.001	<0.001	<0.001	0.006
Conductivity (microS/cm) Lab		200	47	47	79	86
Iron	0.30	0.09	0.12	0.08	0.13	0.09
Lead	0.010					
Manganese	0.050	0.050	<0.01	0.030	0.030	<0.01
Molybdenum						
Nickel						
Phosphorus						
Silicon						
Silver	0.050					
Strontium		0.040	0.033	0.030	0.009	0.011
Sulphur						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	5.00					
Hardness	80 - 100					
Alkalinity as CaCO3	30 - 500	**<5**	**13**	**14**	**8**	**13**
TKN		<0.10	0.11	<0.10	<0.10	<0.10
N-NH3 (Ammonia)		<0.02	<0.02	<0.02	<0.02	<0.02
Organic Nitrogen	0.15		≤0.11	<0.10	<0.10	<0.10
Phenols		<0.001	<0.001	<0.001	<0.001	<0.001
COD		<5	<5	<5	25	35
DOC						
Total Phosphorous						
TDS	500	130	31	31	51	56
Ion Balance		0.97	N/A - LC	N/A - LC	N/A-LC	N/A-LC
Field Measured						
Water Temp. (°C)	15.0	9.9	8.6		8.2	
Conductivity (microS/cm)		190	46		62	
pH (pH units)	6.5 - 8.5	6.60	6.80		7.0	

Notes:

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
Shaded values exceed ODWS
nd = not detected
ns = not sampled

AECOM

Appendix C

Surface Water Quality

Surface Water Quality Data
Bissett Creek Landfill Site

Monitor Number		SW # 1				
Date Sampled	PWQO	16-Oct-00	17-May-01	22-Aug-01	29-Aug-02	18-Aug-03
Parameters						
Fluoride		DRY	DRY	DRY		DRY
Chloride						
N-NO2 (Nitrite)					<0.10	
N-NO3 (Nitrate)					<0.10	
Sulphate					<1	
Calcium					1	
Magnesium					<1	
Sodium					2	
Potassium					1	
Aluminum						
Barium						
Boron					<0.05	
Cadmium	0.0002				<0.0001	
Chromium	0.001					
Cobalt						
Copper	0.005				<0.001	
Conductivity (microS/cm)						
Iron	0.30				0.21	
Lead	f(Alk)					
Manganese					0.246	
Nickel	0.025					
Silicon						
Silver	0.0001					
Strontium					0.008	
Zinc	0.03				0.026	
Hardness as CaCO3						
Alkalinity as CaCo3					8	
TKN					2.32	
N-NH3 (Ammonia)	f(pH, Temp)				0.03	
Organic Nitrogen					2.29	
Un-ionized Ammonia	0.02					
Phenols	0.001				<0.001	
Ion Balance					N/A	
COD					88	
DOC						
Total Phosphorous	0.03				**0.06**	
TDS					18	
Field Measured						
Water Temp. (°C)					17.6	
Conductivity (microS/cm)					70	
pH (pH units)	6.5 - 8.5				**5.72**	
Disolved Oxygen (DO)	f(Temp)				1.33	
Flow (liters/sec)					No Flow	

Notes:
All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
Shaded values exceed PWQO
nd = not detected
ns = not sampled

Surface Water Quality Data
Bissett Creek Landfill Site

Monitor Number		SW # 1				
Date Sampled	PWQO	19-Aug-04	30-May-05	20-Jun-06	10-May-07	10-Sep-08
Parameters						
Fluoride		DRY				
Chloride			3	<1	3	1
N-NO2 (Nitrite)			<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			1	<0.10	<0.10	<0.10
Sulphate			10	2	5	<1
Calcium			2	1	<1	3
Magnesium			<1	<1	<1	<1
Sodium			<2	<2	<2	<2
Potassium			3	2	2	3
Aluminum						
Barium						
Boron			0.01	0.01	<0.01	<0.01
Cadmium	0.0002			<0.0001	<0.0001	<0.0001
Chromium	0.001					
Cobalt						
Copper	0.005		<0.001	<0.001	<0.001	0.001
Conductivity (microS/cm)			65	23	22	28
Iron	0.30		0.13	0.20	0.08	**0.63**
Lead	f(Alk)					
Manganese			0.120	0.160	0.110	0.680
Nickel	0.025					
Silicon						
Silver	0.0001					
Strontium			0.005	0.007	0.006	0.076
Zinc	0.03			0.030	0.020	**0.070**
Hardness as CaCO3						
Alkalinity as CaCo3			<5	<5	<5	5
TKN			1.76	1.94	1.51	2.05
N-NH3 (Ammonia)	f(pH, Temp)		0.21	0.03	0.37	0.05
Organic Nitrogen				1.91	1.14	2.00
Un-ionized Ammonia	0.02					
Phenols	0.001		<0.001	<0.001	<0.001	<0.001
Ion Balance			N/A LC	N/A - LC	N/A - LC	N/A - LC
COD			68	108	53	123
DOC						
Total Phosphorous	0.03			**0.06**	**0.06**	**1.11**
TDS			42	15	14	18
Field Measured						
Water Temp. (°C)			23.5	24.1	20.0	15.5
Conductivity (microS/cm)			21	18	12	24
pH (pH units)	6.5 - 8.5		**6.28**	7.14	7.46	**6.20**
Disolved Oxygen (DO)	f(Temp)		1.55	6.14	7.87	6.38
Flow (liters/sec)			No Flow	No Flow	No Flow	No Flow

Notes:

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
Shaded values exceed PWQO
nd = not detected
ns = not sampled

Surface Water Quality Data
Bissett Creek Landfill Site

Monitor Number		SW # 1				
Date Sampled	PWQO	23-Jul-09	28-Apr-10	22-Jun-11		
Parameters			No Water To Sample			
Fluoride						
Chloride		2		1		
N-NO2 (Nitrite)		<0.10		<0.10		
N-NO3 (Nitrate)		<0.10		<0.10		
Sulphate		<3		2		
Calcium		1		2		
Magnesium		<1		<1		
Sodium		<2		<2		
Potassium		2		2		
Aluminum						
Barium						
Boron		0.10		<0.1		
Cadmium	0.0002	<0.01		<0.01		
Chromium	0.001					
Cobalt						
Copper	0.005	<0.01		<0.01		
Conductivity (microS/cm)		19		32		
Iron	0.30	**0.90**		0.20		
Lead	f(Alk)					
Manganese		0.620		0.240		
Nickel	0.025					
Silicon						
Silver	0.0001					
Strontium		<0.05		<0.05		
Zinc	0.03	**0.070**		<0.05		
Hardness as CaCO3				5		
Alkalinity as CaCo3		5		<5		
TKN		11.00		0.92		
N-NH3 (Ammonia)	f(pH, Temp)	<0.02		0.03		
Organic Nitrogen		≤ 11.0				
Un-ionized Ammonia	0.02					
Phenols	0.001	<0.001		<0.001		
Ion Balance		N/A - LC		N/A - LC		
COD		89		120		
DOC						
Total Phosphorous	0.03	**0.70**		0.01		
TDS		12		21		
Field Measured						
Water Temp. (°C)		19.2		8.1		
Conductivity (microS/cm)		20		21		
pH (pH units)	6.5 - 8.5	**6.40**		**6.30**		
Disolved Oxygen (DO)	f(Temp)	3.54		3.99		
Flow (liters/sec)		No Flow		No Flow		

Notes:
All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
Shaded values exceed PWQO
nd = not detected
ns = not sampled

Surface Water Quality Data
Bissett Creek Landfill Site

Monitor Number		SW-2				
Date Sampled	PWQO	16-Oct-00	17-May-01	22-Aug-01	29-Aug-02	18-Aug-03
Parameters						
Fluoride			<0.10	DRY		DRY
Chloride		1.00	<1		<1	
N-NO2 (Nitrite)		<0.10	<0.10		<0.10	
N-NO3 (Nitrate)		<0.10	<0.10		<0.10	
Sulphate		6	6		4	
Calcium		5	2		5	
Magnesium		3	2		3	
Sodium		<2	<2		<2	
Potassium		1	<1		<1	
Aluminum						
Barium						
Boron		<0.01	0.01		<0.05	
Cadmium	0.0002	<0.0001	<0.0001		<0.0001	
Chromium	0.001					
Cobalt						
Copper	0.005	<0.001	<0.001		<0.001	
Conductivity (microS/cm) Lab						
Iron	0.30	**0.46**	**0.47**		**2.47**	
Lead	f(Alk)					
Manganese		0.010	0.020		0.166	
Nickel	0.025					
Silicon						
Silver	0.0001					
Strontium		0.039	0.030		0.041	
Zinc	0.030	<0.01	<0.01		<0.005	
Hardness as CaCO3						
Alkalinity as CaCO3		21	12		26	
TKN			0.44		0.76	
N-NH3 (Ammonia)	f(pH, Temp)	0.59	0.03		0.05	
Organic Nitrogen			0.41		0.71	
Un-ionized Ammonia	0.02	0.0106	0.0001			
Phenols	0.001	<0.001	<0.001		<0.001	
Ion Balance		0.920	N/A		N/A	
COD		38	32		45	
DOC						
Total Phosphorous	0.03	<0.01	0.01		**0.04**	
TDS		52	32			
Field Measured						
Water Temp. (°C)		8.1	13.1		16.3	
Conductivity (microS/cm)		50	40		45	
pH (pH units)	6.5 - 8.5	8.01	7.01		7.27	
Disolved Oxygen (DO)	f(Temp)	9.50	10.12		3.83	
Flow (liters/sec)		2.40	8.00		0.01	

Notes:

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
Shaded values exceed PWQO
nd = not detected
ns = not sampled

Surface Water Quality Data
Bissett Creek Landfill Site

Monitor Number		SW-2				
Date Sampled	PWQO	19-Aug-04	30-May-05	20-Jun-06	10-May-07	10-Sep-08
Parameters						
Fluoride						
Chloride		3	2	<1	4	1
N-NO2 (Nitrite)		<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)		<0.10	<0.10	<0.10	<0.10	<0.10
Sulphate		4	5	3	4	1
Calcium		5	4	4	3	4
Magnesium		1	1	1	1	1
Sodium		3	<2	<2	<2	2
Potassium		<1	<1	1	1	<1
Aluminum						
Barium						
Boron		<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.0002	<0.0001		0.000	<0.0001	<0.0001
Chromium	0.001					
Cobalt						
Copper	0.005	<0.001	0.001	<0.001	<0.001	<0.001
Conductivity (microS/cm) Lab		41	33	32	32	41
Iron	0.30	**3.16**	**1.18**	**2.43**	**0.62**	**1.94**
Lead	f(Alk)					
Manganese		0.190	0.080	0.160	0.040	0.100
Nickel	0.025					
Silicon						
Silver	0.0001					
Strontium		0.036	0.030	0.029	0.020	0.290
Zinc	0.030	<0.01		<0.01	<0.01	<0.01
Hardness as CaCO3						
Alkalinity as CaCO3		17	15	14	9	16
TKN		0.65	0.73	0.85	0.50	0.73
N-NH3 (Ammonia)	f(pH, Temp)	0.08	0.21	0.07	0.17	0.10
Organic Nitrogen		0.57	0.52	0.78	0.33	0.63
Un-ionized Ammonia	0.02					
Phenols	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Balance		N/A	N/A LC	N/A - LC	N/A - LC	N/A - LC
COD		43	40	90	28	38
DOC						
Total Phosphorous	0.03	**0.06**		**0.05**	<0.01	**0.05**
TDS		27	22	21	21	27
Field Measured						
Water Temp. (°C)		15.2	18.3	20.9	17.0	14.0
Conductivity (microS/cm)		50	53	29	26	35
pH (pH units)	6.5 - 8.5	7.08	7.11	6.65	7.06	**6.47**
Disolved Oxygen (DO)	f(Temp)	10.59	4.01	6.18	6.58	6.39
Flow (liters/sec)		0.20	3.00	5.0	11.0	1.0

Notes:

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
Shaded values exceed PWQO
nd = not detected
ns = not sampled

Surface Water Quality Data
Bissett Creek Landfill Site

Monitor Number		SW-2				
Date Sampled	PWQO	23-Jul-09	28-Apr-10	22-Jun-11		
Parameters						
Fluoride						
Chloride		2	1	1		
N-NO2 (Nitrite)		<0.10	<0.10	<0.10		
N-NO3 (Nitrate)		0.150	0.11	<0.10		
Sulphate		3	6	4		
Calcium		5	4	4		
Magnesium		2	2	1		
Sodium		<2	<2	<2		
Potassium		<1	<1	<1		
Aluminum						
Barium						
Boron		<0.1	<0.01	<0.1		
Cadmium	0.0002	<0.01	<0.0001	<0.01		
Chromium	0.001					
Cobalt						
Copper	0.005	<0.01	<0.001	<0.01		
Conductivity (microS/cm) Lab		40	39	38		
Iron	0.30	**1.80**	**0.44**	**0.80**		
Lead	f(Alk)					
Manganese		0.090	0.02	0.040		
Nickel	0.025					
Silicon						
Silver	0.0001					
Strontium		<0.05	0.028	<0.05		
Zinc	0.030	<0.05	<0.01	<0.05		
Hardness as CaCO3			18	14		
Alkalinity as CaCO3		14	8	12		
TKN		0.66	0.35	0.43		
N-NH3 (Ammonia)	f(pH, Temp)	0.08	<0.02	0.03		
Organic Nitrogen		0.58	≤0.35	0.40		
Un-ionized Ammonia	0.02					
Phenols	0.001	<0.001	<0.001	<0.001		
Ion Balance		N/A - LC	N/A - LC	N/A - LC		
COD		37	23	60		
DOC						
Total Phosphorous	0.03	0.05	<0.01	<0.01		
TDS		26	25	25		
Field Measured						
Water Temp. (°C)		18.3	13.9	18.3		
Conductivity (microS/cm)		35	37	30		
pH (pH units)	6.5 - 8.5	**7.40**	7.20	**6.30**		
Disolved Oxygen (DO)	f(Temp)	6.43	5.99	5.09		
Flow (liters/sec)		3.0	1.5	3.0		

Notes:

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
Shaded values exceed PWQO
nd = not detected
ns = not sampled

AECOM

Appendix D

Photos of Monitoring Locations

BH 1-I & 1-II

Plate 1

BH 3-I & 3-II

BH 4

BH 5

BH 6

Plate 3

BH 7

BH 8

SW 1 Area

SW 1 Staff Guage

Plate 5

SW 2 Area

SW 2