



2012/2013 Biennial Monitoring Report Deux Rivieres Waste Disposal Site

Cambium Reference No.: 2923-004

2014-05-29

Prepared for: The United Townships of Head, Clara & Maria



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EXECUTIVE SUMMARY

Cambium Inc. was retained by the United Townships of Head, Clara & Maria to complete the 2012/2013 Biennial Monitoring Report for the Deux Rivieres Waste Disposal Site. The 2012 and 2013 monitoring programs were completed by Jp2g Consultants Inc. and AECOM.

The Deux Rivieres Waste Disposal Site is a natural attenuation landfill consisting of an approved fill area of 0.442 hectares within a total area of 1.4 hectares and a contaminant attenuation zone 14.89 hectares in size. The site had operated under Ontario Ministry of the Environment Environmental Compliance Approval No. A412407 as a trench and cover natural attenuation landfill until September 30, 2007 when final cover was applied and waste was no longer accepted at the site. The volume of waste deposited at the site, consisting of waste, daily cover, intermediate cover and the final cover is 12,175 cubic metres.

There have been no monitoring wells installed on-site, however it is assumed that the local groundwater flow is towards the northwest. This is evidenced by the presence of springs and a river northwest of the Site.

To determine the impact of the site on downgradient groundwater a ground-to-surface water spring had been sampled historically. The spring has however been observed to be dry since 2008, and has subsequently been removed from the monitoring program.

There are four surface water sampling stations located near the site which characterize the background water quality (SW-4A) and the downgradient surface water quality (SW-1, SW-2 and SW-3). A sample was collected from each surface water sampling station during the 2012/2013 sampling programs. The quality of all parameters were reported at a concentration less than Provincial Water Quality Objectives during both sampling events, with the exception of dissolved oxygen (which also exceeded the Provincial Water Quality Objectives in the background surface water station). The concentrations of most parameters were slightly elevated at surface water station SW1 during the 2012/2013 monitoring program when compared to surface water SW-4A, however these elevated concentrations do not are likely not related to the former landfill operation.

Minor erosion and two seeps were observed around the waste mound during the 2013 monitoring program. Cambium recommends that remedial measures are taken to reduce the amount of erosion occurring on-site and monitor the severity of the seeps during the 2014/2015 monitoring programs.

Aside from the need for the Township to complete the Registration on Title and Certificate of Requirement, the Deux Rivieres waste disposal site can be considered in compliance with the ECA during 2012 and 2013.

Cambium does not recommend any changes to the 2014/2015 monitoring programs.



Respectfully submitted,

Cambium Inc.

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DFB/cjm



TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	SITE LOCATION.....	1
1.2	SITE DESCRIPTION	1
2.0	METHODOLOGY.....	2
2.1	GROUNDWATER MONITORING PROGRAM.....	2
2.2	SURFACE WATER MONITORING PROGRAM.....	2
2.3	LANDFILL GAS MONITORING PROGRAM	3
2.4	SITE INSPECTION AND OPERATIONS OVERVIEW	3
3.0	GEOLOGICAL AND HYDROGEOLOGICAL CONTEXT	4
3.1	TOPOGRAPHY AND DRAINAGE	4
3.2	HYDROGEOLOGICAL SETTING.....	4
3.2.1	Groundwater Flow Direction	4
4.0	RESULTS AND DISCUSSION	5
4.1	GROUNDWATER QUALITY.....	5
4.2	SURFACE WATER QUALITY	5
4.2.1	Background	6
4.2.2	Down-Gradient Water Quality	6
4.3	COMPLIANCE ASSESSMENT.....	6
5.0	SITE OPERATIONS	7
5.1	SITE ACCESS AND SECURITY	7
5.2	DRAINAGE	7
5.3	FINAL COVER INTEGRITY	7
5.4	COMPLIANCE	7
6.0	CONCLUSIONS AND RECOMMENDATIONS.....	8



REFERENCES

GLOSSARY OF TERMS

LIST OF APPENDED FIGURES

Figure 1	Regional Location Plan
Figure 2	Site Plan

LIST OF APPENDED TABLES

Table 1	Deux Rivieres WDS Monitoring Program
Table 2	Summary of Groundwater Quality
Table 3	Summary of Surface Water Quality

LIST OF APPENDICES

Appendix A	Environmental Compliance Approval Number. A412407
Appendix B	Laboratory Certificates of Analysis
Appendix C	Site Photographs



1.0 INTRODUCTION

Cambium Inc. (Cambium) was retained by the United Townships of Head, Clara & Maria (Township) to complete the 2012/2013 Biennial Monitoring Report (BMR) for the Deux Rivieres Waste Disposal Site (Site). The Site, now closed, operated under Ontario Ministry of the Environment (MOE) Environmental Compliance Approval (ECA) No. A412407 (Appendix A). The purpose of this report is to satisfy Condition 26 of the ECA (last amended May 2, 2012) and includes an evaluation of the overall adequacy of the monitoring program, an assessment of the current impact of the Site on the natural environment, and a review (if required) of any remedial action. Cambium has provided recommendations for the 2014/2015 monitoring program based on the results of the 2012/2013 monitoring program.

1.1 SITE LOCATION

The Site is located at 201 Brent Road, on Lots 23 and 24, Concession B, in the geographic Township of Maria, in the United Townships of Head, Clara & Maria. The Site is situated in zone 17 at Universal Transverse Mercator (UTM) coordinates zone 17 707295 5124429, North American Datum 83 (Figure 1).

1.2 SITE DESCRIPTION

The Site is owned by the United Townships of Head, Clara & Maria and operated as a natural attenuation landfill consisting of an approved fill area of 0.442 hectares (ha) within a total Site area of 1.4 ha and a contaminant attenuation zone (CAZ) 14.89 ha in size (Figure 2). The Site had operated as a trench and cover waste disposal site until September 30, 2007 when final cover was applied and waste was no longer accepted at the Site. The volume of waste deposited at the Site, consisting of waste, daily cover, intermediate cover and the final cover is 12,175 cubic metres.

The Township will continue its efforts to complete the Registration on Title and Certificate of Requirement as per Conditions 14 (a) and (b) of the ECA dated May 2, 2012.

To aid in the understanding of the Site history and development, the following reports are included digitally in the report package:

- 2010/2011 Biennial Report, Deux Rivieres Waste Disposal Site (Jp2g Consultants Inc. and AECOM, May 2012)
- Deux Rivieres Waste Disposal Site – Site Closure Plan (Jp2g Consultants Inc., May 2008)



2.0 METHODOLOGY

Groundwater and surface water samples were collected by Jp2g personnel during the 2012/2013 monitoring program. The sampling and shipping methodology utilized during the 2012/2013 sampling program is detailed in the report titled *2010/2011 Biennial Report, Deux Rivieres Waste Disposal Site* (Jp2g Consultants Inc. and AECOM, May 2012):

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 collected. Field measurement of pH, electrical conductivity and water temperature were collected at the time of sampling...

The monitoring program for the Site is outlined in Table 1 (enclosed).

2.1 GROUNDWATER MONITORING PROGRAM

There have been no groundwater monitoring wells installed on-site. Alternatively, groundwater monitoring has been achieved by sampling a spring downgradient the Site to the northwest (known as Spring #1). This location has been observed to be dry since 2008 and has subsequently been removed from the monitoring program (see Site ECA (Appendix A)). A secondary spring located northeast of the Site was sampled (labelled Spring #2) has been sampled in the past. Both springs were observed to be dry during the 2012 and 2013 monitoring programs and have subsequently been removed from the monitoring program (see Site ECA (Appendix A)). Historical groundwater quality is attached as Table 2. The laboratory Certificates of Analysis are included in this report as Appendix B.

2.2 SURFACE WATER MONITORING PROGRAM

Surface water samples were collected on June 20, 2012 and June 3, 2013 from the existing surface water sampling stations. The location of each surface water sampling location is outlined in Figure 2; additionally the following table outlines the UTM coordinates of each surface water sampling location.

Surface Water Sampling Location	Easting	Northing
SW-1	707286	5124667
SW-2	707261	5124339
SW-3	707074	5124135
SW-4A	706741	5123922



During the 2012/2013 sampling program, surface water samples were collected at stations SW-3A and SW-5 in 2013. The location of these sampling stations is unknown nor are they a requirement of the monitoring program. The results of the surface water sampling program are discussed in Section 4.2, and are attached as Table 3. The laboratory Certificates of Analysis are included in this report as Appendix B.

2.3 LANDFILL GAS MONITORING PROGRAM

Landfill gas is not currently managed at the Deux Rivieres waste disposal site. The large, open site area and isolated location from the public supports a passive landfill gas management process, which allows generated landfill gas to naturally disperse through the waste and the naturally-permeable cover soil to the atmosphere.

2.4 SITE INSPECTION AND OPERATIONS OVERVIEW

During the monitoring program completed in June 2012 and June 2013, Jp2G staff completed an inspection of the Deux Rivieres Site property and made note of the status of operations at the Site.



3.0 GEOLOGICAL AND HYDROGEOLOGICAL CONTEXT

3.1 TOPOGRAPHY AND DRAINAGE

The Deux Rivieres waste disposal site is relatively remote, located in the Ottawa valley area, approximately 1 kilometre (km) south of the Ottawa River, and north of Algonquin Park. The Site is located on the northwest flank of a low hill and is assumed to drain towards the northwest into Cotnam Creek.

A review of the 2012 and 2013 precipitation data in comparison to the average precipitation for Chalk River (1981 to 2010; (Environment Canada, 2013)) indicated that the June 2012 rainfall was less than average (i.e. 53.4 mm versus 86.8 mm) and the July 2013 rainfall was also less than average (i.e. 48.2 mm versus 84.8 mm). Overall, both the 2012 and 2013 precipitation was observed to be less than average.

3.2 HYDROGEOLOGICAL SETTING

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 (L.J. Chapman and D.F. 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.

Locally the overburden materials at the Site consist of thick glaciofluvial outwash and ice contact sand and gravel deposits. The closest groundwater potable water supply is for the logging camp located over 300 m to the north. A number of springs are located down-gradient of the Site and Cotnam creek is located approximately 200 m west of the Site (Jp2g Consultants Inc., May 2008).

3.2.1 GROUNDWATER FLOW DIRECTION

There have been no monitoring wells installed at the Deux Rivieres Waste Disposal Site. Therefore a groundwater flow direction cannot be calculated. It can be assumed that groundwater flows from areas of higher elevation (southeast portion of the Site), to areas of lower elevation (northwest portions of the Site). This is evidenced by the presence of two springs (Spring #1 and Spring #2) and a creek (Cotnam Creek) located north and west of the Site. In recent years however both springs have been observed to be dry (see Table 2).



4.0 RESULTS AND DISCUSSION

Water quality analytical results from the monitoring program are used to assess the existence, extent, and intensity of impacts to the groundwater environments related to waste disposal site activities. To ensure appropriate actions are in place to respond to any potential degradation in groundwater quality beyond an acceptable level, Site specific trigger levels and contingency plans need to be adhered to for the Site to aid in the assessment of impacts from leachate contamination and to help prevent adverse impacts to the environments surrounding the waste disposal site.

This section presents the results of the 2012 and 2013 monitoring program completed at the Site as compared to available historical data and discusses observed trends in the groundwater quality.

4.1 GROUNDWATER QUALITY

As noted previously, no monitoring wells have been installed at the Site to monitor groundwater quality. Alternatively, a spring (Spring #1) is located north of the Site (Figure 2) has been sampled to determine the degree of impact (if any) caused by landfill leachate. During the 2012 and 2013 monitoring programs Spring #1 was observed to be dry. Spring #1 has been observed to be dry since 2008 and has subsequently been removed from the monitoring program (see Site ECA (Appendix A)) . Additionally a secondary spring (Spring #2) located northeast of the Site has been sampled in the past. Spring #2 was observed to be dry during the 2012 and 2013 monitoring programs and has been dry since 2009. Historically, the groundwater quality reported from sampled collected from Spring #1 and Spring #2 exhibited parameter concentrations below the Ontario Drinking Water Quality Standards (ODQWS) (Ministry of the Environment, June 2006) with the exception of iron, manganese, organic nitrogen, and field pH (low). A summary of the historical groundwater quality is attached as Table 2.

4.2 SURFACE WATER QUALITY

Four (4) surface water monitoring stations were monitored in 2012 and 2013. Surface water sampling station SW-1 is located downstream and approximately 300 m north of the Site, station SW-2 is located downstream of the Site on the northern CAZ boundary, station SW-3 is located downstream the Site at the western CAZ boundary, and station SW4-A is located upstream the Site and 240 m west of the Site. Refer to Figure 2 for locations of the surface water sample stations. Surface water quality data was compared against the MOE Provincial Water Quality Objectives (PWQO) (Ministry of the Environment, July 1994). Photographs of each surface water sampling location are attached as Appendix C.



4.2.1 BACKGROUND

Surface water sampling station SW-4A is located upgradient and approximately 240 m west of the Site; the water quality reported from samples collected at station SW4A is therefore assumed to be representative of background conditions of the Site.

Prior to 2009, background surface water was sampled from station SW-4, however during the 2009 sampling program it was noted that station SW-4 was dry and the creek had shifted. Sampling station SW-4A was therefore established in replacement of station SW-4. Surface water quality reported from SW-4A during the 2012 and 2013 indicated that every parameter was less than PWQO criteria with the exception of dissolved oxygen (DO) in 2013. Historically, the concentration of all parameters have been less than the PWQO criteria.

4.2.2 DOWN-GRADIENT WATER QUALITY

The surface water quality reported from the downstream sampling stations SW-1, SW-2, and SW-3 generally exhibits similar parameter concentrations to those reported from the background water quality. The majority of parameter concentrations reported from the downstream sampling stations in the past have been less than the PWQO criteria, with the exception of iron, total phosphorus, total phenolics, and field pH (high and low). The concentration of all parameters reported in 2012 and 2013 from stations SW-1, SW-2 and SW-3 were less than PWQO criteria, with the exception of DO which did not meet the PWQO criteria at all three downstream stations during the 2013 sampling event. Additionally the concentration of DO did not meet the PWQO criteria at the background surface water sampling location (SW-4A); therefore, the low DO noted at the sampling locations downstream are likely not related to the Site.

The concentrations of most parameters were marginally elevated at surface water station SW1 during the 2012/2013 monitoring program when compared to surface water SW-4A, however these elevated concentrations do not represent a significant impact.

Additional analytical data for two more surface water stations (labelled SW-3A and SW-5) were included with the data forwarded to Cambium from the Township. The location of these sampling locations is unknown but the water quality from both samples reported parameters concentrations less than PWQO criteria.

4.3 COMPLIANCE ASSESSMENT

Samples collected from every sampling location downstream the Deux Rivieres Site (SW-1, SW-2, and SW-3) exhibited water quality similar to that reported from the background surface water monitoring location (SW-4A) during the 2012 and 2013 monitoring program. Leachate emanating from the Site is therefore not believed to be impacting downstream surface waters.

The Deux Rivieres waste disposal site can be considered in compliance with the ECA during 2012 and 2013.



5.0 SITE OPERATIONS

5.1 SITE ACCESS AND SECURITY

The Site is located at 201 Brent Road on the southeast side of the road. A lockable gate at the entrance controls access to the Site.

5.2 DRAINAGE

On-site drainage is controlled by the surface topography. No surface water features were created in 2013. Straw bales were photographed on-site, likely in an attempt to curb erosion in areas of concern.

5.3 FINAL COVER INTEGRITY

Based on a review of photographs taken by Jp2g personel during the 2013 monitoring program the final cover applied to the waste mound appears to be significantly vegetated with only minor erosion noted. Site photographs can be viewed in Appendix C. The Township will need to ensure any erosion occurring at the Site is managed in the future. Additionally there were photographs taken of two seeps during the 2013 monitoring program, however the location of each seep is unknown. The presence of the these seeps requires confirmation during the 2014 monitoring program. If significant seeps are identified during the 2014 monitoring program remedial actions may be required.

5.4 COMPLIANCE

Aside from the need for the Township to complete the Registration on Title and Certificate of Requirement, as per Conditions 14 (a) and (b) of the ECA, the Deux Rivieres waste disposal site can be considered in compliance with the ECA during 2012 and 2013. The Site has been closed since September of 2007, since then final cover has been applied and the mound vegetated. The mound was observed to be well vegetated during the 2013 monitoring program.



6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions were drawn from the results of the 2012 and 2013 monitoring programs at the Deux Rivieres waste disposal site.

- There have been no monitoring wells installed at the Deux Rivieres waste disposal site. The groundwater flow direction is assumed to be towards the northwest due to the presence of springs north of the Site and the higher elevation of the local topography south and east of the Site.
- Spring #1 has been sampled in the past to characterize groundwater downgradient the Site. This sampling location has been dry since 2008, and has therefore been removed from the sampling program.
- Surface water quality reported from the Site during the 2012 and 2013 indicate that surface waters downstream the Site are not being impacted by the former landfill operations.
- The final cover of the waste mound appeared vegetated during the 2013 monitoring program; however some areas appeared to have experienced erosion in the past.

Based on the results of the 2012/2013 biennial monitoring program, Cambium recommends the following:

- The surface water sampling program summarized in Table 1 should be completed in 2014 and 2015
- Ensure that erosion control measures are in place to mitigate any future erosion



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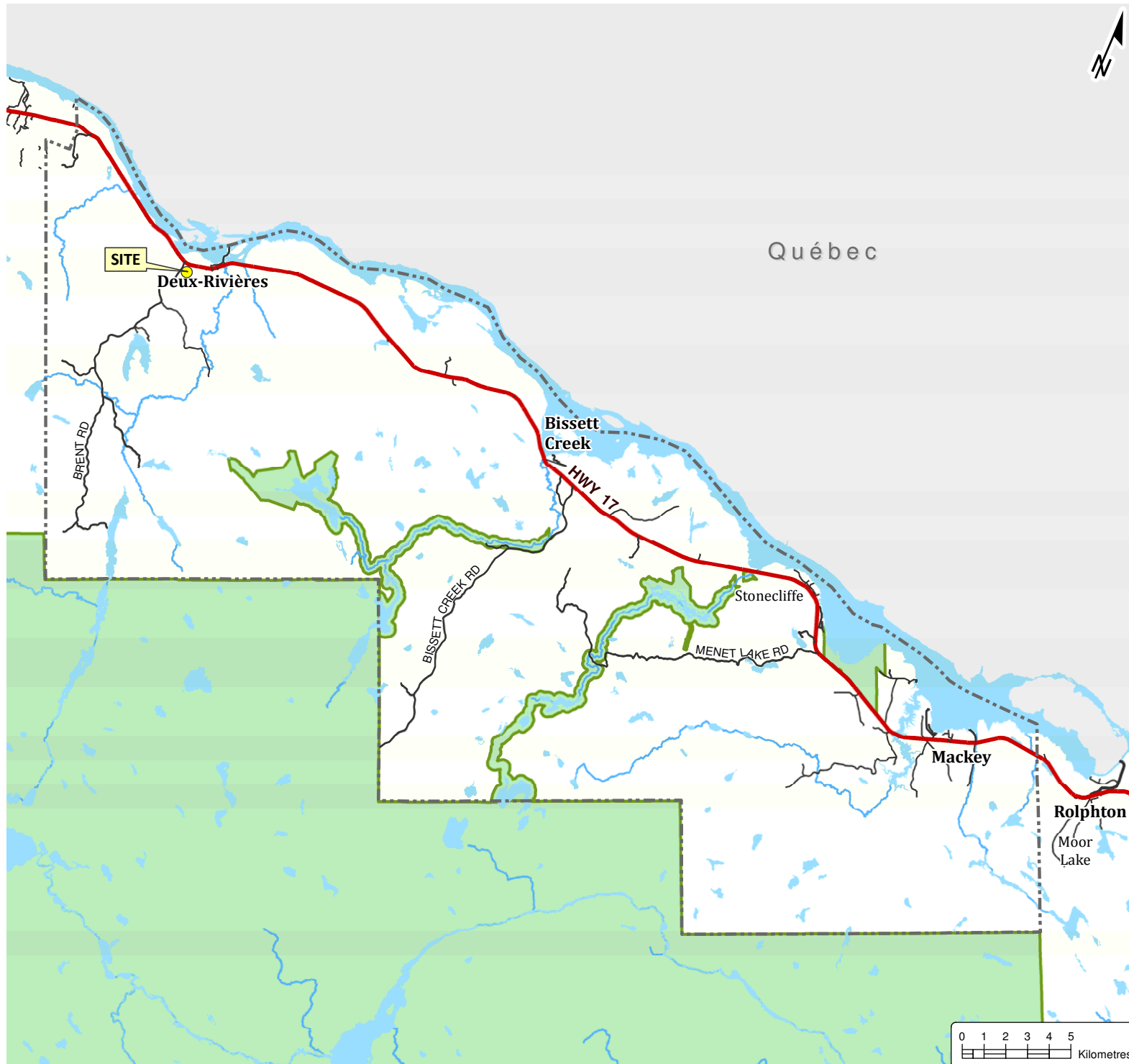
Appended Figures

DEUX-RIVIÈRES WASTE DISPOSAL SITE

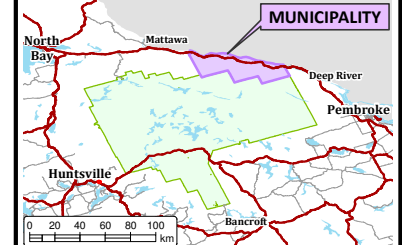
The Municipality of the United Townships of
Head, Clara & Maria

LEGEND

-  Municipal Boundary
-  Highway
-  Minor Road
-  Water Area
-  River/Creek
-  Provincial Park



Index Map



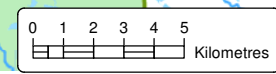
Notes:
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 - Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
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REGIONAL LOCATION PLAN
















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Figure: 1	



DEUX-RIVIÈRES WASTE DISPOSAL SITE

The Municipality of the United Townships of
Head, Clara & Maria

LEGEND

-  Surface Water Sampling Location
-  Spring
-  Contaminant Attenuation Zone
-  Limit of Waste
-  Property
-  Building
-  Highway
-  Minor Road
-  Other Roadway
-  Hydro Line
-  Natural Gas Pipeline
-  Watercourse, Permanent
-  Contour (5 m)
-  Lot
-  Wetland Area
-  Wooded Area

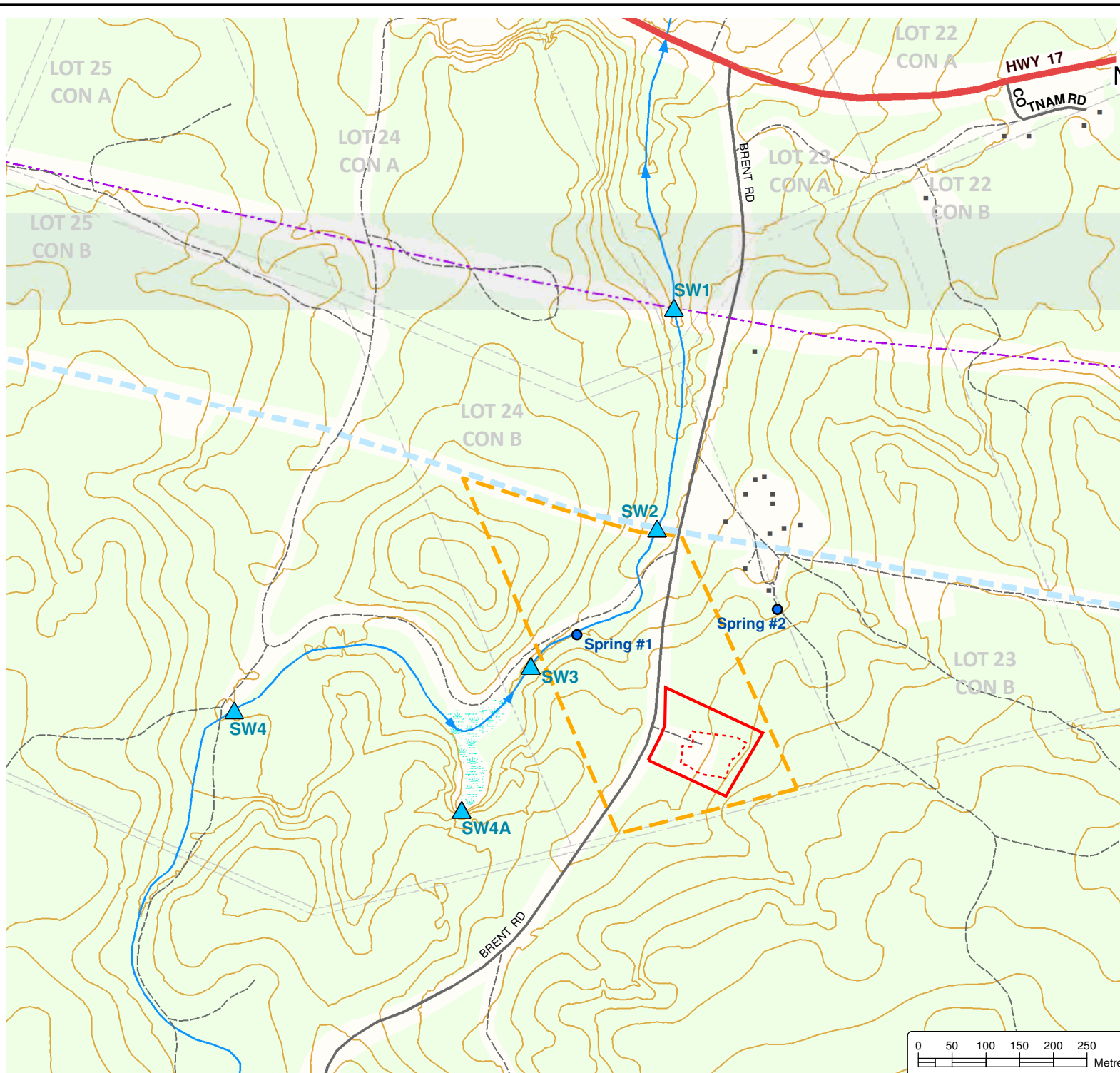
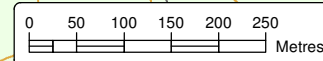
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LOCAL TOPOGRAPHY PLAN

Project No.:	2923-004	Date:	May 2014
Scale:	1:8,000	Rev.:	
Created by:	GMH	Projection:	NAD 1983 UTM Zone 17N
Checked by:	DFB	Figure:	2





Appended Tables



Table 1

Surface Water Monitoring Program

Deux Rivieres Waste Disposal Site

Location	Task	Frequency	Analytical Parameters
<p><u>Surface Water</u> SW1, SW2, SW3, SW4A 1 QA/QC Duplicate</p>	<ul style="list-style-type: none"> • Surface water sampling • Flow estimates • Field measurements (pH, temperature, conductivity, dissolved oxygen, oxygen reduction potential) 	<p>Once (Spring)</p>	<p>Alkalinity, Ammonia – Total, Boron, Calcium, Chloride, COD, Conductivity, Hardness, Cadmium, Copper, Iron, Magnesium, Manganese, Nitrate, Nitrite, pH, Phenols, Phosphorous - Total, Potassium, Sodium, Strontium, Sulphate, TDS, TKN, TSS, Zinc</p>



Table 2 - Summary of Groundwater Quality

Parameter	ODWQS ¹	Spring # 1		Spring # 2						
		12-Jun-02	09-May-08	12-Jun-02	28-May-03	18-May-05	25-May-06	14-May-07	09-May-08	22-Jul-09
Alkalinity (mg/L as CaCO ₃)	500	<5	<5	31	36	43	35	33	32	36
Conductivity (µs/cm)	NV	-	24	-	90	93	86	79	84	85
Solids - Total Dissolved (TDS)	500	15	16	53	59	61	56	51	55	55
Oxygen Demand - Chemical (COD)	NV	37	39	12	<5	<5	<5	<5	<5	<5
Chloride	250	<1	1	1	1	<1	<1	1	1	<1
Nitrogen - Ammonia (NH ₃)	NV	0.07	<0.02	0.09	<0.02	0.11	0.05	0.03	0.08	<0.02
Nitrogen - Nitrate (NO ₃)	10	<0.10	<0.10	0.290	0.420	<0.10	0.260	0.130	0.140	<0.10
Nitrogen - Nitrite (NO ₂)	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrogen - Total Kjeldahl (TKN)	NV	0.4	0.55	0.13	0.09	0.15	0.12	0.09	0.15	<0.10
Total Phosphorus	NV	-	-	-	0.04	0.06	<0.01	0.12	0.01	0.02
Sulphate	500	6	4	8	7	8	8	7	7	7
Boron	5	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.005	-	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NV	2	1	10	11	13	10	10	11	8
Copper	1	<0.001	0.001	<0.001	0.001	0.002	<0.001	0.003	<0.001	<0.001
Iron	0.3	0.22	0.59	0.06	0.1	0.26	0.09	0.55	0.04	0.13
Magnesium	NV	1	<1	2	2	2<1	2	2	2	1
Manganese	0.05	0.04	0.1	<0.01	0.022	0.06	0.01	0.12	0.01	0.02
Potassium	NV	<1	2	<1	<1	-	<1	<1	<1	<1
Sodium	200	<2	<2	4	2	2	<2	<2	<2	<2
Strontium	NV	0.012	0.01	0.049	0.046	0.049	0.04	0.057	0.04	0.046
Zinc	5	-	<0.01	-	0.018	0.04	0.01	0.02	<0.01	<0.01
Phenolics - Total	NV	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Organic Nitrogen	0.15	0.33	< 0.55	0.04	<0.09	0.04	0.07	0.06	0.07	<0.10
Water Temp. (°C) ⁶	NV	12.1	17	8.2	8.6	7.6	9.1	8.2	6.3	9.5
Conductivity (µs/cm) ⁶	NV	21.6	27	59.4	103	75	65	64	67	72
pH (pH units) ⁶	6.5-8.5	4.23	6.33	7.1	7.88	8.43	8.24	6.37	6.46	8.2
Dissolved Oxygen	NV	7.48	9.91	8.8	8.98	6.69	5.46	8.58	7.51	9.07

Notes:

1. Ontario Drinking Water Quality Standard (ODWQS).
2. Parameter name in *(parenthesis)* indicate alternate chemical names.
3. Bold and Shaded values exceed ODWQS
4. "-" indicates value not analyzed.
5. NV indicates no value.
6. Field Analysis
7. Units are mg/L unless otherwise specified



Table 3 - Summary of Surface Water Quality

Parameter	PWQO ¹	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1	SW-1
		25-May-06	14-May-07	09-May-08	22-Jul-09	28-Apr-10	02-Jun-11	20-Jun-12	03-Jun-13
Alkalinity (mg/L as CaCO ₃)	decr >25% of bkgd.	28	29	23	28	27	28	27	20
Conductivity (µs/cm)	NV	98	76	66	72	73	90	77	62
Solids - Total Dissolved (TDS)	NV	-	-	3	-	48	58	50	40
Solids - Total Suspended Solids (TSS)	NV	64	49	43	47	-	-	<2	<2
Oxygen Demand - Chemical (COD)	NV	<5	<5	<5	<5	-	-	<5	14
Chloride	NV	7	2	2	1	3	7	3	3
Un-ionized Ammonia	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrogen - Ammonia (NH ₃) & Ammonium (NH ₄)	NV	0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.06
Nitrogen - Nitrate (NO ₃)	NV	0.6	0.44	0.33	0.24	0.3	0.47	0.32	0.19
Nitrogen - Nitrite (NO ₂)	NV	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrogen - Total Kjeldahl (TKN)	NV	0.15	0.22	0.1	<0.10	<0.10	<0.10	<0.10	0.3
Phosphorous - Total	0.03	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate	NV	6	7	7	7	11	6	7	5
Boron	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NV	9	8	7	9	9	12	8	7
Copper	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	0.3	<0.03	0.05	0.08	0.07	<0.03	<0.03	<0.03	0.1
Magnesium	NV	2	2	2	2	2	2	2	2
Manganese	NV	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Potassium	NV	<1	1	1	1	1	<1	<1	<1
Sodium	NV	3	2	<2	3	3	4	<2	2
Strontium	NV	0.046	0.04	0.035	0.045	0.045	0.05	0.044	0.037
Zinc	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenolics - Total	0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001
Organic Nitrogen	NV	0.13	0.19	< 0.10	<0.10	<0.10	<0.10	<0.10	-
Water Temp. (°C) ⁵	NV	8.3	8.1	7.5	9.3	10.1	8.2	10.2	10.5
Conductivity (µs/cm) ⁵	NV	55	61	58	65	71	72	66	60
pH (pH units) ⁵	6.5-8.5	8.57	6.81	6.92	8.5	7.7	8.4	7.5	7.3
Disolved Oxygen (DO) ⁵	5	6.97	9.35	11.08	10.13	7.06	10.65	8.54	1.91

Notes:

1. Provincial Water Quality Objective (PWQO).
2. Bold and Shaded values exceed PWQO criteria
3. "-" indicates value not analyzed.
4. NV indicates no value.
5. Field Analysis
6. Units are mg/L unless otherwise specified



Table 3 - Summary of Surface Water Quality

Parameter	PWQO ¹	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2	SW-2
		25-May-06	14-May-07	9-May-08	22-Jul-09	28-Apr-10	02-Jun-11	20-Jun-12	3-Jun-13
Alkalinity (mg/L as CaCO ₃)	decr >25% of bkgd.	25	21	15	24	21	16	26	16
Conductivity (µs/cm)	NV	74	56	51	62	57	43	65	46
Solids - Total Dissolved (TDS)	NV	48	36	33	40	37	28	42	30
Solids - Total Suspended Solids (TSS)	NV	-	-	<2	-	-	-	<2	3
Oxygen Demand - Chemical (COD)	NV	33	<5	9	<5	-	-	<5	29
Chloride	NV	3	1	1	2	<1	<1	<1	<1
Un-ionized Ammonia	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrogen - Ammonia (NH ₃) & Ammonium (NH ₄)	NV	0.07	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrogen - Nitrate (NO ₃)	NV	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrogen - Nitrite (NO ₂)	NV	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrogen - Total Kjeldahl (TKN)	NV	2.33	0.35	0.18	<0.10	<0.10	0.15	<0.10	0.4
Phosphorous - Total	0.03	0.11	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate	NV	7	6	6	7	6	6	6	5
Boron	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NV	7	6	5	8	7	5	6	6
Copper	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	0.3	1.06	0.08	0.15	0.07	<0.03	0.07	0.05	0.17
Magnesium	NV	1	2	1	2	2	1	2	1
Manganese	NV	0.26	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Potassium	NV	1	1	1	1	1	<1	<1	<1
Sodium	NV	3	<2	<2	<2	2	<2	<2	<2
Strontium	NV	0.04	0.032	0.03	0.041	0.036	0.026	0.04	0.032
Zinc	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenolics - Total	0.001	<0.001	<0.001	0.003	<0.001	-	-	<0.001	<0.001
Organic Nitrogen	NV	2.26	0.3	< 0.18	<0.10	-	<0.10	<0.10	-
Water Temp. (°C) ⁵	NV	18.5	11	9.9	9.9	13.3	15.6	12.4	12.9
Conductivity (µs/cm) ⁵	NV	55	45	42	54	56	34	52	45
pH (pH units) ⁵	6.5-8.5	7.85	6.8	6.87	8.3	8	7.9	7.3	7.2
Disolved Oxygen (DO) ⁵	5	6.81	9.09	11.19	9.86	7.41	9.98	8.75	2.33

Notes:

1. Provincial Water Quality Objective (PWQO).
2. Bold and Shaded values exceed PWQO criteria
3. "-" indicates value not analyzed.
4. NV indicates no value.
5. Field Analysis
6. Units are mg/L unless otherwise specified



Table 3 - Summary of Surface Water Quality

Parameter	PWQO ¹	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3	SW-3
		25-May-06	14-May-07	9-May-08	22-Jul-09	28-Apr-10	02-Jun-11	20-Jun-12	3-Jun-13
Alkalinity (mg/L as CaCO ₃)	decr >25% of bkgd.	6	19	17	24	23	17	24	22
Conductivity (µs/cm)	NV	33	51	47	62	57	42	62	57
Solids - Total Dissolved (TDS)	NV	22	33	31	40	37	27	40	37
Solids - Total Suspended Solids (TSS)	NV	-	-	<2	-	-	-	<2	<2
Oxygen Demand - Chemical (COD)	NV	16	8	5	9	-	-	<5	23
Chloride	NV	<1	1	1	<1	<1	<1	<1	<1
Un-ionized Ammonia	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrogen - Ammonia (NH ₃) & Ammonium (NH ₄)	NV	0.09	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Nitrogen - Nitrate (NO ₃)	NV	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	<0.10
Nitrogen - Nitrite (NO ₂)	NV	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrogen - Total Kjeldahl (TKN)	NV	0.22	0.23	0.3	<0.10	0.15	<0.10	0.1	0.25
Phosphorous - Total	0.03	<0.01	0.09	<0.01	0.02	<0.01	0.01	<0.01	<0.01
Sulphate	NV	7	6	6	7	6	6	7	5
Boron	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NV	2	5	5	7	7	5	6	6
Copper	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	0.3	0.39	0.22	0.05	0.07	<0.03	0.07	0.05	0.13
Magnesium	NV	<1	1	1	2	2	1	2	1
Manganese	NV	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Potassium	NV	<1	<1	<1	1	1	<1	<1	<1
Sodium	NV	<2	<2	<2	<2	2	2	<2	<2
Strontium	NV	0.019	0.034	0.027	0.041	0.037	0.026	0.041	0.032
Zinc	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenolics - Total	0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001
Organic Nitrogen	NV	0.13	< 0.23	< 0.30	<0.10	<0.15	<0.10	0.08	-
Water Temp. (°C) ⁵	NV	13.2	9.7	9.9	9.4	12.1	12	12	13.3
Conductivity (µs/cm) ⁵	NV	24	40	39	54	56	34	52	45
pH (pH units) ⁵	6.5-8.5	8.06	6.2	6.79	8.2	7.7	7.6	7.3	7.1
Disolved Oxygen (DO) ⁵	5	7.21	9.44	12.02	8.87	6.97	9.34	8.39	2.234

Notes:

1. Provincial Water Quality Objective (PWQO).
2. Bold and Shaded values exceed PWQO criteria
3. "-" indicates value not analyzed.
4. NV indicates no value.
5. Field Analysis
6. Units are mg/L unless otherwise specified



Table 3 - Summary of Surface Water Quality

Parameter	PWQO ¹	SW-4A	SW-4A	SW-4A	SW-4A	SW-4A	SW-4A
		22-Jul-09	28-Apr-10	02-Jun-11	02-Jun-11	20-Jun-12	03-Jun-13
Alkalinity (mg/L as CaCO ₃)	decr >25% of bkgd.	26	24	21	20	25	25
Conductivity (µs/cm)	NV	65	64	55	54	67	63
Solids - Total Dissolved (TDS)	NV	42	42	36	35	44	41
Solids - Total Suspended Solids (TSS)	NV	-	-	-	-	3	<2
Oxygen Demand - Chemical (COD)	NV	<5	-	-	-	<5	5
Chloride	NV	<1	<1	<1	<1	<1	<1
Un-ionized Ammonia	0.02	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrogen - Ammonia (NH ₃) & Ammonium (NH ₄)	NV	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrogen - Nitrate (NO ₃)	NV	0.22	0.13	<0.10	<0.10	0.12	0.14
Nitrogen - Nitrite (NO ₂)	NV	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrogen - Total Kjeldahl (TKN)	NV	<0.10	<0.10	1.4	<0.10	<0.10	0.25
Phosphorous - Total	0.03	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Sulphate	NV	11	7	7	6	7	6
Boron	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	NV	8	8	6	6	6	7
Copper	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	0.3	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Magnesium	NV	2	2	1	1	2	2
Manganese	NV	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Potassium	NV	1	1	<1	<1	<1	1
Sodium	NV	<2	2	2	2	<2	<2
Strontium	NV	<0.043	0.042	0.028	0.03	0.041	0.043
Zinc	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenolics - Total	0.001	<0.001	-	-	-	<0.001	<0.001
Organic Nitrogen	NV	-	<0.10	<0.10	<0.10	<0.10	-
Water Temp. (°C) ⁵	NV	8	8.2	10	-	9.3	7.7
Conductivity (µs/cm) ⁵	NV	58	64	43	-	55	62
pH (pH units) ⁵	6.5-8.5	8.2	7.7	7.8	-	7.1	7.3
Disolved Oxygen (DO) ⁵	5	9.42	6.65	11.45	-	7.46	2.01

Notes:

1. Provincial Water Quality Objective (PWQO).
2. Bold and Shaded values exceed PWQO criteria
3. "-" indicates value not analyzed.
4. NV indicates no value.
5. Field Analysis
6. Units are mg/L unless otherwise specified



Appendix A

Environmental Compliance Approval Number. A412407


AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER A412407

Issue Date: May 2, 2012

The Corporation of the Township of Head, Clara and Maria
 15 Township Hall Rd
 Stonecliffe, Ontario
 K0J 2L0

Site Location: Deux Rivières Waste Disposal Site
 201 Brent Rd
 Head, Clara and Maria Township, County of Renfrew

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

a closed 0.442 hectare Waste Disposal Site (Landfill) within a total site area of 1.4 hectares and a Contaminant Attenuation Zone of 14.89 hectares.

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

"Approval" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A".

"Contaminating Life Span" means contaminating life span as defined in Ontario Regulation 232/98;

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

"District Manager" means the District Manager of the local district office of the *Ministry* in which the *Site* is geographically located;

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

"HHW" means household hazardous waste;

"Ministry" means the Ontario Ministry of the Environment;

"NMA" means *Nutrient Management Act*, 2002, S.O. 2002, c. 4, as amended from time to time;

"Operator" means any person, other than the Owner's employees, authorized by the *Owner* as having the charge, management or control of any aspect of the *Site* and includes its successors or assigns;

"Owner" means any person that is responsible for the establishment or operation of the *Site* being approved by this *Approval*, and includes The Corporation of the Corporation of the Township of Head, Clara and Maria its successors and assigns;

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

"PA" means the *Pesticides Act*, R.S.O. 1990, c. P-11, as amended from time to time;

"Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the *OWRA* or Section 5 of the *EPA* or Section 17 of *PA* or Section 4 of *NMA* or Section 8 of *SDWA*.

"Regional Director" means the Regional Director of the local Regional Office of the *Ministry* in which the *Site* is located.

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

"SDWA" means *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32, as amended from time to time;

"Site" means the entire waste disposal site, including the buffer lands, and contaminant attenuation zone at Deux Rivières Waste Disposal Site, 201 Brent Rd, Head, Clara and Maria Township, County of Renfrew described as Part 4 of 49R-16962 and Parts 1, 2, 3 and 5 of 49R-16962; and

"Trained personnel" means personnel knowledgeable in the following through instruction and/or practice:

- a. relevant waste management legislation, regulations and guidelines;
- b. major environmental concerns pertaining to the waste to be handled;
- c. occupational health and safety concerns pertaining to the work at the *Site*;
- d. management procedures including the use and operation of equipment for the work at the *Site*;
- e. emergency response procedures;
- f. specific written procedures for the control of nuisance conditions; and
- g. the requirements of this *Approval*.

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

TERMS AND CONDITIONS

1. GENERAL

Compliance

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

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

In Accordance

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

Interpretation

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

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

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

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

Other Legal Obligations

(8) The issuance of, and compliance with, this *Approval* does not:

- (a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
- (b) limit in any way the authority of the *Ministry* to require certain steps be taken or to require the *Owner* and *Operator* to furnish any further information related to compliance with this *Approval*.

Adverse Effect

(9) The *Owner* and *Operator* shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the *Site*, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

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

Change of Ownership

(11) The *Owner* shall notify the *Director*, in writing, and forward a copy of the notification to the *District Manager*, within 30 days of the occurrence of any changes in the following information:

- (a) the ownership of the *Site*;
- (b) the *Operator* of the *Site*;
- (c) the address of the *Owner* or *Operator*; and
- (d) the partners, where the *Owner* or *Operator* is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act*, R. S. O. 1990, c. B.17, shall be included in the notification.

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

(13) In the event of any change in *Ownership* of the *Site*, other than change to a successor *Owner*, the *Owner* shall notify the successor of and provide the successor with a copy of this *Approval*, and the *Owner* shall provide a copy of the notification to the *District Manager* and the *Director*.

Certificate of Requirement/Registration on Title

(14) The *Owner* shall:

- (a) Within sixty (60) days of the date of the issuance of this *Approval*, submit to the *Director* for review, two copies of a completed Certificate of Requirement with a registerable description of the *Site*; and
- (b) Within 10 calendar days of receiving the Certificate of Requirement authorized by the *Director*, register the Certificate of Requirement in the appropriate Land Registry Office on title to the *Site* and submit to the *Director* and the *District Manager* the duplicate registered copy immediately following registration.

(15) Pursuant to Section 197 of the Environmental Protection Act, neither the *Owner* nor any person having an interest in the *Site* shall deal with the *Site* in any way without first giving a copy of this *Approval* to each

person acquiring an interest in the *Site* as a result of the dealing.

Inspections by the Ministry

(16) No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA*, the *EPA*, the *PA*, the *SDWA* or the *NMA*, of any place to which this *Approval* relates, and without limiting the foregoing:

- (a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this *Approval* are kept;
- (b) to have access to, inspect, and copy any records required to be kept by the conditions of this *Approval*;
- (c) to inspect the *Site*, related equipment and appurtenances;
- (d) to inspect the practices, procedures, or operations required by the conditions of this *Approval*; and
- (e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Approval* or the *EPA*, the *OWRA*, the *PA*, the *SDWA* or the *NMA*.

Information and Record Retention

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

- (b) The *Owner* shall retain all documentation listed in Schedule "A" for as long as this *ECA* is valid.
- (c) All inspection reports are to be kept at the *Site* until they are included in the Biennial Report.
- (d) The *Owner* shall retain employee training records as long as the employee is working at the *Site*.
- (e) The *Owner* shall make all of the above documents available for inspection upon request of *Ministry* staff.

(18) The receipt of any information by the *Ministry* or the failure of the *Ministry* to prosecute any person or to require any person to take any action, under this *Approval* or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:

- (a) an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any term or condition of this *Approval* or any statute, regulation or other legal requirement; or
- (b) acceptance by the *Ministry* of the information's completeness or accuracy.

(19) The *Owner* shall ensure that a copy of this *Approval*, in its entirety and including all its Notices of Amendment, and documentation listed in Schedule "A", are retained at the *Owner's* office at all times.

2. SITE OPERATION and MAINTENANCE

Operation

(1) The *Site* shall be maintained at all time including management and disposal of all waste in accordance with the *EPA*, *Regulation 347*, and the conditions of this *Approval*. At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

Signs

(2) A sign shall be installed and maintained at the main entrance/exit to the *Site* on which is legibly displayed the following information:

- (a) the name of the *Site* and *Owner*;
- (b) the number of the *Approval*;
- (c) the name of the *Operator*;
- (d) the telephone number to which complaints may be directed;
- (e) a warning against unauthorized access; and
- (f) a twenty-four (24) hour emergency telephone number (if different from above).

Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic

(3) The *Site* shall be operated and maintained such that the vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.

3. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the *Site* shall be developed and implemented by the *Operator*. Only *Trained Personnel* shall operate any aspect of the *Site* or carry out any activity required under this *Approval*.

4. COMPLAINTS RESPONSE PROCEDURE

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

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

5. EMERGENCY RESPONSE

(1) Any spills, fires or other emergency situations shall be forthwith reported directly to the *Ministry's* Spills Action Centre (1-800-268-6060) and shall be cleaned up immediately.

(2) In addition, the *Owner* shall submit, to the *District Manager* a written report within three (3) business days of the emergency situation, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the *Site*.

(3) All wastes resulting from an emergency situation shall be managed and disposed of in accordance with *O.Reg. 347*.

(4) All equipment and materials required to handle the emergency situations shall be:

- (a) kept on hand at all times that waste landfilling and/or handling is undertaken at the *Site*; and
- (b) adequately maintained and kept in good repair.

(5) The *Owner* shall ensure that the emergency response personnel are familiar with the use of such equipment

and its location(s).

6. RECORD KEEPING AND REPORTING

Inspections and Log Book

(1) A record of the inspections shall be kept in a log book that includes:

- (a) the name and signature of person that conducted the inspection;
- (b) the date and time of the inspection;
- (c) the results of the inspection and list of any deficiencies discovered;
- (d) recommendations for remedial action; and
- (e) the date, time and description of actions taken.

(2) Any information requested, by the *Director* or a *Provincial Officer*, concerning the *Site* and its operation under this *Approval*, including but not limited to any records required to be kept by this *Approval* shall be provided to the *Ministry*, upon request.

(3) Once closure of the *Site* is complete, an inspection of the *Site* shall be conducted on a quarterly basis to assess the following:

- (a) the presence of leachate seeps;
- (b) support of vegetation by the final cover;
- (c) occurrences of erosion on the slopes of the cover material;
- (d) waste material is protruding from the cap; and
- (e) any other notable deficiencies and issues.

Biennial Report

(4) By May 31, 2006 and by May 31 every two (2) years thereafter, the Owner shall submit to the District Manager, a report detailing the analyses of the previous two (2) calendar years of monitoring results which shall include, as a minimum, the following:

- (a) a summary of findings, conclusions and recommendations;
- (b) an updated Site Plan should there be changes to the monitoring network;
- (c) an assessment of environmental monitoring data;
- (d) an assessment of the need for implementing the contingency plan;
- (e) the results of remedied issues in accordance with inspections conducted in the *Site*;
- (f) an assessment of the *Site's* compliance with the *Ministry's* Guideline B-7;
- (g) an assessment of the surface water quality with respect to the *Ministry's* Provincial Water Quality Objectives; and
- (h) recommendations with respect to any changes to environmental monitoring program.

7. LANDFILL CLOSURE, MAINTENANCE AND MONITORING

(1) This *Site* is now closed and shall no longer receive or dispose of any wastes.

(2) The *Site* shall be capped and closed in accordance with the document entitled "Deux Rivieres Waste Disposal Site, Site Closure Plan, Corporation of the United Townships of Head, Clara and Maria", dated May 2008 and prepared by Jp2g Consultants Inc., amended as Item 12 of this *Approval's* Schedule "A".

Capacity

(3) The volume of waste deposited at the *Site*, consisting of waste, daily cover, intermediate cover and the final cover is 12,175 cubic metres.

8. LANDFILL MONITORING

Compliance

(1) The *Site* shall be operated in such a way as to ensure compliance with the following:

(a) Reasonable Use Guideline B-7 for the protection of the groundwater at the *Site*; and

(b) Provincial Water Quality Objectives included in the July 1994 publication titled "Water Management Policies, Guidelines, Provincial Water Quality Objectives", as amended from time to time or limits set by the *Regional Director*, for the protection of the surface water at and off the *Site*.

Surface Water

(2) The *Owner* shall monitor surface water in accordance with the monitoring programs outlined in documents listed in the attached Schedule "A".

Contingency Plans

(3) Contingency plan in the event of a confirmed exceedence of a site-specific trigger level relating to leachate mounding or surface water impacts due to leachate shall be in accordance with the documents of Schedule "A".

(4) In the event of a confirmed exceedence of a Compliance Limit as per this Approval relating to leachate mounding or surface water impacts due to leachate, the *Owner* shall immediately notify the *District Manager*, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the *Owner* in accordance with this *Approval*.

(5) If monitoring results, investigative activities indicate the need to implement contingency measures, the *Owner* shall ensure that the following steps are taken:

(a) The *Owner* shall notify the *District Manager*, in writing of the need to implement contingency measures, no later than 30 days after confirmation of the exceedences;

(b) Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the *Owner* to the *District Manager* for approval; and

(c) The contingency measures shall be implemented by the *Owner* upon approval by the *District Manager*.

Changes to the Monitoring Plan

(6) The *Owner* may request to make changes to the monitoring program(s) to the *District Manager* in accordance with the recommendations of the biennial report. The *Owner* shall make clear reference to the proposed changes in separate letter that shall accompany the annual report.

(7) Within fourteen (14) days of receiving the written correspondence from the *District Manager* confirming that the *District Manager* is in agreement with the proposed changes to the environmental monitoring program, the *Owner* shall forward a letter identifying the proposed changes and a copy of the correspondences from the *District Manager* and all other correspondences and responses related to the changes to the monitoring program, to the *Director* requesting the *Approval* be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

(8) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the biennial report, the *Owner* shall follow current ministry procedures for seeking approval

for amending the *Approval*.

SCHEDULE "A"

1. General location map "Lot 24, Con. B, Clara Twp." dated November 23, 1976.
2. Detail site plans dated November 23, 1976.
3. Detail site plan "Waste Disposal Site, Twp. of Clara, Lot 24, Con. B", dated November 25, 1975.
4. Operating programme submitted by S. Senack (Mrs.), Clerk-Treasurer, and dated November 24, 1975.
5. The Application for a Provisional Certificate of Approval for a Waste Disposal Site dated May 15, 2001 and signed by Mr. Brian Whitehead of Jp2g Consultants Inc. on behalf of the Township of Head, Clara & Maria.
6. The document entitled "Application and Supporting Documentation for a Category 56 Amendment to the C. of A. for the Deux Rivieres Waste Disposal Site, Township of Head, Clara and Maria, C. of A. No. A412407" dated May 2001 by Jp2g Consultants Inc.
7. The letter dated September 10, 2001 to Mr. John A. Kaasalainen, P.Eng. of the Ministry of the Environment, Environmental Assessment and Approvals Branch from Mr. Brian Whitehead, Planning Consultant of Jp2g Consultants Inc. providing additional information with respect to the proposed amendment.
8. Deux Rivieres Waste Disposal Site, Site Development and Operations Plan prepared by Jp2g Consultants Inc. dated December 2001. This document also includes in the appendix, Hydrogeology of the Deux Rivieres Landfill Site, Township of Clara dated October 2001, prepared by Gartner Lee Limited.
9. Application and Supporting Documentation for a Category 56 Amendment to the C. of A. for the Deux Rivieres Waste Disposal Site, Township of Head, Clara and Maria prepared by Jp2g Consultants Inc. dated May 2001.
10. Correspondence from Jp2g Consultants MOE dated September 16, 2002 responding to comments and questions from MOE.
11. Correspondence from Gartner Lee Limited to Jp2g Consultants dated September 16, 2002 responding to comments and questions from MOE.
12. Document entitled "Deux Rivieres Waste Disposal Site, Site Closure Plan, Corporation of the United Townships of Head, Clara and Maria", dated May 2008 and prepared by Jp2g Consultants Inc.
13. Plan of Survey (49R-16962), Location CL- 14460 of Part of Lots 23 and 24, Concession B, Geographic Township of Clara, Township of Head, Clara & Maria, County of Renfrew.
14. Application for a Certificate of Approval for a Waste Disposal Site dated September 23, 2011 and signed by Melinda Reith, Municipal Clerk.

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

GENERAL

1. The reason for Conditions 1(1), (2), (4), (5), (6), (7), (8), (9), (10), (17), (18) and (19) is to clarify the legal rights and responsibilities of the *Owner* and *Operator* under this *Approval*.
2. The reasons for Condition 1(3) are to ensure that the *Site* is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the *Owner*, and not in a manner which the *Director* has not been asked to consider.
3. The reasons for Condition 1(11) are to ensure that the *Site* is operated under the corporate name which appears on the application form submitted for this *approval* and to ensure that the *Director* is informed of any changes.

CONTENT COPY OF ORIGINAL

4. The reasons for Condition 1(12) are to restrict potential transfer or encumbrance of the *Site* without the approval of the *Director* and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this *Approval*.

5. The reason for Condition 1(13) is to ensure that the successor is aware of its legal responsibilities.

6. Conditions 1 (14) and (15) are included, pursuant to subsection 197(1) of the *EPA*, to provide that any persons having an interest in the *Site* are aware that the land has been approved and used for the purposes of waste disposal.

7. The reason for Condition 1(16) is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this *Approval*. This Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the *Act*, the *OWRA*, the *PA*, the *NMA* and the *SDWA*.

SITE OPERATION

8. The reasons for Conditions 2(1) and 2(3) are to ensure that the *Site* is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.

9. The reason for Condition 2 (2) is to ensure that users of the *Site* are fully aware of important information and restrictions related to *Site* operations and access under this *Approval*.

EMPLOYEE TRAINING

10. The reason for Condition 3(1) is to ensure that the *Site* is supervised and operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.

COMPLAINTS RESPONSE PROCEDURE

11. The reason for Condition 4(1) is to ensure that any complaints regarding landfill operations at this *Site* are responded to in a timely and efficient manner.

EMERGENCY RESPONSE

12. Conditions 5(1) and 5(2) are included to ensure that emergency situations are reported to the Ministry to ensure public health and safety and environmental protection.

13. Conditions 5(3), 5(4) and 5(5) are included to ensure that emergency situations are handled in a manner to minimize the likelihood of an adverse effect and to ensure public health and safety and environmental protection.

RECORD KEEPING AND REPORTING

14. The reason for Conditions 6 (1) , 6 (2) and 6(3) is to ensure that Site inspections are carried out to visually assess the performance of the Site's final cover.

15. The reasons for Condition 6(4) are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.

LANDFILL CLOSURE, MAINTENANCE AND MONITORING

16. The reasons for Conditions 7(1) and 7(2) are to ensure the Site is closed and is done so in the manner which the Director has been asked to consider.

17. Condition 7(3) is included to document the amount of waste that was disposed in the landfill *Owner's* application and supporting documentation.

LANDFILL MONITORING

18. Condition 8(1) is included to provide the surface water limits to prevent water pollution at the *Site*.
19. Condition 8(2) is included to require the *Owner* to demonstrate that the *Site* is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
20. Conditions 8(3), 8(4) and 8(5) inclusive are added to ensure the *Owner* has a plan with an organized set of procedures for identifying and responding to potential issues relating to surface water contamination at the *Site's* compliance point.
22. Conditions 8(6), 8(7) and 8(8) are included to streamline the approval of the changes to the monitoring plan.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A412407 and associated notices issued on March 27, 1980.

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

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

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

The Notice should also include:

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

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

This Notice must be served upon:

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

AND

The Director appointed for the purposes of Part II.1 of
the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at:
Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

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

CONTENT COPY OF ORIGINAL

DATED AT TORONTO this 2nd day of May, 2012

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

RM/
c: District Manager, MOE Ottawa
Kevin Mooder, Jp2g Consultants Inc.



Appendix B

Laboratory Certificates of Analysis



Client: Jp2g Consultants Inc.
1150 Morrison Dr., Suite 410
Ottawa, ON
K2H 8S9
Attention: Mr. Andrew Buzza
PO#:
Invoice to: Jp2g Consultants Inc. (Ottawa)

Report Number: 1310603
Date Submitted: 2013-06-04
Date Reported: 2013-06-11
Project: Deux Rivieres 2006024 N
COC #: 161083

Dear Andrew Buzza:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

APPROVAL: _____

Lorna Wilson
Laboratory Supervisor, Inorganics

Exova (Ottawa) is certified and accredited for specific parameters by:
CALA, Canadian Association for Laboratory Accreditation (to ISO 17025), OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils), Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is accredited for specific parameters by:
SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only.

Client: Jp2g Consultants Inc.
 1150 Morrison Dr., Suite 410
 Ottawa, ON
 K2H 8S9
 Attention: Mr. Andrew Buzza
 PO#:
 Invoice to: Jp2g Consultants Inc. (Ottawa)

Report Number: 1310603
 Date Submitted: 2013-06-04
 Date Reported: 2013-06-11
 Project: Deux Rivières 2006024 N
 COC #: 161083

Group	Analyte	MRL	Units	Guideline	Lab I.D.	1030618	1030619
					Sample Matrix	Surfacewater	Surfacewater
					Sample Type	2013-06-03	2013-06-03
					Sampling Date	SW#1	SW#2
					Sample I.D.		
Calculations	TDS (COND - CALC)	1	mg/L			40	30
General Chemistry	Alkalinity as CaCO3	5	mg/L			20	16
	Cl	1	mg/L			3	<1
	Conductivity	5	uS/cm			62	46
	N-NO2	0.10	mg/L			<0.10	<0.10
	N-NO3	0.10	mg/L			0.19	<0.10
	SO4	3	mg/L			5	5
	Total Suspended Solids	2	mg/L			<2	3
Metals	B	0.01	mg/L	IPWQO-0.200		<0.01	<0.01
	Ca	1	mg/L			7	6
	Cd	0.0001	mg/L	PWQO-0.0002		<0.0001	<0.0001
	Cu	0.001	mg/L	PWQO-0.005		<0.001	<0.001
	Fe	0.03	mg/L	PWQO-0.30		0.10	0.17
	K	1	mg/L			<1	<1
	Mg	1	mg/L			2	1
	Mn	0.01	mg/L			<0.01	<0.01
	Na	2	mg/L			2	<2
	Sr	0.001	mg/L			0.037	0.032
	Zn	0.01	mg/L	PWQO-0.030		<0.01	<0.01
Nutrients	COD	5	mg/L			14	29
	N-NH3	0.02	mg/L			0.06	<0.02
	Phenols	0.001	mg/L	PWQO-0.001		<0.001	<0.001
	Total Kjeldahl Nitrogen	0.10	mg/L			0.30	0.40
	Total P	0.01	mg/L	IPWQO-0.02		<0.01	<0.01

Guideline = PWQO - Ontario **Y** *** = Guideline Exceedence**

** = Analysis completed at Mississauga, Ontario.

Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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Group	Analyte	MRL	Units	Guideline	Lab I.D.	1030620	1030621	1030622	1030623
					Sample Matrix	Surfacewater	Surfacewater	Surfacewater	Surfacewater
					Sample Type	2013-06-03	2013-06-03	2013-06-03	2013-06-03
					Sampling Date	SW#3	SW#3A	SW#5	SW#4A
					Sample I.D.				
Calculations	TDS (COND - CALC)	1	mg/L			37	34	<1	41
General Chemistry	Alkalinity as CaCO3	5	mg/L			22	20	<5	25
	Cl	1	mg/L			<1	<1	<1	<1
	Conductivity	5	uS/cm			57	53	<5	63
	N-NO2	0.10	mg/L			<0.10	<0.10	<0.10	<0.10
	N-NO3	0.10	mg/L			<0.10	<0.10	<0.10	0.14
	SO4	3	mg/L			5	5	<3	6
	Total Suspended Solids	2	mg/L			<2	<2	<2	<2
Metals	B	0.01	mg/L	IPWQO-0.200		<0.01	<0.01	<0.01	<0.01
	Ca	1	mg/L			6	6	<1	7
	Cd	0.0001	mg/L	PWQO-0.0002		<0.0001	<0.0001	<0.0001	<0.0001
	Cu	0.001	mg/L	PWQO-0.005		<0.001	<0.001	<0.001	<0.001
	Fe	0.03	mg/L	PWQO-0.30		0.13	0.13	<0.03	<0.03
	K	1	mg/L			<1	<1	<1	1
	Mg	1	mg/L			1	1	<1	2
	Mn	0.01	mg/L			<0.01	<0.01	<0.01	<0.01
	Na	2	mg/L			<2	<2	<2	<2
	Sr	0.001	mg/L			0.032	0.032	<0.001	0.043
	Zn	0.01	mg/L	PWQO-0.030		<0.01	<0.01	<0.01	<0.01
Nutrients	COD	5	mg/L			23	30	<5	5
	N-NH3	0.02	mg/L			<0.02	<0.02	0.05	<0.02
	Phenols	0.001	mg/L	PWQO-0.001		<0.001	<0.001	<0.001	<0.001
	Total Kjeldahl Nitrogen	0.10	mg/L			0.25	0.25	<0.10	0.25
	Total P	0.01	mg/L	IPWQO-0.02		<0.01	<0.01	<0.01	<0.01

Guideline = PWQO - Ontario Y * = Guideline Exceedence

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 COC #: 161083

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 0 Analysis Date 2013-06-10 Method C SM2540			
TDS (COND - CALC)			
Run No 251879 Analysis Date 2013-06-06 Method C SM5220C			
COD	<5 mg/L	104	80-120
Run No 251889 Analysis Date 2013-06-05 Method C SM4500-NO3-F			
N-NO2	<0.10 mg/L	103	80-120
N-NO3	<0.10 mg/L	100	80-120
Run No 251890 Analysis Date 2013-06-05 Method C SM4500-NO3-F			
N-NO2		113	80-120
N-NO3		108	80-120
Run No 251938 Analysis Date 2013-06-05 Method SM 4110C			
Cl	<1 mg/L	100	90-110
SO4	<3 mg/L	110	90-110
Run No 251999 Analysis Date 2013-06-06 Method M SM3120B-3500C			
Ca	<1 mg/L	98	80-120

Guideline = PWQO - Ontario Y * = **Guideline Exceedence**

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 COC #: 161083

QC Summary

Analyte	Blank	QC % Rec	QC Limits
K	<1 mg/L	103	80-120
Mg	<1 mg/L	98	80-120
Na	<2 mg/L	81	80-120
Run No 252013 Analysis Date 2013-06-07 Method SM 2320B			
Alkalinity as CaCO3	<5 mg/L	99	95-105
Conductivity	<5 uS/cm	100	95-105
Run No 252017 Analysis Date 2013-06-07 Method C SM4500-NH3D			
N-NH3	<0.02 mg/L	104	85-115
Run No 252018 Analysis Date 2013-06-07 Method C SM4500-PF			
Total P	<0.01 mg/L	101	85-115
Run No 252071 Analysis Date 2013-06-07 Method EPA 200.8			
B	<0.01 mg/L	89	81-119
Cd	<0.0001 mg/L	100	86-114
Cu	<0.001 mg/L	100	86-114
Fe	<0.03 mg/L	110	88-112
Mn	<0.01 mg/L	100	91-109
Sr	<0.001 mg/L	102	91-109

Guideline = PWQO - Ontario Y * = Guideline Exceedence

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Appendix C

Site Photographs



Photograph 1 Surface water monitoring station SW-1, June 2013



Photograph 2 Surface water monitoring station SW-2, June 2013



Photograph 3 Surface water monitoring station SW-3, June 2013



Photograph 4 Surface water monitoring station SW-4A, June 2013



Photograph 5 View of waste mound looking east, June 2013



Photograph 6 View of waste mound looking west, June 2013