Quinte Source Protection Region
Updated Conditions Report

Submitted to the Source Protection Committee

as part of the

Updated Assessment Report

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1 Introduction

As part of the Source Water Protection program Quinte Conservation has undertaken an inventory of drinking water threats within the vulnerable areas of the Quinte Source Protection Region. These areas include the sensitive zones around four municipal wells and seven surface water intakes serving as municipal drinking water supplies to residents of the Quinte Region. Details of these systems and associated drinking water threats are as outlined in the Quinte Region Assessment Report (March 4, 2011). Drinking water threats are identified in regards to the Clean Water Act which defines a threat as:

"*an activity or condition that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water, and includes an activity or condition that is prescribed by the regulations as a drinking water threat.*"

In terms of the MOE Technical Rules (August, 2009) a threat to a drinking water source can be identified in the following ways:

1) Through an inventoried activity prescribed by the Clean Water *Act* as a Prescribed Drinking Water Threat (PDWT);
2) Through an activity identified by the Source Water Protection Committee as an activity that may be a threat and (in the opinion of the Director) a hazard assessment confirms that the activity is a threat;
3) Through an activity associated with a drinking-water issue; and
4) A condition resulting from a past landuse activity.

An earlier version of the Quinte Region Assessment Report (March 4, 2011) contained a listing of drinking water threats which were determined following the first method. No threats were identified by the Source Water Protection Committee through any of the latter three methods. The following has been prepared as part of an updated Assessment Report to consider a review of past landuse activities (potential conditions) at drinking water intakes in the Quinte Region. A summary of the information reviewed and process followed is provided below.

2 Methodology

To identify areas within intake protection zones of drinking water systems past activities were reviewed. These past activities were assessed to identify potential conditions that would be considered drinking water threats as defined by the Technical Rules (MOE, 2009). Such activities require an assessment of environmental condition in order to determine if the site presents an environmental concern to the drinking water intake.

The process that was followed to assess if conditions exist was as follows:

1) Review of available information pertaining to the location of potentially contaminated sites,
2) Confirm the location of the site within a vulnerable area,
3) Apply local knowledge about the location of potentially contaminated sites (current or past activity),
4) Review available records to determine if sufficient information was available to provide evidence of contamination,
5) Compare the evidence of contamination to the Technical Rule 126 (2009) to determine if the site can be classified as a condition,
6) Determine if the site represents a significant drinking water threat in reference to the MOE Technical Rules (2009).

2.1 Identifying Conditions

In reference to Part X1.3 of the Technical Rule 126 a condition may exist on a property where there is contamination resulting from past activities and if it meets one of the following:

1) The presence of a non-aqueous phase liquid in groundwater in a highly vulnerable aquifer, significant groundwater recharge area, or wellhead protection area,
2) The presence of a single mass of more than 100 litres of one or more dense non-aqueous phase liquids in surface water in a surface water intake protection zone,
3) The presence of a contaminant in groundwater in a highly vulnerable aquifer, significant groundwater recharge area, or a wellhead protection area, if the contaminant is listed in Table 2 of the Soil, Ground Water and Sediment Standards and is present at a concentration that exceeds the potable groundwater standard set out for the contaminant in that Table,
4) The presence of a contaminant in surface soil in a surface water intake protection zone if, the contaminant is listed in Table 4 of the Soil, Groundwater and Sediment Standards is present at a concentration that exceeds the surface soil standard for industrial/commercial/community property use set out for the contaminant in that Table,
5) The presence of a contaminant in sediment, if the contaminant is listed in Table 1 of the Soil, Groundwater and Sediment Standards and is present

at a concentration that exceeds the sediment standard set out for the contaminant in that Table.

In order for a condition to be identified, documented proof of one of the above must be met. Following this the condition is ranked as significant, moderate or low through the determination of a risk score as outlined below.

2.2 Risk Score

Following the identification of a property with a condition the potential threat to drinking water was identified as significant, moderate, or low in accordance with the Technical Rules (2009). This entails determination of a risk score as follows:

Risk Score = A X B

Where:

A = the hazard rating of the condition,
B = the vulnerability score of the vulnerable area (as outlined in the relevant section of the assessment report),

The hazard rating is determined as outlined in the Technical Rules based on either a score of 10 or 6. A score of 10 is assigned where there is evidence of off site contamination or the condition is associated with the property of a drinking water system, or a score of 6 if neither applies. The threat level is then assigned as significant, moderate, or low in accordance with Table 1.

Table 1: Risk Score and Drinking Water Threat Category

Drinking Water Threat Level	Risk Score
Significant	Equal to or greater than 80
Moderate	Equal to or greater than 60 and less than 80
Low	Greater than 40 and less than 60

3 Contaminant Inventory Review

To provide information about the location of historic contaminated sites a review was completed of the contaminant inventory provided in the Quinte Regional Groundwater Study (Dillon, 2004) and the Bay of Quinte Remedial Action Plan Inventory of Contaminated Sites (February, 2004). The Regional Groundwater Study provided a summary of a review of records about potentially contaminated sites such as certificate of approvals, provincial, and municipal records for fuel storage, waste disposal sites and waste generators. The Bay of Quinte study also focused on a review of provincial databases to identify sources of potential contamination within the watershed.

3.1 Contaminant Inventory Results

From the review seven potentially contaminated sites in five of the designated vulnerable areas were identified as listed in Table 2.

Table 2: Potential Conditions Associated with a Municipal Drinking Water System

System	Site #	Zone	Contaminant
Madoc	1	WHPA A	Commercial Property
Tweed	2	WHPA D	Closed Landfill
Wellington	3	IPZ 2	Closed Landfill
Deseronto	4	IPZ 3a	Closed Landfill
Picton	5	IPZ 3a	Waste Transfer Station
Picton	6	IPZ 2	Closed Landfill
Belleville	7	IPZ 1	Industry
Belleville	8	IPZ 1	Closed Landfill

WHPA means Wellhead Protection Area
IPZ means Intake Protection Zone

Following identification of these sites an initial assessment of available information was completed to determine if the site meets Technical Rule 126. Further review was completed of each site to identify if documented evidence of contamination was available to establish that a condition exists. A summary of this review for each of the potential conditions is provided below.

3.2 Site 1 in the Village of Madoc

Local knowledge of landuse in the Madoc area resulted in the identification of a site requiring review. This site was situated next to the Rollins St. well in the Wellhead Protection Zone A. From available information it was indicated that there was potential for contamination of this site from fuel storage as well as vehicle and equipment repair (Ministry of the Environment correspondence,

August 8, 1980). It was also reported that the Ministry provided funding to the municipality to assist in the purchase of the property. Again, no records were available to confirm the presence of contamination. Further review of records did not provide proof of groundwater contamination.

Although contamination of groundwater in the Madoc area by hydrocarbons does exist (Historic municipal correspondence and water supply evaluations provided through internal Ministry of the Environment correspondence) there is no direct linkage to this site. This site does not have sufficient documentation to meet the definition of a concern.

3.3 Site 2 in the Village of Tweed

A closed landfill site within the Village of Tweed Wellhead Protection Area D was investigated and all available records were obtained. The Certificate of Approval for this site, as included in Appendix A, indicated the site was used for the disposal of wood waste from a planing and sawmill located in the Village of Tweed. The records indicated that this activity occurred during the 1970s and entailed the filling of a wetland area with sawdust, slab wood and scrap wood. Such activity can result in the contamination of groundwater by such things as Phenols, Tannins and Lignins, biological oxygen demand, Total Kjeldahl Nitrogen, Organic Nitrogen, Nitrates and Total Phosphorus. From our review of records and discussion with neighbouring residents there was no onsite testing done in this regard. As a result insufficient information exists to identify this property as a condition. It is recommended that groundwater quality testing be undertaken at this site to establish the impact the former landfill may be having on the aquifer.

3.4 Site 3 in the Village of Wellington

A historic landfill site is located within the IPZ2 for the Village of Wellington water supply system. Little history is known about this site other than it was reported to be used for domestic and construction debris and then covered with soil. In 2010 an environmental study was completed by Trow Consulting on behalf of The Corporation of the County of Prince Edward (September, 2010). During this study a total of six monitor wells were installed with samples collected and analysed for petroleum hydrocarbons, volatile organic compounds, polyaromatic hydrocarbons, PCBs and heavy metals. From the information provided it was reported that groundwater at this site flows northerly towards Lane Creek which drains to Lake Ontario within the IPZ2 for the Village of Wellington intake. Samples were collected from the monitor wells and submitted for laboratory analysis for a suite of parameters indicative of typical landfill contamination. The report concluded that landfill leachate exists in the groundwater and that there is potential for offsite impact. The results of analyses from the groundwater monitor wells, as included in Appendix B, were compared with Table 2 of the Soil, Groundwater Water and Sediment Standards for Use Under Part XV.1 of the

Environmental Protection Act Ministry of the Environment July 27, 2009. From this review the parameters as listed in Table 3 were noted as exceeding the standards. As such this site can be considered a condition.

Table 3: Parameters Identified as Meeting Technical Rule 126

Parameter	Units	Table 2 Criteria *	MW-1	MW-2	MW-3	BW-1
Metals						
Mercury	µg/L	0.29	4.4	0.7	1.9	<0.1
Polynuclear Aromatic Hydrocarbons (PAHs)						
Acenaphtylene	µg/L	1	10.7	<0.5	2.3	<0.05
Anthracene	µg/L	2.4	2.5	1.1	5.1	<0.05
Benzo(a)anthracene	µg/L	1	8	3.9	14	<0.05
Dibenzo(a,h)anthracene	µg/L	0.2	1	<1	2	<0.1
Fluoranthene	µg/L	0.41	13	6.2	26	<0.05
Phenanthrene	µg/L	1	8.7	4.9	13	0.07
Pyrene	µg/L	4.1	10	4.9	19	<0.05
Volatile Organic Compounds (VOCs)						
Benzene	µg/L	5	0.2	0.3	0.2	270
Tolune	µg/L	24	<0.2	0.3	0.2	260

*Soil, Ground Water and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act, Ministry of the Environment July 27, 2009.

3.4.1 Risk Score

Based on the identification of this property as a condition the risk score was determined to assess whether this property is a significant, moderate or low condition. The risk score was calculated as follows:

Risk Score = 10 X 3.5 = 35

Where:

- The hazard rating was assigned as 10 given the property is in the IPZ2 associated for the Village of Wellington,
- The vulnerability score of the IPZ2 was assigned as 3.5 as outlined in the Assessment Report (Quinte Conservation, March, 2011).

Given a low risk score of 35 this past landuse is not considered to be either a significant, moderate, or low drinking water threat.

3.5 Site 4 – Town of Napanee (Deseronto System)

A former landfill site is located in the Town of Napanee within the IPZ 3a for the Town of Deseronto drinking water intake. It was reported that this site was

owned and operated by the Town of Napanee from the 1950's to the early 1980's (Genivar, 2010). The site is located on a 2.4 hectare parcel of land (Part Lot 20, Concession 1, Town of Greater Napanee, Lennox & Addington County) along the Napanee River adjacent to the Napanee Water Pollution Control Plant. This site is located within the Town of Deseronto IPZ 3a.

Information about the site was taken from correspondence from Malroz Engineering Incorporated dated April 23, 2010 and Genivar dated November 3, 2010. These reports indicate that groundwater monitoring has been ongoing at the site since 2005. Contaminants of concern have been identified as petroleum hydrocarbons and heavy metals. Seasonal seeps of contaminated groundwater were reported to exist along the down gradient side of the site adjacent to the River.

3.5.1 Assessment as a Condition

To determine if the landfill site can be considered a condition with respect to the Technical Rules (2009) a review of soil chemistry data from 2004 and 2008 was completed. This data, as included in Appendix B, was compared with Table 4 of the Soil, Ground Water and Sediment Standards, potable groundwater standard (MOE, July 27, 2009). From the available data the parameters as listed in Table 4 were noted as exceeding the surface soil standard for Industrial/Commercial/Community Property Use. In addition to the surface soil data a cursory review of groundwater data indicate petroleoum hydrocarbons fractions F2 to F4 exceed the Table 2 standard of the Soil, Ground Water and Sediment Standards, potable groundwater (MOE, July 27, 2009). Based on the detection of parameters exceeding the relevant criteria this site is considered to be a condition with the Town of Deseronto IPZ3a.

Table 4: Parameters Identified as Meeting Technical Rule 126

Parameter	Units	Table 4 Criteria *	BH16	BH17
Arsenic	µg/g	18	20	-
Cadmium	µg/g	1.9	13.5	3.6
Copper	µg/g	230	269	-
Lead	µg/g	120	884	644
Zinc	µg/g	340	4730	681
Anthracene	µg/g	0.67	4.12	1.06
Benzo(a)anthracene	µg/g	0.96	23.3	-
Benzo(b)fluoranthene	µg/g	0.96	39.8	1.9
Benzo(a)pyrene	µg/g	0.3	20.6	1.08
Benzo(k)fluorenthene	µg/g	0.96	8.23	-
Chrysene	µg/g	9.6	19.7	-
Dibenzo(a,h)anthracne	µg/g	0.1	11	0.77
Fluoranthene	µg/g	9.6	30.6	-
Indeno(1,2,3-cd)pyrene	µg/g	0.76	36.6	1.52
Phenanthrene	µg/g	12	17.4	-
PHC-F4	µg/g	3300	25100	-

*Soil, Ground Water and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act, Ministry of the Environment July 27, 2009.

3.5.2 Risk Score

Based on the identification of the landfill as a condition the risk score was determined to assess whether this property is considered a significant, moderate or low condition. This score was calculated as follows:

Risk Score = 10 X 7.2 = 72

Where:

- The hazard rating was assigned as 10, given the property is in the IPZ3a associated for the Town of Deseronto Intake,
- The vulnerability score of the IPZ3a was assigned as 7.2 as outlined in the Assessment Report (Quinte Conservation, March, 2011).

Given a risk score of 72 this past landuse is considered to be a moderate threat for the Town of Deseronto drinking water.

3.6 Site 5 Town of Picton Waste Transfer Station

A review of records resulted in the identification of two landfill sites in the intake protection zone for the Town of Picton drinking water system. One of these sites (Site5) is referred to as the Town of Picton Waste Transfer Station on Church

Street. The other site (Site 6) is the former Town of Picton Dump located at Delhi Park adjacent to Marsh Creek as located by Map 1. The review of Site 5 is discussed in Section 3.7.

A review of the Certificate of Approval Number 350102 (as included in Appendix A) indicates the Picton Waste Transfer site was licensed as a waste disposal site for the disposal and burning of wood waste only. The current certificate 350104 no longer permits waste disposal, but indicates the site is to be used for a transfer station for municipal waste only. Discussion with representatives of Prince Edward County indicated no recollection that burial of waste occurred. Additionally, it was reported that there has been no testing for contamination at this site. Further discussion with Ministry of the Environment representatives indicated that a recent site inspection was completed and there does not appear to be evidence of land filling. Local knowledge is that it was common practice at this site to burn brush and wood. Regardless of past use there is insufficient information to allow the assessment of the site as a condition in regards to Technical Rule 126 (Ministry of the Environment, 2009). Note that this does not mean that contamination does not exist.

3.7 Site 6: The Town of Picton Landfill

The Town of Picton operated a landfill site from approximately the early 1900s until 1979. This site, as illustrated by Map 1, is located within the Town of Picton IPZ2. The site was developed through the filling of a wetland along the banks of Marsh Creek. Historic maps, as illustrated by Figure 1, show the area of filling. Over the lifespan of the site it is believed that agricultural and canning industry waste were land filled in the early 1900s. Domestic waste was land filled starting in the 1940s and finally construction debris was deposited during reconstruction of the Town's Main St. in the 1970s. The landfill was closed in 1979 and a 0.6 metre thick cap of clean fill was placed over the site followed by redevelopment as a Park in the early 1980s. A copy of the Certificate of Approval is provided in Appendix A.

3.7.1 Environmental Condition

To assess whether the site is considered to be a condition a review was completed of a hydrogoelogical assessment of the site completed in 1988 (Water & Earth Science & Associates, 1988). Other information was reviewed to provide additional detail regarding potential overall impact including water quality data for the Town of Picton drinking water system, surface water quality of Marsh Creek and sediment quality in Marsh Creek and Picton Bay.

A review of the Hydrogeological Assessment report indicated that the assessment included the installation of monitor wells, surface water sampling sites and seepage meters in Marsh Creek at the locations illustrated by Map 1. A discussion of the results of this assessment is as provided below.

3.7.2 Groundwater

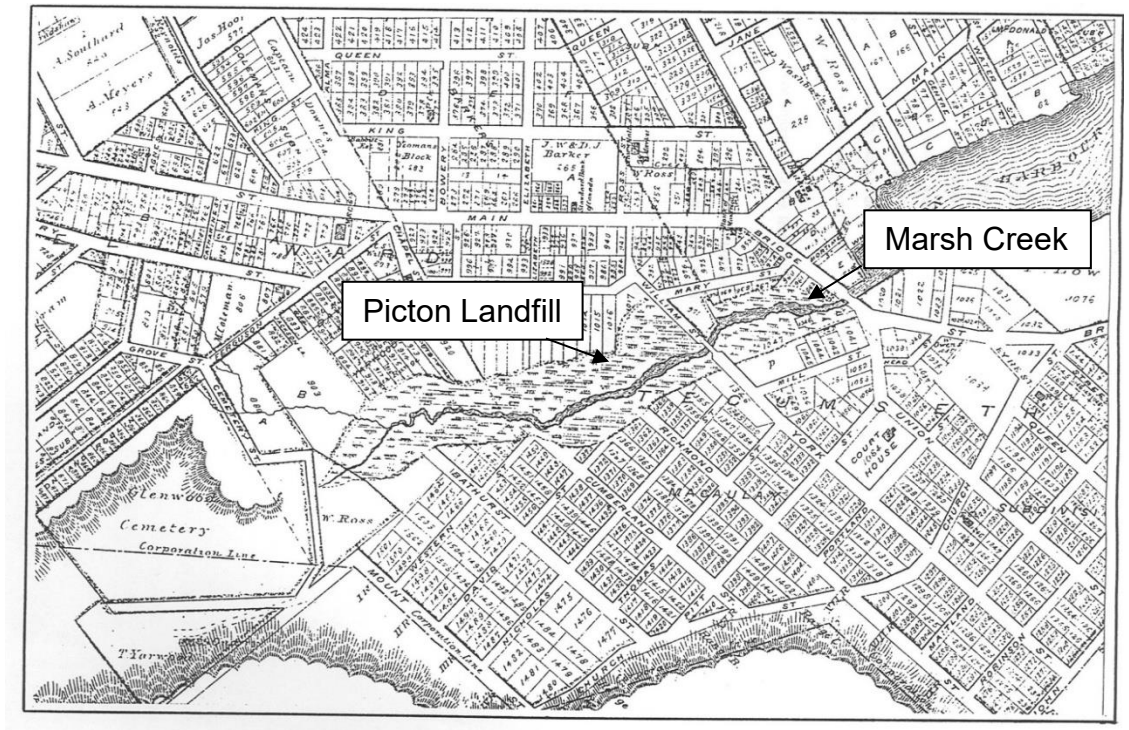
A total of five boreholes were installed at the site with four constructed as monitor wells and the remaining as a gas probe. Some of the wells were constructed as multi level with deep and shallow zones. Samples were collected from the monitor wells in 1988 and analysed for inorganic and organic parameters with the data as summarized in Appendix B.

Measurement of the monitor wells indicated groundwater flow at the site is towards Marsh Creek and Picton Bay with vertical gradients suggesting the site is in an area of groundwater discharge. Under these conditions, contaminants generated at the site may discharge into Marsh Creek. Elevated levels of parameters indicative of leachate (iron, manganese, chloride, calcium and sodium) from a landfill were detected in the monitor wells but overall thought to represent low strength leachate. The low strength of the leachate was thought to be potentially related to shallow depth of the landfill (3 to 6 metres). The rapid flow of groundwater through this area of groundwater discharge may also minimize the amount of time of leaching as well as flush contaminants out of the site. Higher concentrations of inorganic parameters were determined in the shallow groundwater and associated with contamination from the landfill. Measurable levels of volatile compounds were found in one of the monitor wells (P1-2) including hydrocarbons, chloroform, tetrachloroethylene, and trichlorofluoromethane. These contaminants may be derived from petroleum products, solvents, dry cleaning fluids, and Freon used in refrigeration.

3.7.3 Surface Water

It was reported that landfill operations was recommended to maintain a 30 metre separation from Marsh Creek. However this recommendation did not appear to be followed (Water & Earth Science Associates, 1989). Water quality monitoring of the creek by the Ministry of the Environment in 1971 and 1979 found the landfill to be impacting on the creek with some parameters identified at higher levels in 1977 than in 1971.

Map 1



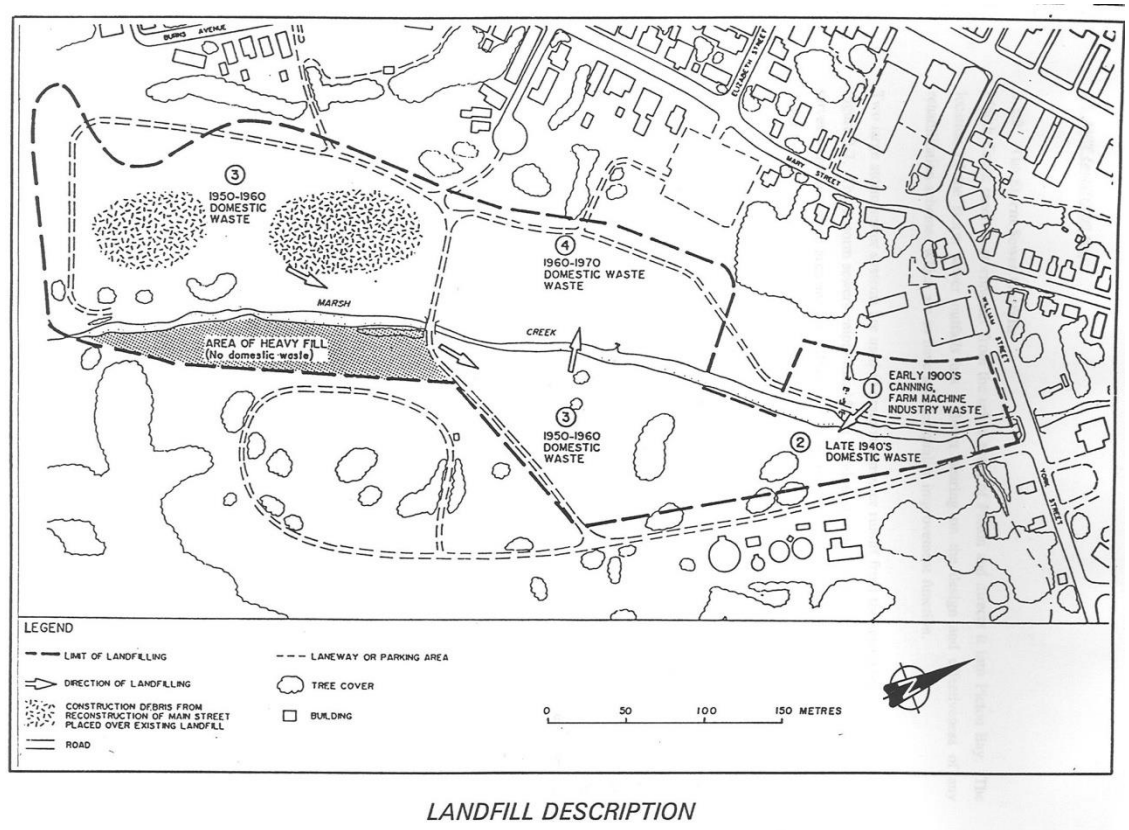


Figure 1: Town of Picton Landfill Site

Monitoring in the creek by Water & Earth Science Associates in 1988 indicated an improvement of quality over sampling completed in 1977. This monitoring included sites up and down stream of the sewage treatment plant discharge to allow assessment of water quality parameters potentially originating from the sewage plant as opposed to the landfill site. As a result parameters were detected that were indicative of leachate from the landfill. This included low levels of both inorganic and volatile organic compounds with levels increasing as the creek traverses through the site. The levels of these contaminants were reported as being below the drinking water standards at that time and it was speculated that the impacts of this leachate would likely be immeasurable in Picton Bay due to biodegradation and dilution. The overall degradation of water quality was speculated as not being severe, however an oily film and scum were reported to exist on the creek during periods of low flow (WESA, 1989).

As part of that study two seepage meters were also established in the Marsh Creek to measure the quality of groundwater discharging to the creek. Analysis of a sample from one of the sites confirmed the discharge of groundwater as the quality was similar to groundwater.

3.7.4 Assessment as a Condition

To determine if the landfill site can be considered a condition with respect to the Technical Rules (2009) a review of the 1988 groundwater data was completed for comparison with Table 2 of the Soil, Ground Water and Sediment Standards, potable groundwater standard (MOE, July 27, 2009). From the available data the parameters as listed in Table 5 were noted as exceeding the potable drinking water standard. The results of analysis are from samples collected at monitor well P1-2 at a depth of 6 metres.

Table 5: Picton Landfill Parameters Identified as Meeting Technical Rule 126

Parameter	Units	Table 2 Criteria *	P1-2
Chloroform	ug/l	2.4	90.7
1,1 Dichlorethylene	ug/l	1.6	2.8
1,1 Dicchlorethane	ug/l	5	7.9
Ethylbenzene	ug/l	2.4	12
Trichlorfluoromethane	ug/l	150	540
1,4 Dichlorobenzene	ug/l	1	1.2

*Soil, Ground Water and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act, Ministry of the Environment July 27, 2009.

Based on the detection of these parameters above the standards the site is considered a condition within the Town of Picton IPZ. These parameters are organic and related to a group of chlorinated hydrocarbons. Sources of such chemicals may be from solvents, refrigerants, plastics, rubber, insecticides and

pesticides. Typical disposal of items containing these chemicals is possible in the landfill site.

3.7.5 Risk Score

Based on the identification of the landfill as a condition the risk score was determined to assess whether this property is considered a significant, moderate or low condition. This score was calculated as follows:

Risk Score = 10 X 9.0 = 90

Where:

- The hazard rating was assigned as 10, given the property is in the IPZ2 associated for the Town of Picton Intake and past evidence suggests there is offsite impact,
- The vulnerability score of the IPZ2 was assigned as 9.0 as outlined in the Assessment Report (Quinte Conservation, March, 2011).

Given a risk score of 90 this past landuse is considered to be a significant drinking water threat.

3.7.6 Sediment Data

Additional information about environmental quality was provided through review of sediment quality data for samples collected form Marsh Creek and Picton Bay. This information was taken from a Summary of Recent Sediment Investigations for the Bay of Quinte, Lake Ontario National Water Research Institute September, 2006. This overview included a summary of eight independent studies completed since 1995 with some of the studies focused on individual areas and others spread through the Bay with sampling intensity based on proximity to urban centres and the tributary mouths of creeks and rivers.

From this compilation, two sampling sites were noted in the general area of the Picton intakes as illustrated by Map 1. One station (labeled as EHD-6) is located near the mouth of Marsh Creek where it discharges to Picton Bay, downstream of the landfill site and the sewage treatment plant outfall. This site was part of an Environment Canada study when samples were collected between July and November of 2003. During this study surface sediment samples were taken to a depth of 1-2 cm and analysed for trace metals, PCBS, as well as PAHs.

The other site (labeled as 2031) was also part of an Environment Canada study and is located near the drinking water intake. Bulk sediment samples were collected and analysed for trace elements including Mercury, Total Phosphorus, Total Kjeldahl Nitrogen, and Total Organic Carbon. Analysis for PCBs and PAHs was not completed.

To assess sediment quality at these locations a review of the data, as included in Appendix C, was completed in respect of Table 1 of the Ministry of the Environment Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act (July 27, 2009). Parameters noted as being elevated above the standards are as listed in Table 6.

Table 6: Sediment Parameters Elevated in Marsh Creek & Picton Bay

Parameter	Units	Table 1 Criteria *	2031	EHD-6
Arsenic	µg/g	6	**9.49**	<5
Cadmium	µg/g	0.6	**1**	**1.3**
Chromium	µg/g	26	**49.1**	**52**
Copper	µg/g	16	**45.1**	**215**
Lead	µg/g	31	**73**	**89**
Mercury	µg/g	0.2	0.167	**0.647**
Nickel	µg/g	16	**46.1**	9
Silver	µg/g	0.5	0.25	**11.3**
Zinc	µg/g	120	**179**	**504**
Fluoranthene	µg/g	0.75	n/a	**1.11**
Phenanthrene	µg/g	0.56	n/a	**0.852**
PCB	µg/g	0.07	n/a	**0.11**

*Soil, Ground Water and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act, Ministry of the Environment July 27, 2009.

From the sediment sample at the mouth of Marsh Creek it was found that many of the parameters related to trace metals were elevated. However, many of these parameters are commonly elevated in sediments throughout the Bay of Quinte. A review of relevant studies indicates that effluent from sewage treatment plants can contribute to elevated levels of heavy metals and some may be naturally occurring such as Cadmium and Zinc which may be related to the geology of the limestone bedrock. A study of water quality in the Bay suggested that the major tributaries may contribute significantly to levels of heavy metals in the Bay. Water quality data at Marsh Creek as reported in the Bay of Quinte Rap reports (Beak, 1988) indicate elevated levels of Copper, Zinc, Lead, Nickel, Iron and Phenols at Marsh Creek.

In addition to the heavy metals, organic parameters including fluoranthene, phenanthrene, and PCBs were found to be elevated at the Marsh Creek site. The first two parameters are classed as polyaromatic hydrocarbons and were not reported to be prevalent throughout the sediments in the Bay of Quinte but can be found near urban centres. These parameters are closely associated with coal tar, however there is no record of a coal gasification plant in this vicinity. PCBs were reported to be slightly elevated throughout the Bay but generally not exceeding the standard. Coincidentally, Marsh Creek was one of the few sites where the concentration exceeded the standard. This occurrence may be related

to the discharge of sewage treatment plant effluent upstream. Overall, the detection of the elevated levels of heavy metal and organic parameters may be related to the landfill, yet insufficient evidence exists to pinpoint this as a source due to other potential sources of contamination in the area.

For the station near the drinking water intake (station 2031) trace metal parameters were detected above the standard similar to the general quality of sediments throughout the Bay. The exception was Arsenic which has been recorded at elevated levels near the mouth of the Moira River and is attributed to historical mining and smelting operations at Deloro farther up the Moira River system. The other parameters may be associated with sources as discussed for the site at Marsh Creek given they were also elevated at that location. Note that analysis of organic parameters was not completed at this location.

3.7.7 Review of Picton Drinking Water and PWQMN data

Given the identification of elevated parameters in the groundwater and sediments additional review of other data has been completed to determine if correlation exists between the detection of indicator parameters and the water quality at the PWQMN station on Marsh Creek and the Picton Drinking Water Plant. A detailed review of this information is provided in Appendix D and summarized below.

From this review it was found that the 5 of the 6 groundwater contaminants were tested and detected in the raw water at the Picton drinking water intake. Of the 12 parameters found to be elevated in the sediment ten were detected in the raw water. As regards the Provincial Water Quality Monitoring Station on Marsh Creek none of the groundwater parameters are tested for in the regular monitoring at the Creek, however, 8 of the 12 sediment parameters are. Monitoring of the quality of storm water includes 6 of the contaminants found in the sediments. All six were detected during periods of wet weather suggesting this is a contributing factor.

In reference to this review and detection of elevated parameters it is recommended that the water quality monitoring programs continue.

3.8 Site7: Former Industrial Property in the City of Belleville

Two sites that could be considered conditions were identified within the vulnerable area for the City of Belleville drinking water system. Site 6 is a former industrial property located within the IPZ2. Site 8 is the closed Zwicks Island landfill site located in the IPZ1. A discussion of the findings for Site 7 is presented in Section 3.9.

An industrial property located within the City of Belleville near Bridge and Sidney Streets was identified as being potentially contaminated. Detailed information about this site (Site6) was provided by the City of Belleville and included reports on Phase 1 and 2 Environmental Site Assessments and a work plan for the

Phase 3 cleanup. From these reports it was found that property was previously used by a company manufacturing electrical circuit boards. An assessment of the site was completed through sampling of soil and groundwater from 17 boreholes due to potential for contamination of the site by PAHs and heavy metals. This assessment identified several heavy metal parameters (Barium, Cadmium, Copper, Lead, and Zinc) as being elevated above the standards. A cleanup of the site was accomplished by excavation of contaminated soil and disposal offsite. Correspondence was provided indicating that the contaminated soils were removed from the site. It was reported that the site was cleaned up to meet the requirements of Ontario Regulation 153/04 for a record of site condition as a sensitive site. The environmental studies were peer reviewed on behalf of the City and it was reported that they were satisfactory. A follow up report and Record of Site Condition was not available. However correspondence provided by the City of Belleville indicated that the contaminated soil was removed from the site. Based on this information this site would not be considered a condition.

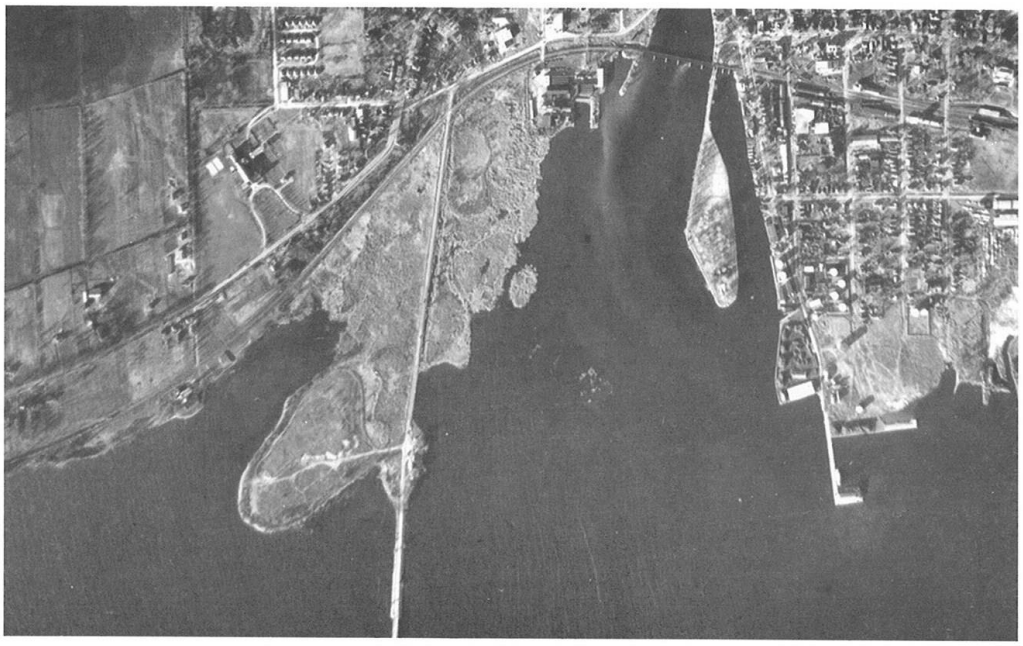
3.9 Site 8: Zwick's Island Landfill in the City of Belleville

The City of Belleville operated the Zwicks Island Landfill site in the 1950s and 60s for the disposal of mainly municipal waste with reports of the site also receiving some commercial, industrial, and liquid waste. The area was filled through the construction of an earthen dyking system out into the Bay of Quinte with waste deposited behind the dyke. An illustration of the filled area can be viewed from Figure 2 which includes a historic aerial photograph from 1948. After closure of the site in 1971 the landfill was covered and converted to a park.

3.9.1 Environmental Condition

Over the years a number of studies have been completed on the closed landfill site to assess environmental impact. For the purposes of this review information contained in the following two reports was considered.

> Zwick's Island Landfill Environmental Investigations Final Report, Ontario Ministry of the Environment, October 1991,
>
> Report on 2008 Environmental Monitoring Program Zwick's Centennial Park, Belleville, Ontario. Golder & Associates, March 2009.



Aerial Photograph 1 (Roll No. A11795-73) Zwick's Island, Belleville, December 3, 1948

Aerial Photograph 2 (Roll No. 92032-10-132) Zwick's Island, Belleville, May 6, 1992

Figure 2: Zwicks Island Landfill Before & After Filling

From review of the 1991 Ministry of the Environment Report it was reported that a network of nine monitor wells and 10 surface water stations was established in April of 1990. These stations were sampled in May and August of 1990 for

parameters indicative of landfill leachate. As a result it was found that groundwater flows radially outward from the site towards the Bay of Quinte. Analysis of samples of groundwater found the site to be impacted by landfill leachate, however the overall strength of the leachate was thought to be low.

This low strength was attributed to how the waste was deposited (filling of the Bay) with significant flushing of contaminants and dilution. Parameters that were detected in the groundwater included Benzene, Toluene, Trichloroethane and some pesticides such as Aldrin. Analysis of surface water samples found discharge of leachate to ditches on the site, however the water quality in the Bay was found to not be significantly poorer than water farther off shore. Regardless it was reported that there is continual loading of relatively low strength landfill leachate to the Bay. Continued monitoring was recommended.

To provide more up to date information about the monitoring of the Zwick's Island site a recent report prepared by Golders & Associates (2009) was reviewed. This study included the sampling of 10 groundwater monitoring wells, as located by Map 2, with analysis for a complete suite of parameters. Groundwater flow was determined as radially outward from the northwest corner of the site generally beneath the perimeter of the berm along the Bay of Quinte. The presence of leachate at the site was confirmed with detection of levels of petroleum hydrocarbons, volatile organic carbons, and other key indicator parameters.

Monitoring of surface water quality included the sampling of 11 stations in the spring and fall as well as three precipitation event samplings. This sampling indicated water quality as generally similar to background with marginally elevated levels of key indicator parameters. Parameters noted as exceeding the Provincial water quality objectives were Total Phosphorus, Iron and Copper. Non point discharge of leachate occurs around the perimeter of the site however, there are three areas of point leachate discharge at the ditch near the Ramada Inn Hotel draining eastward (surface water station SW1), a ditch at the bay at surface water station SW8 and the embayment at the west near stations SW4 and SW9. Leachate is observed to discharge at the shoreline of this embayment subject to the water level in the Bay. Photos of this area of discharge and surface of the discharge are illustrated by Figures 3 & 4. Water quality at these points of discharge were noted to be indicative of leachate with elevated levels of Phenols, Total Phosphorus, Iron, Fluoride, Ammonia, Aluminum, Arsenic, Cadmium, Cobalt, Lead, Vanadium, Zinc, Phenanthrene, and Total Suspended Solids. Acute lethality testing for Rainbow Trout and Daphnia magna were completed at these locations from samples collected at these sites in 2008. All of the lethality tests were reported as pass. Nevertheless, continued monitoring was recommended.

Map 2

Figure 3: Seep from Zwicks Island Landfill

Figure 4: Surface of Seep at Zwicks Island Landfill

3.9.2 Assessment as a Condition

To determine if the site represents a condition a review of the available data was compared with the Ministry of the Environment Technical Rule 126. Based on these rules the data from 2 monitor wells located within the IPZ was reviewed and compared with Table 2 of the Soil, Ground Water and Sediment Standards, potable groundwater standard (July 27, 2009). From the available data, as included in Appendix B, the parameters as listed in Table 7 were noted as exceeding the potable drinking water standard.

The results of analysis are from samples collected at monitor well BH4 and BH8 which both extend to approximate depths of 4.6 metres and are located within the limits of the IPZ1. These parameters are organic and related to a group of chlorinated hydrocarbons. Sources of such chemicals may be from solvents, refrigerants, plastics, rubber, insecticides and pesticides. Typical disposal of items containing these chemicals is possible in the landfill site. Based on the detection of these parameters above the standard, the site is considered a condition within the City of Belleville IPZ1.

Table 7: Zwicks Island Parameters Identified as Meeting Technical Rule 126

Parameter	Units	Table 2 Criteria *	BH 4	BH 8
BNAs, PAHs, and Phenols				
Benzo(a)anthracene	µg/L	1		1.9-3.4
Benzo(a)pyrene	µg/L	0.01	0.09-0.24	0.09-2.7
Benzo(b)fluoranthene	µg/L	0.1	0.2	0.2-3.6
Benzo(g,h,i)perylene	µg/L	0.2		0.75-1.3
Benzo(k)fluoranthene	µg/L	0.1	0.2	0.13-1.4
Chrysene	µg/L	0.1	0.27	0.24-3.1
Dibenzo(a,h)anthracene	µg/L	0.2		0.33
Fluoranthene	µg/L	0.41		0.73-6.4
Indeno(1,2,3-cd)pyrene	µg/L	0.2	0.27	0.27-1.4
Pyrene	µg/L	4.1		4.6-4.9
Petroleum Hydrocarbons and PCBs				
Petroleumb Hydrocarbons F2 (>C10-C16)	µg/L	150		x
Metals				
Cadmium	mg/L	0.0027	0.005	0.0039-0.005
Cobalt	mg/L	0.0038	0.05	0.05
Lead	mg/L	0.01	0.05	0.05
Molybdenum	mg/L	0.07	0.2	0.2
Silver	mg/L	0.0015	0.005	0.005
Pesticides				

Parameter	Units	Table 2 Criteria *	BH 4	BH 8
Heptachlor Epoxide	µg/L	0.048		0.05
Volatile Organic Compounds				
1,4-Dichlorobenzene	µg/L	1	2.9-13.8	1.5-5.5
Benzene	µg/L	5	6.6-9.7	5
Bromomethane	µg/L	0.89	0.2-10.0	0.2-10.0
Vinyl Chloride	µg/L	0.5	0.2-10.0	0.2-10.0

*Soil, Ground Water and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act, Ministry of the Environment July 27, 2009.

3.9.3 Risk Score

Based on the identification of the landfill as a condition the risk score was determined to assess whether this property is considered a significant, moderate or low condition. This score was calculated as follows:

Risk Score = 10 X 9.0 = 90

Where:

- The hazard rating was assigned as 10 given the property is in the IPZ1 associated with the City of Belleville Intake and offsite impact,
- The vulnerability score of the IPZ1 was assigned as 9.0 as outlined in the Assessment Report (Quinte Conservation, March 4, 2011).

Given a risk score of 90 this past landuse is considered to be a significant drinking water threat.

3.9.4 Sediment Data near Zwicks Island

Information about sediment quality was obtained through a review of a compilation of studies on sediment quality in the Bay of Quinte (Summary of Recent Sediment Investigations for the Bay of Quinte, Lake Ontario National Water Research Institute September, 2006). This overview included a summary of eight independent studies completed since 1995 with some of the studies focused on individual areas and others spread through the Bay with sampling intensity based on proximity to urban centres and the tributary mouths of creeks and rivers draining to the Bay.

From this compilation, the data from five sampling sites as included in Appendix C was reviewed. The location of the sampling sites is as illustrated by Map 2. These sites were part of different studies including one completed in 1997 by a private consulting company and another by Environment Canada in 2000. The 1997 study (sites Sed1, Sed2, & Sed-SW4) was completed through collection of composite samples and analysis for Polyaromatic hydrocarbons and trace

metals. The Environment Canada samples were collected as cores with analysis for trace metals, organics and nutrients.

The parameters found to be elevated are listed in Table 8 and are similar to those found in Picton Bay and Marsh Creek. Exception was that Pyrene was not found in Picton. The sources of the common parameters are likely similar as discussed for Picton and may include natural occurrences, sewage treatment plant effluent, air borne particulate matter as well as non point sources from the many tributaries draining into the Bay of Quinte. The organic parameters were reported to be elevated in the vicinity of urban centres with things like Fluoranthene and Phenanthrene, which are potentially related to coal tar. The detection of Pyrene may also be directly related to coal tar.

Some of the elevated parameters (Cadmium, Lead, Fluoranthene, and Pyrene) coincide with elevated levels of the same constituents found in the groundwater at Zwicks (listed in Table 7) and there is significant potential that this may be the source in part.

Table 8: Sediment Parameters Elevated in the Bay of Quinte near Zwicks Island.

Parameter	Units	Table 1 Criteria*	SED-SW4	SED1	200610602	SED2	2007
Arsenic	µg/g	6	-	-	**7.1**		2.5
Cadmium	µg/g	0.6	-	**0.6**	**1.5**	0.5	**1**
Chromium	µg/g	26	-	24	**61**	**47**	**54.2**
Copper	µg/g	16	-	**30**	**45**	**21**	**48**
Lead	µg/g	31	-	<0.4	**81**	<0.4	**74.3**
Mercury	µg/g	0.2	-	-	**0.81**	-	**0.45**
Nickel	µg/g	16	-	-	**24**		**25.5**
Silver	µg/g	0.5	-	-	-	-	**0.7**
Zinc	µg/g	120	-	**150**	**190**	**121**	**208**
PCB	µg/g	0.07	-	-	**0.18**	-	-
Anthracene	µg/g	0.22	0.0002	**0.689**	-	**0.23**	-
Fluoranthene	µg/g	0.75	0.00062	**1.01**	-	0.266	-
Phenanthrene	µg/g	0.56	0.00026	**0.645**	-	0.216	-
Pyrene	µg/g	0.49	0.00051	**0.705**	-	0.167	-

* Soil, Ground Water and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act, Ministry of the Environment July 27, 2009.

3.9.5 Review of Belleville Drinking Water Quality Data

Given the identification of elevated parameters in the groundwater and sediments additional review of other data has been completed to determine if correlation exists between the detection of indicator parameters and the treated water

quality at the Belleville Drinking Water Plant. A detailed review of this information is provided in Appendix D with a summary as provided below.

From this review it was found that most of the indicator parameters are monitored in the treated water at the Belleville intake. In total 37 contaminants from either sediment or groundwater data were detected in raw water at the intake. However, six of the indicator parameters are not routinely tested in the raw water (see Appendix D for the list).

4 Conclusions & Recommendations

1.0 Based on review of available information nine potential conditions within the vulnerable areas of six drinking water systems were identified. These sites are closed gas stations, closed landfill sites and an industrial property.

2.0 Review of available information for sites located in Madoc and Tweed did not provide enough data to allow assessment of the sites as conditions. Nevertheless, the absence of such information is expected considering that such data either does not exist or rarely becomes public. Therefore, it is possible that condition-related drinking water threats do exist; however, no data is available to either confirm or refute this possibility.

3.0 Review of recent information for a closed landfill located within the Village of Wellington IPZ2 indicated this site to be classified as a condition. However, determination of the risk score indicated the score was not high enough for this area to be considered a drinking water threat.

4.0 A closed municipal landfill site is located within the Town of Napanee along the Napanee River. This property is located down gradient of the drinking water intake for the Town of Napanee but is within the IPZ3a for the Town of Deseronto drinking water system. A review of recent soil and groundwater data indicated heavy metal and petroleum hydrocarbon parameters as exceeding the relevant standards to classify this property as a condition. Calculation of the risk score indicated the site is considered to be a moderate drinking water threat for the Town of Deseronto drinking water.

5.0 A waste transfer station located in the Town of Picton IPZ 3a was reported to be formerly used for waste disposal. A review of records indicated the site was licensed to receive wood waste but is currently used as a transfer station only. There is no evidence of actual filling at this location as it was common practice to burn the wood waste. The absence of data on the presence of contamination prevents assessment of the site as a condition in reference to the MOE Technical Rules (2009).

6.0 The former Town of Picton Dump was established in the early 1900's and closed in 1979. Hydrogeological assessment of the site was completed in 1988 and review of groundwater quality data for the site indicated that some parameters meet the standard for classification as a condition. The calculated risk score classified this property as a significant drinking water threat. Given the date of the data it is recommended that updated data be obtained to confirm this assessment.

7.0 A potential condition was identified within the IPZ2 for the City of Belleville. This site was a property which was formerly used for industrial purposes with soils assessed as being contaminated with heavy metals. Information was

provided by the City to indicate that the contaminated soils were removed from the site and the property is not considered to be a condition.

8.0 The Zwicks Island landfill site was identified as a condition in the City of Belleville IPZ1. Review of groundwater data from 2008 confirmed the presence of contamination in the groundwater with many parameters exceeding the relevant standard. The risk score for this site indicted that it is to be classified a significant drinking water threat.

9.0 This review was the first attempt at identifying contaminated sites that should be considered as conditions and drinking water threats in the source protection planning process. It is recognized that other conditions and potentially contaminated sites may exist. However in the absence of data it is not permissible to identify such sites as conditions. As such data becomes available it is recommended that the condition process be applied to address potential drinking water threats.

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Lower Trent Conservation, 2004. Potential Sources of Contamination in the Bay of Quinte Watershed. February 2004.

Ministry of the Environment, 1988. MEMO (internal) re Village of Madoc Municipal Well No. 1. August 8, 1980.

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Quinte Region Source Protection Committee, 2011. Assessment Report. March 4, 2011

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Corporation of the County of Prince Edward. Town of Picton Drinking Water System water quality data.

Appendix A: Certificates of Approval

Appendix B: Groundwater & Soil Quality Data

Appendix C: Sediment Quality Data

Appendix D1: Belleville Water Quality Report
Appendix D2: Picton Water Quality Report

Ontario
Ministry of the Environment

Provisional Certificate No.
A 350101

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Town of Picton
Box 1670
Picton, Ontario

for the landfilling Site
located Town Marsh (Licence of Occupation # 1072)
Town of Picton
County of Prinee Edward

subject to the following conditions:

1. No operation shall be carried out at the site after sixty days from this condition becoming enforceable unless this Certificate including the reasons for this condition have been registered by the applicant as an instrument in the appropriate Land Reigstry Office against the title to the site and a duplicate registered copy thereof has been returned by the applicant to the Director.

THIS IS A TRUE COPY OF THE ORIGINAL CERTIFICATE MAILED

ON MAR 22 19..

(Signed)

This Provisional Certificate expires on the 31st day of May, 19 79

Dated this 16th day of March, 19 79

DIRECTOR, SECTION 3 (a) E.P.A.

201

Ontario
Ministry of the Environment

Provisional Certificate No.
A 350101

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Town of Picton
Box 1670
Picton, Ontario

for the Landfilling Site
located Town Marsh (Licence of Occupation # 1072)
Town of Picton
County of Prince Edward

subject to the following conditions:

This Provisional Certificate expires on the 31st day of December, 19 77

Dated this 27th day of May, 19 77

DIRECTOR, SECTION 3 (a) E.P.A.

Ontario
Ministry of the Environment

Provisional Certificate No.
350101

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Town of Picton,
Box 1670,
Picton, Ontario.

for the Landfill Site
located Town of Marsh, Licence of Operation #1072
Town of Picton.

subject to the following conditions:

1. An attendant shall be present on the site whenever the site is open to receive waste.
2. An impervious berm is to be constructed so that the waste disposal operation is contained in an area no closer than twenty-five (25) feet from the creek.
3. All waste materials shall be covered with six (6) inches of earth cover material, daily, by a proper landfilling operation.
4. Procedures are to be established to control rodents and insects at the site.
5. That council actively pursue alternate arrangements for the ultimate disposal of refuse with a view to completely closing the site off by January 1, 1977.

This Provisional Certificate expires on the 31st day of March, 19 76

Dated this 1st day of April, 19 75.

D. P. Caplice
DIRECTOR, SECTION 3 (a) E.P.A.

Ontario
Ministry of the Environment

Provisional Certificate No.
350101

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Town of Picton,
Box 1670,
Picton, Ontario.

for the Landfill Site
located Town Marsh Licence of Operation #1072,
Town of Picton.

subject to the following conditions:

1. That prior to March 31, 1975, the holder of this certificate submit to the Regional Engineer a detailed proposal outlining the closing off procedure to be employed at the site.
2. All waste materials shall be covered with six (6) inches of earth cover material, daily, by a proper landfilling operation.
3. That the waste disposal operations do not continue closer than 100 feet from the small creek that runs through the marsh.
4. Procedures are to be established to control rodents and insects at the site.

This Provisional Certificate expires on the 31st day of March, 19 75

Dated this 10th day of November, 19 74

DIRECTOR, SECTION 3 (a) E.P.A.

Phone: 965-7752

December 1, 1973.

Town of Picton,
P. O. Box #1670,
Picton, Ontario.

Dear Sir:

This site (facility) does not meet the standards required by the Environmental Protection Act and Regulation.

A Provisional Certificate of Approval No. ~~350101~~ has been issued with an expiry date of ~~November 15, 1974~~. During this period the following improvements shall be implemented and maintained:

An attendant shall be present on the site whenever the site is open to receive waste.

All waste materials shall be covered with six (6) inches of earth cover material, daily, by a proper landfilling operation.

Procedures are to be established to control rodents and insects at the site.

The operation of the site (facility) will be inspected periodically prior to the expiry date of the certificate. Failure to comply with this program of upgrading the site (facility) may result in refusal to reissue this certificate or such other action as is available under the Act.

Yours truly,

W. Williamson P. Eng.,
Acting Director.

ONTARIO

Department of the Environment

For Head Office Use	
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2nd Sheet	
#	

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Provisional Certificate No. 350101

Under **The Environmental Protection Act, 1971** and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to

Town of Picton,

P.O. Box 1670, Picton, Ontario

for the Landfill Site

located Town of Marsh, Licence of Operation A1072

subject to the following conditions

1. That all fill areas bordering the creek are regraded to a maximum 30 degree slope, compacted and covered with two (2) feet of clean earth fill. (Davidson's letter of March 9, 1972). This work to be completed by June 15, 1972.

2. That a minimum separation of twenty (20) feet be maintained between the creek and any deposited wastes.

3. That the site shall be properly closed or the installation of an approved isolation system be completed no later than November 15, 1972.

SUBJECT AS WELL TO THE CONDITIONS SET OUT ON THE ATTACHED SHEET.

This Provisional Certificate expires on the 15th day of November, 19 72

Dated this 10th day of May, 19 72

Director, Waste Management Branch

Ontario

Ministry of the Environment

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Provisional Certificate No. 350101

Under **The Environmental Protection Act, 1971** and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to

Town of Picton,

P. O. Box #1670, Picton, Ontario

for the Landfill Site

located Town of Marsh,

Licence of Operation #1072

subject to the following conditions

DEPARTMENT OF THE ENVIRONMENT ONTARIO
JUN 8 1973
WASTE MANAGEMENT BRANCH KINGSTON OFFICE

This Provisional Certificate expires on the 30th day of November, 19 73

Dated this 30th day of May, 19 73

Director, Waste Management Branch

Ontario

Ministry of the Environment **Ministère de l'Environnement**

AMENDED PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A350104

The Corporation of the County of Prince Edward
PO Box 1550
Picton, Ontario
K0K 2T0

Site Location: Picton Waste Transfer Site
37 Church Street
Prince Edward County,

You have applied in accordance with Section 27 of the Environmental Protection Act for approval of:

For the use and operation of a 0.4 hectare Waste Disposal Site (Recycling and Transfer Station) for the collection and transfer of municipal waste generated by the Picton, Hallowell and North Marysburgh Wards within the County of Prince Edward.

Note: Use of the site for any other type of waste is not approved under this Certificate, and requires obtaining a separate approval amending this Certificate.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

(a) "*Certificate*" means this entire *provisional certificate of approval* document, issued in accordance with section 39 of the *EPA*, and includes any schedules to it, the application and the supporting documentation listed in Schedule "A" and Schedule "B";

(b) "*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*;

(c) "*District Manager*" means the *District Manager* of the local district office of the *Ministry* in which the site is geographically located;

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

(e) "*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;

(f) "*Owner*" means any person that is responsible for the establishment or operation of the site being approved by this *Certificate*, and includes the Corporation of the County of

Prince Edward, its successors and assigns;

(g) "*OWRA*" means the *Ontario Water Resources Act*, R.S.O. 1990, c. O-40, as amended from time to time;

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

(i) "*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*;

(j) "*Regional Director*" means the Regional Director of the local Regional Office of the *Ministry* in which the *Site* is located;

(k) "*Reg. 347*" means Regulation 347, R.R.O. 1990, made under the *EPA*, as amended from time to time;

(l) "*Site*" means the entire waste transfer site, located at 37 Church Street, Picton, Ontario, approved by this *Certificate*;

(m) *"Trained personnel"* means 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 processes and wastes to be handled;
   d. management procedures including the use and operation of equipment for the processes and wastes to be handled;
   e. emergency response procedures;
   f. specific written procedures for the control of nuisance conditions;
   g. specific written procedures for refusal of unacceptable waste loads;
   h. the requirements of this *Certificate*.

(n) "*white goods which contain refrigerants*" means white goods which contain, or may contain refrigerants, and which include, but are not restricted to refrigerators, freezers and air-conditioning systems;

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

TERMS AND CONDITIONS

GENERAL

Compliance

1. This Provisional Certificate of Approval supersedes and replaces Provisional Certificate Number A350104 issued on November 1, 1991.

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

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

4. Except as otherwise provided by this *Certificate*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the application for this *Certificate*, dated June 29, 2004, and the supporting documentation listed in Schedule "A".

Interpretation

5. Where there is a conflict between a provision of any document, including the application, referred to in this *Certificate*, and the conditions of this *Certificate,* the conditions in this *Certificate* shall take precedence.

6. Where there is a conflict between the application and a provision in any documents 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.

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

8. The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

Other Legal Obligations

9. The issuance of, and compliance with the conditions of, this *Certificate* 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 *Certificate*;

10. 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.

11. Despite an Owner, Operator or any other person fulfilling any obligations imposed by this certificate the person remains responsible for any contravention of any other condition of this *Certificate* 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 Owner

12. 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:
    a. the ownership of the *Site;*
    b. the *Operator* of the *Site;*
    c. the address of the *Owner* or *Operator*;
    d. the partners, where the *Owner* is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c. B-17 shall be included in the notification;
    e. the name of the corporation where the *Owner* is or at any time becomes a corporation, other than a municipal corporation, and a copy of the most current information filed under the *Corporations Information Act*, R.S.O. 1990, c. C-39 shall be included in the notification.

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

Inspections

14. No person shall hinder or obstruct a *Provincial Officer* in the performance of their duties, including any and all inspections authorized by the *OWRA*, the *EPA* or the *PA* of any place to which this *Certificate* relates, and without limiting the foregoing to:
    a. enter upon the premises where the *Site* are located, or the location where the records required by the conditions of this *Certificate* are kept;
    b. have access to, inspect, and copy any records required by the conditions of this *Certificate*;
    c. inspect the practices, procedures, or operations required by the terms conditions of this *Certificate*; and
    d. sample and monitor for the purposes of assessing compliance with the conditions of this *Certificate* or the *EPA*, the *OWRA* or the *PA.*

Information and Record Retention

15. Any information requested, by the *Ministry*, concerning the *Site* and its operation under this *Certificate*, including but not limited to any records required to be kept by this *Certificate* shall be provided to the *Ministry,* upon request. Records shall be retained for 5 years except for as otherwise authorized in writing by the *Director*.

16. 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 *Certificate* 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 *Certificate* or any statute, regulation or other legal requirement; or
    b. acceptance by the *Ministry* of the information's completeness or accuracy.

OPERATION and MAINTENANCE

Operation

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

Vermin, etc.

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

Waste Type

19. Only the following types of waste shall be accepted at the *Site*:
    a. Municipal waste;

Waste Storage

20. Outdoor storage is limited to leakproof bins if waste has the potential to produce contaminate runoff and must be covered if waste is susceptible to blowing, at the end of each operating day to prevent wind-blown litter and contaminate runoff.

21. With respect to accepting *white goods which contain refrigerants*, the *Owner* shall ensure that:
    a. all white goods which contain refrigerants which have not been tagged by a

licensed technician to verify that the equipment no longer contains refrigerants, are stored in a separate area in an upright position; and

b. white goods which contain refrigerants received on-site shall be shipped off-site in order to have the refrigerants removed by a licensed technician in accordance with Ontario Regulation 189; or

c. the refrigerant is removed on-site from white goods by a licensed technician, in accordance with Ontario Regulation 189, prior to shipping white goods off-site; and

d. a detailed log of all white goods which contain refrigerants received is maintained. The log shall include the following:

   i. date of the record;

   ii. types, quantities and source of white goods which contain refrigerants received;

   iii. details on removal of refrigerants as required by Ontario Regulation 189; and

   iv. the quantities and destination of the white goods and/or refrigerants transferred from the Site.

Waste Limits

22. No more than 20 tonnes (200 cubic yards) of waste per day shall be accepted at the *Site*.

23. No more than 20 tonnes (200 cubic yards) of waste shall be stored or be present on-site at any time. If for any reason waste cannot be transferred from the *Site*, the *Site* must cease accepting waste. Schedule "B" provides a further breakdown of waste allowed to be stored on *Site*.

Service Area

24. Only waste that is generated from within the geographical boundaries of the Picton, Hallowell and Marysburgh Wards within the County of Prince Edward shall be accepted at the *Site*.

Hours of Operation

25. Waste shall only be accepted at the *Site* during the following time periods:
08:00 - 21:00; Wednesday and Saturday only

26. With the prior written approval of the *District Manager*, the time periods may be extended to accommodate seasonal or unusual quantities of waste.

Site Security

27. The *Site* shall be operated and maintained in a secure manner, such that unauthorized persons cannot enter the *Site*.

Waste Inspection

28. All waste shall be inspected by *Trained personnel* prior to being accepted at the *Site* to ensure that the waste is of a type approved for acceptance under this *Certificate*.

29. In the event that load of waste is refused, a record shall me made in the daily log book of the reason the waste was refused and the origin of the waste, if known.

Site Inspection

30. An inspection of the entire *Site* and all equipment on the *Site* shall be conducted each day the *Site* is in operation to ensure that: the *Site* is secure; that the operation of the *Site* is not causing any nuisances; that the operation of the *Site* is not causing any adverse effects on the environment and that the *Site* is being operated in compliance with this *Certificate* . Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the *Site* if needed.

31. A record of the inspections shall be kept in the daily log book that includes the following information:
    a. the name and signature of person that conducted the inspection;
    b. the date and time of the inspection;
    c. a list of any deficiencies discovered;
    d. any recommendations for remedial action; and
    e. the date, time and description of actions taken.

Training Plan

32. A training plan shall be developed and maintained for all employees that operate the *Site*. Only *Trained personnel* may operate the *Site* or carry out any activity required under this *Certificate*.

33. The *Owner* shall ensure that *Trained personnel* as per Condition 28 are available at all times during the hours of operation of this *Site*. *Trained personnel* shall supervise all transfer or processing of waste material at the *Site*.

Complaint Response

34. 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. record and number each complaint, either electronically or in a separate log book, and shall include the following information:
    b. the nature of the complaint,
    c. if complaint is odour or nuisance related, the weather conditions and wind direction at the time of the complaint;
    d. the name, address and the telephone number of the complainant (if provided) and

e. the time and date of the complaint;
f. 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
g. 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.

Emergency Response Plan

35. Within 3 months of the date of this *Certificate*, an Emergency Response Plan for shall be developed and implemented for the Site. The Plan shall include, but is not necessarily limited to:
    a. emergency response procedures to be undertaken in the event of a spill or process upset, including specific clean up methods for each different type of waste the site is approved to accept;
    b. a list of equipment and spill clean up materials available in case of an emergency
    c. notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

36. The Emergency Response Plan shall be kept up to date, and a copy shall be retained in a central location on the *Site* and shall be accessible to all staff at all times. Changes to the Emergency Response Plan shall be submitted to the *Director* for approval.

37. A copy of the Emergency Response Plan shall be submitted to the to the *Director* for approval with a copy to the *District Manager*, the local Municipality and the Fire Department.

38. The equipment, materials and personnel requirements outlined in the Emergency Response Plan shall be immediately available on the *Site* at all times. The equipment shall be kept in a good state of repair and in a fully operational condition.

39. All staff that operate the site shall be fully trained in the use of the contingency and emergency response plan, and in the procedures to be employed in the event of an emergency.

40. The *Owner* shall immediately take all measures necessary to contain and clean up any spill or leak which may result from the operation of this *Site* and immediately implement the emergency response plan if required.

Closure Plan

41. The *Owner* must submit, for approval by the Director, a written Closure Plan for the *Site* six (6) months prior to closure of the Site. This plan must include, as a minimum, a description of the work that will be done to facilitate closure of the Site and a schedule for completion of that work; and

42. The *Site* shall be closed in accordance with the approved *Closure Plan.*

43. Within 10 days after closure of the *Site*, the Owner shall notify the Director, in writing, that the Site is closed and that the approved Closure Plan has been implemented.

Design and Operation Report

44. The Design and Operations Report shall be retained at the *Site*; kept up to date through periodic revisions; and be available for inspection by *Ministry* staff. Changes to the Design and Operations Report shall be submitted to the *Director* for approval.

Signs

45. A sign shall be posted and maintained at the main entrance/exit to the site displaying in a manner that is clear and legible up and contain the following information:
    a. the name of the *Site* and *Owner*;
    b. the number of this *Certificate*;
    c. the name of the operator (if applicable);
    d. the normal hours of operation;
    e. the allowable and prohibited waste types;
    f. a telephone number to which complaints may be directed;
    g. a twenty-four (24) hour emergency telephone number (if different from above);
    h. a warning against dumping outside the Site;

Labelling

46. Each designated areas (as identified in item 5, drawing SP1-B in Schedule "A") containing waste storage containers shall have a label or sign with the following information: total number of containers, total volume, type and waste characteristic. The label or sign shall be clearly visible for inspection and record keeping.

Daily Log Book

47. A daily log shall be maintained in written format and shall include the following information:
    a. date;
    b. types (class and primary characteristic), quantities and source of waste received;
    c. quantity of unprocessed, processed and residual waste on the *Site*;

d. quantities and destination of each type of waste shipped from the *Site*;
e. a record of daily inspections required by this *Certificate;*
f. a record of any spills or process upsets at the site, the nature of the spill or process upset and the action taken for the clean up or correction of the spill, the time and date of the spill or process upset, and for spills, the time that the *Ministry* and other persons were notified of the spill in fulfilment of the reporting requirements in the *EPA;*
g. a record of any waste refusals which shall include; amounts, reasons for refusal and actions taken;
h. and the signature of the *Trained Personnel* conducting the inspection and completing the report.

Annual Report

48. By March 31, 2005, and on an annual basis thereafter, a written report shall be prepared for the previous calendar year ("*Annual Report*"). The Annual Report shall be submitted to the *District Manager* on March 31 of each year. The report shall include, at a minimum, the following information:
    a. a detailed monthly summary of the type and quantity of all incoming and outgoing wastes and the destination of all outgoing wastes;
    b. any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the *Site* and during the facility inspections and any mitigative actions taken;
    c. any changes to the Emergency Response Plan and the Design and Operations Report that have been approved by the *Director* since the last *Annual Report;*
    d. any recommendations to minimize environmental impacts from the operation of the *Site* and to improve *Site* operations and monitoring programs in this regard.

Schedule "A"

This Schedule "A" forms part of Certificate of Approval No. A350104.

1. Application for a Provisional Certificate of Approval for a Waste Disposal Site signed by Mr. Ray Ford, Deputy Public Works Engineer, The Corporation of the County of Prince Edward, dated June 29, 2004.

2. Design & Operation Plan, County of Prince Edward, Picton Waste Transfer Site, Certificate of Approval No. A350104, dated June 30, 2004.

3. Letter from Mr. Ray Ford, Deputy Public Works Engineer, The Corporation of the County of Prince Edward to Richard Saunders (MOE) responding to a request for additional information for the Design & Operation Plan dated October 14, 2004.

4. Letter from Mr. Ray Ford, Deputy Public Works Engineer, The Corporation of the County of Prince Edward to Richard Saunders (MOE) regarding public notification dated November 8, 2004.

5. Letter from Mr. Ray Ford, Deputy Public Works Engineer, The Corporation of the County of Prince Edward to Richard Saunders (MOE) regarding re-submitted plans, dated November 12, 2004:
   Drawings: SP1-A Existing Conditions, dated November 8, 2004;
   SP1-B Proposed Conditions, dated November 8, 2004;
   SP3 - Grading and Drainage Plan dated November 8, 2004.

Schedule "B"

This Schedule "B" forms part of Certificate of Approval No. A350104.

1. Breakdown of waste stored on site:
    a. Municipal waste (domestic non-recyclables) - stored in 5 X 30 cubic yard containers (15 tonnes);
    b. Recyclables from Schedule 1 of O.Reg. 101/94 excluding corrugated cardboard - stored in 25 X one cubic yard containers;
    c. Corrugated cardboard - stored in 3 X 6 cubic yard containers;
    d. Scrap metal and white goods - stored in one X 5 cubic yard container.

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

REASONS

1. The reason for Condition 1 is to clarify that the previously issued *Certificate* of Approval No. A350104 issued on November 1, 1991 as amended on February 10, 1992 are no longer in effect and have been replaced and superseded by the Terms and Conditions stated in this *Certificate*.

2. The reason for Conditions 2, 3, 5, 6, 7, 8, 9, 10, 11, 15, and 16 are to clarify the legal rights and responsibilities of the *Owner* and *Operator*.

3. The reason for Conditions 4 and 44 are to ensure that the *Site* is operated in accordance with the application and supporting documentation submitted by the Company, and not in a manner which the *Director* has not been asked to consider.

4. The reasons for Condition 12 is to ensure that the *Site* is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the *Director* is informed of any changes.

5. The reasons for Condition 13 is to restrict potential transfer or encumbrance of the *Site* without the approval of the *Director* and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this *Certificate* of Approval.

6. The reason for Condition 14 is to ensure that appropriate Ministry staff have ready access to the *Site* for inspection of facilities, equipment, practices and operations required by the conditions in this *Certificate* of Approval. This condition is supplementary to the powers of entry afforded a *Provincial Officer* pursuant to the *EPA* and *OWRA*.

7. The reason for Conditions 17, 18, 20, 21, 30, 38, and 46 are to ensure that the *Site* is operated in a manner which does not result in a nuisance or a hazard to the health and safety of the environment or people.

8. The reasons for Conditions 19, 22, 23, and 24 are to specify the approved service area from which waste may be accepted at the Site, the types of waste that may be accepted at the *Site*, the amounts of waste that may be stored at the Site and the maximum rate at which the Site may receive waste based on the Company's application and supporting documentation.

9. The reasons for Conditions 25 and 26 are to specify the hours of operation for the *Site* and a mechanism for amendment of the hours of operation, as required.

10. The reasons for Condition 27 is to ensure the controlled access and integrity of the *Site* by preventing unauthorized access when the Site is closed and no site attendant is on duty.

11. The reason for Conditions 28 and 29 are to ensure that all wastes are properly classified to ensure that they are managed, processed and disposed in accordance with O. Reg. 347, R.R.O. 1990 and in a manner that protects the health and safety of people and the public.

12. The reason for Condition 31 is to ensure that detailed records of *Site* inspections are recorded and maintained for inspection and information purposes.

13. The reason for Condition 32 and 33 are to ensure that the *Site* is operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.

14. The reason for Condition 34 is to ensure that any complaints regarding *Site* operations at the *Site* are responded to in a timely manner.

15. The reasons for Conditions 35, 36, 37, 38, 39 and 40 are to ensure that an Emergency Response Plan is developed and maintained at the *Site* and that staff are properly trained in the operation of the equipment used at the *Site* and emergency response procedures.

16. The reasons for Condition 41, 42 and 43 are to ensure that the *Site* is closed in accordance with Ministry standards and to protect the health and safety of the public and the environment.

17. The reason for Condition 45 is to ensure that users of the *Site* are fully aware of important information and restrictions related to *Site* operations and access under this Certificate of Approval.

18. The reasons for Condition 47 is to provide for the proper assessment of effectiveness and efficiency of site design and operation, their effect or relationship to any nuisance or environmental impacts, and the occurrence of any public complaints or concerns. Record keeping is necessary to determine compliance with this *Certificate* of Approval, the *EPA* and its regulations.

19. The reasons for Condition 48 is 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.

This Provisional Certificate of Approval revokes and replaces Certificate(s) of Approval No. A350104 issued on November 1, 1991

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as

amended, 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 approval or each term or condition in the 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.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of Environment and Energy
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) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 20th day of December, 2004

Ian Parrott, P.Eng.
Director
Section 39, *Environmental Protection Act*

RS/
c: District Manager, MOE Belleville
Bryan Robson, The Corporation of the County of Prince Edward

Ontario

Ministry of the Environment — Waste Management Branch

Provisional Certificate No. 350102

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Town of Picton,
P. O. Box 1670, Picton, Ontario.

for the Landfill Site.

located Lot #1298,
Town of Picton.

subject to the following conditions:

1. That only the following waste shall be deposited at the site: wood wastes such as brush and demolition lumber.

DEPARTMENT OF THE ENVIRONMENT
JAN 8 1974
WASTE MANAGEMENT BRANCH
KINGSTON OFFICE

This Provisional Certificate expires on the 30th day of November, 1974

Dated this 21st day of December, 1973.

DIRECTOR, WASTE MANAGEMENT BRANCH

MOE 14-201

9 Tooley

Ontario
Ministry of the Environment

Provisional Certificate No.
361701

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Kaladar Planning Mills Limited,
P. O. Box 280,
Tweed, Ontario.

for the landfilling Site
located lot 8, concession 10,
Township of Hungerford.

subject to the following conditions:

1. Wood Wastes to be graced and landfilled at least (3) three times yearly. Landfilling must form complete cells.

1973

MINISTRY
OF THE ENVIRONMENT
ONTARIO
AUG 7 1975
BELLEVILLE OFFICE

This Provisional Certificate expires on the 31st day of December, 1976

Dated this 1st day of September, 1975

DIRECTOR, SECTION 3 (a) E.P.A.

Ontario

Ministry of the Environment

NOTICE

TO: Kaladar Planning Mills Limited,
P. O. Box 280,
Tweed, Ontario.

You are hereby notified that Provisional Certificate of Approval No. 361701 has been issued to you subject to the conditions outlined therein.

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

To prevent fires

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

Environmental Appeal Board,
365 Bay Street,
Suite 900,
Toronto, Ontario.
M5H 2V3

AND

The Director,
Section 3a, E. P. A.,
Ministry of the Environment,
135 St. Clair Ave. West,
Toronto, Ontario.
M4V 1P5.

DATED at Toronto this 1st day of September, 1975.

D. P. Caplice

Director,
Section
Ministry of the Environment.

MOE 14 251

Ministry of the Environment

Ontario

File	A
Issue	
Re-issue	
Up-grade	

RECOMMENDATION OF REGIONAL ENGINEER

NOTE: This form shall be submitted by the Regional Engineer to Head Office along with the application form and all supporting information.

APPLICANT: Kalator Planning Mills Limited

Box 350 Tweed ont.

FOR THE WASTE DISPOSAL SITE ✓

LOCATED AT: Lot 8 Concession 10

Twp. of Huntingford

FOR THE WASTE MANAGEMENT SYSTEM ✓

SERVING: Tue Above.

DATE APPLICATION RECEIVED

FILE: A

ISSUE Certificate of Approval ☐ Provisional Certificate of Approval ✓

PROVISION CERTIFICATE TO EXPIRE ON: Dec 31/76.

CONDITIONS

Disposal Site Wood Wastes To Be Burned Crushed & Land Filled At Least 3 Times Yearly. Land Fieing West from Complete Cells To Prevent Fires.

CIRCULATE TO

REASONS FOR CIRCULATION

Refuse Application ☐ Revoke ☐ Suspend ☐ Refuse to re-issue ☐ Cert. No. _____

REASONS

DATE: Dec 31/75 SIGNED: _____ REGION: South Eastern #4.

Ontario

Ministry of the Environment — Waste Management Branch

Provisional Certificate No. 361701

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A
WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to: Kaladar Planning Mills,
Box #280, Tweed, Ontario

for the Landfill Site.

located Lot 8, Concession 10,
Township of Hungerford

DEPARTMENT OF THE ENVIRONMENT
FEB 11 1974
WASTE MANAGEMENT BRANCH
KINGSTON OFFICE

subject to the following conditions:

That only the following waste shall be deposited at the site:
wood wastes, including wood shavings, sawdust and short lengths of wood.

This Provisional Certificate expires on the 31st day of August, 1974

Dated this 5th day of February, 1974.

DIRECTOR, WASTE MANAGEMENT BRANCH

Gary C. Newman

MOE 14-201

Ministry of the Environment

Ontario

NOTICE

TO: **Kaladar Planning Mills,**
Box #280,
Tweed, Ontario

You are hereby notified that Provisional Certificate of Approval No. **361701** has been issued to you subject to the conditions outlined therein.

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

Your application for the use of this site was limited to these materials.

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

Environmental Appeal Board,
365 Bay Street,
Suite 300,
Toronto, Ontario.
M5H 2V3

AND

The Director,
Waste Management Branch,
Ministry of the Environment,
880 Bay Street, 3rd Floor,
Toronto, Ontario.
M5S 1Z8.

DATED at Toronto this **5th** day of **February**, 19**74**.

Director,
Waste Management Branch,
Ministry of the Environment.

MOE 14/13 5/73

FROM J.W. Dooley DEPARTMENT

SEND TO File # 361701

DATE Oct. 3/73

SUBJECT WDS L & C X
Hungerford twp

MESSAGE

The writer inspected the above-mentioned site on Sept. 11/73. It appears to be operating with little or no problem.

cc: R. Hotts

USE LOWER PORTION FOR REPLY REPLY FROM DATE

GRAND & TOY

Ontario

Ministry of the Environment

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Provisional Certificate No. 361701

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to

Kaladar Planning Mills Limited,

Box #280, Tweed, Ontario.

for the Landfill Site

located Lot 8, Concession 10,

Township of Hungerford

subject to the following conditions

1. That the site shall be used for the disposal of clean wood wastes only.

This Provisional Certificate expires on the 31st day of December, 19 73

Dated this 22nd day of June, 19 73

Director, Waste Management Branch

Ministry of the Environment

Ontario

NOTICE

TO: **Kaladar Planning Mills Limited,**
Box #280,
Tweed, Ontario.

You are hereby notified that Provisional Certificate of Approval No. **361701** has been issued to you subject to the conditions outlined therein.

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

Your application for approval of the site as a landfill site was limited to the use of the site for these materials.

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

Environmental Appeal Board,
365 Bay Street,
Suite 300,
Toronto, Ontario.
M5H 2V3

AND

The Director,
Waste Management Branch,
Ministry of the Environment,
880 Bay Street, 3rd Floor,
Toronto, Ontario.
M5S 1Z8.

DATED at Toronto this **22nd** day of **June**, 19**73**.

Director,
Waste Management Branch,
Ministry of the Environment.

MOE 1421J 5/73

Ontario

Ministry of the Environment

Waste Management Branch,
880 Bay Street, 3rd Floor,
Toronto, Ontario,
M5S 1Z8.

SITE RESUME

Date: April 27/73

Applicant: Kaladar Planing Mills Ltd. File No. 361701

Location: Lot 8, Conc. X, Hungerford Twp.

Common Name (if applicable) n/a

Municipalities Served: Kaladar Planing Mills

Population Served _____ Type of Site Landfill

No. of Inspections: 1 Date of Last Inspection: June 2/72

Upgrading proceeding under an Approved Program: Yes _____ No x

Applicant's Attitude: Retarding the Efforts of Branch ____ Adequate _____

Current Status of Site:

Location:

Private wood waste disposal site, put on certificate to simplify water sampling. Past policy of Branch has been "hands off" on wood waste disposal. No conditions put on site except that wood wastes only be dumped.
Unsatisfactory 10 (1) 5, 17.

Operations:

Unsatisfactory 10 (1) 4, 5, 9, 13, 14, 15.

Ontario

Ministry of the Environment

Waste Management Branch

FOR MOE USE ONLY	
File	A
Issue	
Re-issue	
Up-grade	

RECOMMENDATION OF REGIONAL ENGINEER

NOTE. This form shall be submitted by the Regional Engineer to Head Office along with the application form and all supporting information.

APPLICANT

FOR THE WASTE DISPOSAL SITE ☐ Wood Waste Disposal

FOR THE WASTE MANAGEMENT SYSTEM ☐

LOCATED AT

SERVING

DATE APPLICATION RECEIVED

FILE A

ISSUE Certificate of Approval ☐ Provisional Certificate of Approval ☐

PROVISION CERTIFICATE TO EXPIRE ON

CONDITIONS

CIRCULATE TO

REASONS FOR CIRCULATION

Refuse Application ☐ Revoke ☐ Suspend ☐ Refuse to re-issue ☐ Cert. No.

REASONS

DATE

SIGNED F. J. Dick (Regional Engineer)

REGION

DISTRICT(S)

WASTE MANAGEMENT BRANCH

RECOMMENDATION OF REGIONAL ENGINEER

FOR HEAD OFFICE USE	
FILE	A
ISSUE	
RE-ISSUE	
UP-GRADE	

NOTE: This form shall be submitted by the Regional Engineer to Head Office along with the application form and all supporting information.

APPLICANT: Kaladar Planning Mills Limited

FOR THE WASTE DISPOSAL SITE [x] WASTE MANAGEMENT SYSTEM [ ]

LOCATED AT Lot 8, Concession 10, Twp. of Hungerford

SERVING

DATE APPLICATION RECEIVED: n/a File: A 361701

ISSUE: Certificate of Approval [ ] Provisional Certificate of Approval [x] Provisional Certificate to Expire On MAY-8 DEC. 31/73

CONDITIONS:

(1) THAT THE SITE IS USED FOR THE DISPOSAL OF CLEAN WOOD WASTES ONLY.

CIRCULATE TO:

REASONS FOR CIRCULATING:

REFUSE APPLICATION: [ ]

REVOKE [ ] SUSPEND [ ] REFUSE TO RE-ISSUE [ ] (Cert. No.....)

REASONS:

DATE: MAY 16, 1973 SIGNED: E. J. Duncan (Regional Engineer)

ADMASTON Region

FORM WM-306-2-72

WASTE MANAGEMENT BRANCH

RECOMMENDATION OF REGIONAL ENGINEER

NOTE: This form shall be submitted by the Regional Engineer to Head Office along with the application form and all supporting information.

APPLICANT: Kaladar Planing Mills Limited

FOR THE WASTE DISPOSAL SITE [x] | WASTE DISPOSAL SYSTEM [ ]

LOCATED AT Lot 8, Conc. X | SERVING

Township of Hungerford

DATE APPLICATION RECEIVED: March 9, 1972 A-2612

ISSUE: Certificate of Approval [ ] Provisional Certificate of Approval [x] Provisional Certificate to Expire on May 24, 1973

CONDITIONS:

1) site to be used for clean wood wastes only.

CIRCULATE TO:

REASONS FOR CIRCULATING:

REFUSE APPLICATION: [ ]

REVOKE [ ] SUSPEND [ ] REFUSE TO RE-ISSUE [ ] (Cert. No. .....)

REASONS:

DATE: May 15, 1972 SIGNED: .....

..... Region

Form WM-2(C)-72

Waste Management Branch

SUPPORTING INFORMATION TO AN APPLICATION FOR APPROVAL OF A LANDFILL DISPOSAL SITE

1. Wastes to be Disposed of Comprise

Domestic	.....%
Commercial	.....%
Industrial Waste	...100...%
Hauled Liquid Industrial Waste	.....%
Agricultural Waste	.....%
Hazardous Waste	.....%
Hauled Sewage	.....%
*Other	.....%
	100%

*Describe.....

Total..... Tons/Day

Population Served.....

2. Origin and [illegible] of Municipal Components of Waste (other than commercial)

3. Distance to Nearest Watercourse A [illegible] ...Ft.
Distance to Source of Potable Water " .....Ft.
Distance to Dwelling " ...500...Ft.
Distance to Public Road " .....Ft.
Distance to Cemetery .....Ft.

Total Area of Site .....12.....Acres
Anticipated Life .....5.....Years

General Description of Site

4. Maximum Depth of Excavation
Below Surface .....Ft.
Maximum Depth of Fill
Above Surface .....Ft.
Type(s) of Material Encountered From Surface

Depth of Water Table [illegible] .....Ft.
on ..... (Date)

5. Proposed Future Land Use

6. Operating Equipment

Hours of Operation

7. The Following Documents are Attached

Prepared by

DATED.....

SIGNED.....

FOR DEPARTMENTAL USE

8. Authority Contacted

Health Unit	Approval	☐ No Objection
C.V.R.C.	Approval	☑ No Objection
A.R.D.	Approval	☐ No Objection
Municipality	Approval	☐ No Objection
Conservation Authority	Approval	☐ No Objection

Other.....

Inspection Report Attached

Regional Engineer's Report Attached ☐

RECOMMENDATIONS

DATED.....

SIGNED.....

W.M.B. Form No. 2.07

Department of Energy and Resources Management

Waste Management Branch

APPLICATION FOR A CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

TO: THE DEPARTMENT OF ENERGY AND RESOURCES MANAGEMENT
680 Bay Street,
Toronto, Ontario

Forward Through Regional Director of Engineering

X (1) Under the Waste Management Act, 1970 and the regulations, this application is made by.....

.....

(Name of Person)

Address

X (2) for the Renewal / Issue of a Certificate of Approval for a

.....Site

Delete non-applicable

Type of Disposal

X (3) located .....

.....

Full particulars of Location

(4) A Certificate / Provisional Certificate of Approval No. .....for this site was issued.....19.....

Delete non-applicable

(5) No change in use, operation, or ownership of the site has occurred since the date of the original application.

Dated this.....day of.....19.....

.....

Signature of Applicant

(6) The following changes in use, operation or ownership (have occurred since the date of the original application) (are proposed)

Delete non-applicable

If necessary, provide additional information on separate sheets and attach to application.

.....

.....

Continued on Attached Sheets ☐

X (7) The site will be operated in accordance with The Waste Management Act, 1970 and the regulations by.....

.....

Name of Operator

Address

The required supporting information to the application is appended hereto.

(8) Notice of this application has been published in the.....

.....on....., ...and

.....19..... and a copy of the notice is attached.

(9) A certificate that the site does not contravene any of the by-laws of the municipality is attached.

To be completed if applicant is other than a municipality

Sub-Paragraphs 1 to 9 on Each of Two Copies which is to be submitted by Applicant.

Dated this.....day of.....19.....

.....

Signature of Applicant

For Ontario Paper Registry

ONTARIO

Ministry of the Environment

For Head Office Use	
O	R
2nd Sheet	
#	

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Provisional Certificate No. 361701

Under **The Environmental Protection Act, 1971** and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to

Kaladar Planing Mills Limited,

Box #280, Tweed, Ontario

for the Landfill Site

located Lot 8, Concession 10,

Township of Hungerford

subject to the following conditions

1. That the site is used for the disposal of clean wood wastes only.

DEPARTMENT OF THE ENVIRONMENT
JUL 13 1972
WASTE MANAGEMENT BRANCH
KINGSTON OFFICE

This Provisional Certificate expires on the 31st day of May, 19 73

Dated this 7th day of July, 19 72.

J. D. Keenan

Director, Waste Management Branch

FORM WM 308-2-72

Township of Hungerford
JAMES KINLIN, CLERK-TREASURER
P. O. BOX 568
TWEED - ONTARIO

March 8,1972

Department Of The Environment,

Waste Management Branch,

797 Princess Street,

Kingston,Ont.

Mr. J.W. Tooley,

Inspector,Mideastern Region

Dear Mr. Tooley;

This is to certify that " The Dump Disposal Site Located At Lot 8,Concession 10,Township Of Hungerford For Which An Application For Approval Is Being Made By Kaladar Planing Mills Limited Does Not Contravene Any Of The By-Laws Of The Municipality Of Hungerford"

James Kinlin
Clerk Township Of Hungerford

ONTARIO

Department of Energy and Resources Management

PROVISIONAL CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

Certificate No. 360102

Under **The Waste Management Act, 1970** and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to

The Corporation of the City of Belleville
City Hall
Belleville, Ontario

for the landfill Site

located Original Township Lots 2 and 3, Concession 1,
City of Belleville

subject to the following conditions

1. Site to be closed in a manner acceptable to this Branch by the expiry date.

This Provisional Certificate expires on the 15th day of May 1971.

Dated this 12th day of February 1971.

Director, Waste Management Branch

W.M.B. Form 2.03

(1) DATE APPLICATION RECEIVED: February 3, 1971 File: A 3601

(2) APPLICANT: Corporation of the City of Belleville

(3) ISSUE: Certificate of Approval ☐

Provisional Certificate of Approval ☒

(4) TIME: Provisional Certificate to Expire ~~in~~ MAY 7, 1971 ~~months from date of issue.~~

(5) CONDITIONS OF ISSUE:

1) SITE TO BE CLOSED IN A MANNER ACCEPTABLE TO THIS BRANCH BY THE EXPIRY DATE.

---

(6) DO NOT ISSUE: REFUSE APPLICATION ☐

REVOKE (Cert. No.....) ☐

(7) REASONS FOR (6)

---

(8) DEFER: CIRCULATE TO:

FOR:

---

(9) DATE: FEB. 5/71 SIGNED: [signature]
Regional Engineer

(OPERATION SATISFACTORY. SEE LETTER OF DEC. 23, 1970 FROM J. R. REYNOLDS, CITY MANAGER.)
TF

(1) Under the Waste Management Act, 1970 and the regulations, this application is made by The Corporation of the City of Belleville — *Owner of Facility*

City Hall, Belleville, Ontario — *Address*

(2) for the ~~Renewal~~ / Issue of a Certificate of Approval for a — *Delete item inapplicable*

Landfilling Site — *Type of Disposal*

(3) located (See attached Description) — *Full particulars of Location*

(4) A Certificate / Provisional Certificate of Approval No. N.A. for this site was issued 19 — *Delete item inapplicable*

(5) No change in use, operation, or ownership of the site has occurred since the date of the original application.

Dated this day of 19

N.A.
Signature of Applicant

(6) The following changes in use, operation or ownership (have occurred since the date of the original application) (are proposed) — *Delete item inapplicable*

N.A. — *If necessary, provide additional details on separate sheets and attach to application.*

Continued on Attached Sheets ☐

(7) The site will be operated in accordance with The Waste Management Act, 1970 and the regulations by CORPORATION OF THE CITY OF BELLEVILLE — *Name of Operator*

CITY HALL, BELLEVILLE, ONT. — *Address*

The required supporting information to the application is appended hereto.

(8) Notice of this application has been published in the N.A.

on , and

19 and a copy of the notice is attached.

(9) A certificate that the site does not contravene any of the by-laws of the municipality is attached. — *To be completed if applicant is other than a municipality*

See notes on sections 1 to 9 on back of last copy (pink) which is to be retained by Applicant.

Dated this 26th day of November 19 70

Signature of Applicant (City Clerk) — *No Carbon Paper Required*

for the Corporation of the City of Belleville

W.M.B. Form 2-02

Hauled Sewage .....%
*Other .....%
100%

*Describe Provide for all wastes

Total ..... Tons/Day

Population Served 33093

3. Distance to Nearest Watercourse .....Ft.
Distance to Source of Potable Water .....Ft.
Distance to Dwelling .....Ft.
Distance to Public Road .....Ft.
Distance to Cemetery .....Ft.

Total Area of Site .....Acres
Anticipated Life .....Years
General Description of Site

Site is abutting bay of Quinte

4. Maximum Depth of Excavation
Below Surface .....Ft.
Maximum Height of Fill
Above Surface .....Ft.
Type(s) of Material Encountered
From Surface

.....Ft.

.....Ft.

.....Ft.

Depth of Watertable Below Surface.....Ft.
on ..... (Date).

5. Proposed Future Land Use

Parklands

6. Operating Equipment

Hours of Operation

7. The Following Documents are Attached

Prepared by

ADAM S. STALKER
CLERK
CITY OF BELLEVILLE

DATED November 26, 1970

SIGNED Adam S Stalker

FOR DEPARTMENTAL USE

8. Authorities Consulted:

Health Unit	☐ Objection	☒ No Objection
O.W.R.C.	☐ Objection	☐ No Objection
A.M.B.	☐ Objection	☐ No Objection
Municipality	☐ Objection	☐ No Objection
Conservation Authority	☐ Objection	☐ No Objection

Other

Inspection Record Forms Attached

Regional Engineer's Report Attached ☐

RECOMMENDATION

SEE FORM 2-11

DATED FEB 5/71

SIGNED

No Carbon Paper Required

Original Township Lots 2 and 3 in Concession I of the Township of Thurlow, now in the City of Belleville, containing an area of 35.24 acres, be the same more or less, and which said Water Lot may be more particularly described as follows:

PROMISING that the north limit of Dundas Street according to a Plan filed in the Registry Office for the said County as Number 9 has an astronomic bearing of N 49° 46' E derived from observation and relating all bearings herein, thereto;

COMMENCING at the north-west corner of the said Water Lot, being the south-east corner of Lot 77 according to H. Carre's Plan filed in the said Registry Office as Number 291, being distant 671.5 feet measured S 13° 05' E along the east limit of said Lot 77 from a point in the west limit of Mary Street according to a Plan filed in the said Registry Office as Number 14, distant 465.06 feet measured S 16° 02' E along the said west limit of Mary Street from a survey post planted in the said north limit of Dundas Street;

THENCE, southerly and south-westerly along the high water mark of the Bay of Quinte, according to a Plan of survey dated July 28, 1883, by W. Drewry, P.L.S., attached to Registered Instrument Number D-540 (Crown Grant to the City of Belleville) to the east limit of the Bay Bridge Road, formerly the King's Highway Number 14 as acquired by Registered Instrument Number 4066;

THENCE, S 8° 05' E, along the said east limit of Bay Bridge Road, 360 feet, more or less, to the high water mark of an island in the said Bay of Quinte known as "Bushy Island" and being Lot 75 according to a Plan by W. Purney filed in the said Registry Office as Memorial Plan Number C-358;

THENCE, South-easterly along the said high water mark of "Bushy Island" to a line drawn N 80° 23' E from a point in the said east limit of Bay Bridge Road distant 2161.54 feet measured S 8° 05' E thereon from its intersection with the south limit of Lot 4 according to said Registered Plan Number 9;

THENCE, N 80° 23' E, along said line, 1495 feet, more or less, to a point being distant 1640.0 feet measured easterly thereon from the said east limit of Bay Bridge Road;

THENCE, N 23° 12' W, 708.6 feet;

THENCE, N 69° 57' 30" W, 497.5 feet;

THENCE, N 13° 57' 30" W, 823.8 feet, more or less, to a line drawn N 76° 02' 30" E from the point of commencement;

THENCE, S 76° 02' 30" W, 258.5 feet to the said point of commencement.

The Water Lot as herein described being shown outlined in red on a plan and field notes of survey dated March 21, 1963, signed by T.S. Ranson, Ontario Land Surveyor, of record in the Department of Lands and Forests, Ontario, a duplicate of which plan and field notes is attached to and forms part of these Letters Patent.

.....(Sgd.)..T.S..Ranson.....
Ontario Land Surveyor

Sediment sample results for contaminants taken at sampling locations near the closed Zwick's Island landfill site, Belleville Ontario.

Parameter	Units	Table 1 Sediment Condition Standards	SED-SW4	SED1	200610602	SED2	2007
Aluminum	µg/g				21000		15700
Antimony	µg/g						2.5
Arsenic	µg/g	6			7.1		2.5
Barium	µg/g			9.8	190	6.5	185
Berylium	µg/g				0.8		0.6
Bismuth	µg/g						2.5
Cadmium	µg/g	0.6		0.6	1.5	0.5	1
Calcium	µg/g				25000		18300
Chromium	µg/g	26		24	61	47	54.2
Cobalt	µg/g	50			11		10.1
Copper	µg/g	16		30	45	21	48
Iron	µg/g			17600	27000	12300	25400
Lead	µg/g	31		<0.4	81	<0.4	74.3
Lithium	µg/g						13.7
Magnesium	µg/g				7600		7180
Manganese	µg/g			351	1100	468	1102
Mercury	µg/g	0.2			0.81		0.45
Molybdenum	µg/g				0.5		0.5
Nickel	µg/g	16			24		25.5
Niobium	µg/g						2.5
Potassium	µg/g						1100
selenium	µg/g				1.5		
Silver	µg/g	0.5					0.7
Sodium	µg/g						355
Strontium	µg/g				64		52.7
Tin	µg/g						10
Titanium	µg/g				670		527
Tungsten	µg/g						10
Vanadium	µg/g				40		27.5
Yttrium	µg/g						18.8
Zinc	µg/g	120		150	190	121	208
TOC	µg/g				110000		108000
tkn	µg/g				10000		
TOC%	µg/g						10.8
TN	µg/g						8600
TP	µg/g				1500		1600
Fluoranthene	µg/g	0.75					
Phenanthrene	µg/g	0.56					
PAH	µg/g						
PCB	µg/g	0.07			0.18		
Indeno(1,2,3-cd)pyrene	µg/g	0.2			0.2		

Acenaphtrene	µg/g		<0.0001	<0.001		0.008	
acenaphthylene	µg/g		0.0003	0.0072		0.007	
Anthracene	µg/g		0.0002	0.689		0.23	
Benzo(a)anthracene	µg/g	0.32	<0.0001	0.0722		0.026	
Benzo(a)pyrene	µg/g	0.37	<0.0001	<0.001		<0.001	
Benzo(b)fluoranthene	µg/g		0.001	<0.001		0.004	
Benzo(g,hi)perylene	µg/g	0.17	<0.0001	<0.001		<0.001	
Benzo(k)fluoanthene	µg/g	0.24	0.0008	<0.001		0.003	
chrysene	µg/g	0.34	<0.0001	0.14		0.057	
Dibenzo(a,h)anthracene	µg/g	0.06	<0.0001	<0.001		<0.001	
Fluoranthene	µg/g	0.75	0.00062	1.01		0.266	
Fluorene	µg/g	0.19	<0.0001	0.0344		0.025	
Indeno(1,2,3-c,d)pyrene	µg/g	0.2	<0.0001	<0.001	0.2	<0.001	
Napthalene	µg/g		<0.00005	0.0038		0.004	
Phenanthrene	µg/g	0.56	0.00026	0.645		0.216	
Pyrene	µg/g	0.49	0.00051	0.705		0.167	
Total PAH	µg/g		0.0037	3.307	1.8	1.012	
Total PCB	µg/g	0.07			0.18		

* red text denotes values higher than the Table 1 standard

Data Source: Table 4 and Table 22 cited in Biberhofer and Dunnett, 2006. Summary of recent sediment investigations for the Bay of Quinte, Lake Ontario. Environment Canada. National Water Research Institute. NWRI 06-229, September 2006.

Sediment sample results for contaminants taken at sampling locations near the closed Delhi Park Waste Disposal Site, Picton Ontario.

Parameter	Units	Table 1 Sediment Condition Standards	2031	EHD-6
Aluminum	µg/g		19500	37783
Antimony	µg/g		2.5	
Arsenic	µg/g	6	9.49	<5
Barium	µg/g		181	389
Berylium	µg/g		0.774	0.3
Bismuth	µg/g		2.5	
Cadmium	µg/g	0.6	1	1.3
Calcium	µg/g		15400	83285
Chromium	µg/g	26	49.1	52
Cobalt	µg/g	50	15.8	5
Copper	µg/g	16	45.1	215
Iron	µg/g		27200	18949
Lead	µg/g	31	73	89
Lithium	µg/g		17.2	6.9
Magnesium	µg/g		9710	7684
Managanese	µg/g		763	240
Mercury	µg/g	0.2	0.167	0.647
Molybdenum	µg/g		0.5	2
Nickel	µg/g	16	46.1	9
Niobium	µg/g		2.5	
Potassium	µg/g		2500	1301
Silver	µg/g	0.5	0.25	11.3
Sodium	µg/g		535	3706
Strontium	µg/g		61.4	218
Tin	µg/g		10	14
Titanium	µg/g		816	241
Tungsten	µg/g		10	
Vanadium	µg/g		35.4	28
Yttrium	µg/g		16.8	6.4
Zinc	µg/g	120	179	504
TOC	µg/g		98800	
TOC%	µg/g		9.88	2
TN	µg/g		12500	
TP	µg/g		1150	
Fluoranthene	µg/g	0.75		1.11
Phenanthrene	µg/g	0.56		0.852
PAH	µg/g			1.962
PCB	µg/g	0.07		0.11

* red text denotes values higher than th

Data Source: Table 7, 11 and 27 cited in Biberhofer and Dunnett, 2006. Summary of recent sediment investigations for the Bay of Quinte, Lake Ontario. Environment Canada. National Water Research Institute. NWRI 06-229, September 2006.

TABLE B: SUMMARY OF GROUNDWATER EXCEEDANCES

	MW2	MW3	MW4	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW14	MW15	MW16A	MW16B	MW17A	Table 9/09 O.Reg. 511/09 (µg/l) coarse grain	Table 3/09 O.Reg. 511/09 (µg/l) coarse grain
METALS																		
antimony																	16000	20000
arsenic																	1500	1900
barium																	23000	29000
boron																	36000	45000
cadmium																	2.1	2.7
copper																	69	87
lead																	20	25
mercury																	0.29	0.29
molybdenum																	7300	9200
nickel																	390	490
selenium																	50	63
silver																	1.2	1.5
zinc																	890	1100
PAHs																		
acenaphthene																	600	600
acenaphthylene																	1.4	1.8
anthracene																	1	2.4
benzo(a)anthracene																	1.8	4.7
benzo(b)fluoranthene																	0.75	0.75
benzo(a)pyrene																	0.81	0.81
benzo(g,h,i)perylene																	0.2	0.2
benzo(k)fluoranthene																	0.4	0.4
chrysene																	0.7	1
dibenzo(a,h)anthracene																	0.4	0.52
fluoranthene																	73	130
fluorene																	290	400
indeno(1,2,3-cd)pyrene																	0.2	0.2
phenanthrene																	380	580
pyrene																	5.7	68
bis(2-ethylhexyl)phthalate																	30	140
HYDROCARBONS																		
PHC F1																	420	750
PHC F2								550		5730	160						150	150
PHC F3					1200		1000	15200		9600	1900						500	500
PHC F4							1900	5800		9800	3900						500	500

Non-Potable within 30m of a waterbody 511/09

Non-Potable medium and fine grain 511/09

TABLE A: SOIL CHEMISTRY SUMMARY

	2004								2008							Table 9 O.Reg. 511/09 (µg/L) coarse grain	Table 3 O.Reg. 511/09 (µg/L) coarse grain
	BH4-01 0-0.6	BH5-01 0.8-1.4	BH5-05 2.9 - 3.5	BH6-03 1.8-2.4	BH7-04 2.7-3.4	BH9-03 2.4 - 2.9	BH10-01 0-0.6	BH10-06 3.1 - 3.7	BH14-S02 0.6-1.3	BH15-S01 0-0.6	BH16-S02 0.7-1.1	BH16-S03 1.1-1.5	BH17-S01 0-0.6	08-S01 0-0.05	08-S02 0.05-0.25		
METALS																	
antimony			3	4	5	12	2	4			4		3			1.3	7.5
arsenic											20					18	18
barium													259		265	220	390
boron																N/A or 36	1.5 or 120
cadmium			3.4	6.6		18.6		1.7			13.5		3.6		1.4	1.2	1.2
copper			110			1920	122				769					92	140
lead			389		1890	946		249			884		644	158	284	120	120
mercury		0.3									0.45		0.391	0.538	0.738	0.27	0.27
molybdenum			8		3	6					9					2	6.9
nickel																82	100
selenium											2.4					1.5	2.4
silver	4					4		1			2.5		1.4			0.5	20
zinc			375		294	3950		487			4730		681	335	509	290	340
PAHs																	
acenaphthene	-	-	-	-	-	-	-	-		0.158						0.072	58
acenaphthylene	-	-	-	-	-	-	-	-								0.093	0.15
anthracene	-	-	-	-	-	-	-	-	0.31		4.12		0.26			0.22	0.67
benzo(a)anthracene	-	-	-	-	-	-	-	-	1.11		23.3		1.06	0.550	0.643	0.36	0.95
benzo(b)fluoranthene	-	-	-	-	-	-	-	-	0.74		39.8		1.9	0.759	0.808	0.47	0.78
benzo(a)pyrene	-	-	-	-	-	-	-	-			20.6		1.08	0.636	0.774	0.3	0.3
benzo(g,h,i)perylene	-	-	-	-	-	-	-	-			15.1	6.43	0.8			0.68	6.6
benzo(k)fluoranthene	-	-	-	-	-	-	-	-			8.23		0.59			0.48	0.78
chrysene	-	-	-	-	-	-	-	-			19.7					2.8	7
dibenzo(a,h)anthracene	-	-	-	-	-	-	-	-			11.0		0.77	0.181	0.203	0.1	0.1
fluoranthene	-	-	-	-	-	-	-	-	1.17		30.6		1.33		1.25	0.69	0.69
fluorene	-	-	-	-	-	-	-	-								0.19	62
indeno(1,2,3-cd)pyrene	-	-	-	-	-	-	-	-			36.6		1.52	0.570	0.673	0.23	0.38
phenanthrene	-	-	-	-	-	-	-	-	1.07		17.4		1.42		2.03	0.69	6.2
pyrene	-	-	-	-	-	-	-	-			26.5				1.35	1	78
PHCs																	
PHC F3	-	-	-	-	-	-	-	-	200		1000		230	170		50	300
PHC F4	-	-	-	-	-	-	-	-	400		25100	60	1800	130		50	2800

Non-Potable within 30m of a waterbody 511/09

Non-Potable medium and fine grain 511/09

TABLE 5: FIELD MONITORING AND INORGANIC CHEMISTRY RESULTS
DELHI LANDFILL, PICTON

	GROUNDWATER SAMPLES							SEEPAGE METER SAMPLE	SURFACE WATER SAMPLES				ONT. DRINKING WATER OBJECTIVES (REVISED 1983)	RANGES IN LEACHATE FROM SANITARY LANDFILLS (FREEZE & CHERRY 1979)
	P1-1	P1-2	P2-1	P2-2	P3-1	P3-2	P4	SM1	SW1	SW2	SW3	SW4		
FIELD MONITORING														
Conductivity (uS/cm)	412	1150	1120	--	485	2580	550	--	460	360			--	--
Temperature (oC)	13	13	13	15‡	12.5	11	10	--	18.5	20.0			--	15
Dissolved Oxygen (ppm)	7.1	5.4	10.0	--	7.0	7.6	5.5	--	10.4	11.3			--	--
pH	7.15	6.45	6.95	--	7.00	6.9	6.9	--	6.9	7.75			--	4-8
INORGANIC CHEMISTRY RESULTS														
Fe (ppm)	<0.10	11.1	0.60	61.0	<0.10	<0.10	11.2	<0.10	<0.10	<0.10			0.3	1-1,000
Mn (ppm)	0.09	2.85	0.09	0.54	0.08	1.40	0.08	<0.05	<0.08	0.23			0.05	0.01-100
COD (ppm)++	<3	154	<3	220	<3	6	27	<5	<5	<5			--	1,000-90,000
Alkalinity (ppm)	318	1030	296	--	285	483	291	502	209	230			--	500-10,000
Phenols (ppb)	<1.0	143	<1.0	--	<1.0	<1.0	3.0	<2	<1.0	<1.0			2.0	--
Chloride (ppm)	81	131	718	29	140	125	142	166	56	7.3			250	300-3,000
Nitrate-N (ppm)	<1	<1	<1	5.0	<1	<1	<1	<1	5.0	<1	8.82	0.54	10.0	0.1-10
Sulphate (ppm)	29	28	9	309	9	25	<2	<2	59	5			500	10-1,000
Ammonia-N (ppm)	<0.10	19	0.47	<0.10	0.12	0.13	8.5	14	3.3	<0.10	4.62	1.38	--	100-3,000
Calcium (ppm)	94	282	136	--	89	170	83	143	74	80			--	100-1,500
Magnesium (ppm)	23	37	46	--	35	40	13	41	7.9	7.5			--	200-1,000
Potassium (ppm)	6.3	30	11.5	--	3.8	2.7	10.8	2.8	7.1	2.0			--	200-1,200
Sodium (ppm)	56	90	460	--	45	34	68	37	39	13			--	200-1200
Calculated Hardness(ppm)	329	857	529	--	366	589	261	526	217	231			--	660-13,650

‡ Poor sample, small volume
++ BOD was measured on surface water samples

TABLE 6: Organic Chemistry Results, Delhi Park Landfill, Picton

	P1-2	P3-2	SW1	SW3	DWO*	MDL**
VOLATILE PRIORITY POLLUANT (ug/l)						
Benzene	4.5 close	-	-	-	10	1
Chlorobenzene	3	-	-	-	60***	1
Chloroform	9.7	-	3.5	-	350	1
1,2-Dichlorobenzene	-	-	1.3	-		1
1,1-Dichloroethylene	2.8	-	-	-	7	1
1,1-Dichloroethane	7.9	-	-	-		1
Dichloromethane	-	-	12	-		10
Ethylbenzene	12	-	-	-		1
Tetrachlorethylene	1	-	7.6	3.4	10	1
Toluene	5.2	-	-	-	2000	2
1,1,1 - Trichloroethane	-	-	trace	-	200	1
Trichlorofluoromethane	540	-	-	-		1
M+P-Xylene	77	-	-	-		2
O-Xylene	7.8	-	-	-		1
Other Aromatic Compounds	140	-	-	-		1
BASE/NEUTRAL PRIORITY POLLUTANTS (ug/L)						
BIS(2-Ethylexyl)Phthalate	1.2	-	n/a	n/a		1
DI-N-Buthyl Phthalate	3.9	4.5	n/a	n/a		1
1,4-Dichlorobenzene	1.2	-	n/a	n/a		1
Diethyl Phthalate	2	-	n/a	n/a		1
Napthalene	3	-	n/a	n/a		1
ACIDIC PRIORITY POLLUTANTS (ug/L)						
Phenol	73	-	n/a	n/a	2	1

NOTE: Only those compounds with detectable concentrations are included in the table. A complete listing of the EPA 625 and 624 compounds analyzed are included in Appendix E.

* Drinking Water Objective (WESA, 1988)
** Method Detection Limit
*** US EPA Limit

Trow

KGEN0016517

Table 2 (continued)
Groundwater Analysis - July 28 and August 5, 2010
Petroleum Hydrocarbons, VOCs, Metals, PAHs
Wellington Community Centre, Wellington, Ontario

Sample Date					June 28, 2010			##########
PARAMETER	UNITS	MDL	CRITERIA		MW-1	MW-2	MW-3	BW-1
			Table 3*	ODWQS^				
METALS								
Antimony	µg/L	0.5	20,000	6 (IMAC)	0.8	< 0.5	< 0.5	< 5
Arsenic	µg/L	1	1,900	25 (IMAC)	5	2	5	< 10
Barium	µg/L	5	29,000	1000 (MAC)	330	480	580	240
Beryllium	µg/L	0.5	67	-	< 0.5	< 0.5	< 0.5	< 5
Boron	µg/L	10	45,000	5000 (IMAC)	170	360	520	840
Cadmium	µg/L	0.1	2.7	5 (IMAC)	0.1	0.1	0.1	< 1
Chromium	µg/L	5	810	50 (MAC)	< 5	< 5	< 5	< 50
Chromium (VI)	µg/L	5	140	-	< 5	< 5	< 5	< 5
Cobalt	µg/L	0.5	66	-	1.3	< 0.5	< 0.5	< 5
Copper	µg/L	1	87	1,000 (AO)	1	< 1	< 1	< 10
Lead	µg/L	0.5	25	10 (MAC)	0.6	< 0.5	< 0.5	< 5
Mercury	µg/L	0.1	(2.8) 0.29	1 (MAC)	4.4		1.9	< 0.1
Molybdenum	µg/L	1	9,200	-	2	2	7	100
Nickel	µg/L	1	490	-	2	< 1	1	< 10
Selenium	µg/L	2	63	10 (MAC)	< 2	< 2	< 2	< 20
Silver	µg/L	0.1	1.5	-	< 0.1	< 0.1	< 0.1	< 1
Sodium	µg/L	100	490,000	20,000†	82,000	180,000	130,000	1,800,000
Thallium	µg/L	0.05	510	-	< 0.05	< 0.05	< 0.05	< 0.5
Vanadium	µg/L	1	250	-	< 1	< 1	< 1	< 10
Zinc	µg/L	5	1,100	5000 (AO)	49	< 5	< 5	< 50
POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)								
Acenaphthene	µg/L	0.5	(1,700) 600	-	1.1	< 0.5	< 0.5	< 0.05
Acenaphthylene	µg/L	0.5	1.8	-	0.7	< 0.5		< 0.05
Anthracene	µg/L	0.5	2.4	-		1.1		< 0.05
Benzo(a)anthracene	µg/L	0.5	4.7	-		3.9		< 0.05
Benzo(a)pyrene	µg/L	0.1	0.81	0.01 (MAC)	5.6	2.3	7.9	0.01
Benzo(b/j)fluoranthene	µg/L	0.5	0.75	-				< 0.05
Benzo(g,h,i)perylene	µg/L	1	0.2	-				< 0.1
Benzo(k)fluoranthene	µg/L	0.5	0.4	-				< 0.05
Chrysene	µg/L	20	1	-	< 10	< 5	< 20	< 0.05
Dibenzo(a,h)anthracene	µg/L	1	0.52	-		< 1		< 0.1
Fluoranthene	µg/L	0.5	130	-	13	6.2	26	< 0.05
Fluorene	µg/L	0.5	400	-	1.3	0.7	1.7	< 0.05
Indeno(1,2,3-cd)pyrene	µg/L	1	0.2	-				< 0.1
1-Methylnaphthalene	µg/L	0.5	1,800**	-	< 0.5	< 0.5	0.7	0.32
2-Methylnaphthalene	µg/L	0.5		-	< 0.5	< 0.5	0.7	0.48
Naphthalene	µg/L	0.5	(6,400) 1,400	-	1.1	0.7	1.4	0.35
Phenanthrene	µg/L	0.3	580	-	8.7	4.9	13	0.07
Pyrene	µg/L	0.5	68	-	10	4.9	19	< 0.05
POLYCHLORINATED BIPHENOLS (PCBs)								
Total PCB	µg/L	0.05	(15) 7.8	3 (MAC)	< 0.05	< 0.05	< 0.05	< 0.5

* = MOE's Soil, Ground Water and Sediment Standards under Part XV.1 of the Environmental Protection Act, July 27, 2009 (Table 3) - All types of Property Use

^ = Ontario Regulation 169/03, Ontario Drinking Water Quality Standards made under the Safe Drinking Water Act, 2002

= Concentration equals or exceeds Table 3 criteria

= Concentration equals or exceeds ODWQS

= Concentration equals or exceeds Table 3 criteria and ODWQS

MDL = Method Detection Limit (lowest level of the parameter that can be quantified with confidence)

† 20,000 ug/L is the recommended warning level for sodium for persons on sodium restricted diets

\- = Not applicable

( ) = Standard in bracket applies to medium and fine textured soils

Trow

KGEN0016517

Table 2
Groundwater Analysis - July 28 and August 5, 2010
Petroleum Hydrocarbons, VOCs, Metals, PAHs
Wellington Community Centre, Wellington, Ontario

Sample Date					July 28, 2010			##########
PARAMETER	UNITS	MDL	CRITERIA		MW-1	MW-2	MW-3	BW-1
			Table 3*	ODWQS^				
TOTAL PETROLEUM HYDROCARBONS								
PHC F1 (C6-C10	µg/L	100	750	^^	< 100	< 100	< 100	330
PHC F2 (C10-C16 Hydrocarbons)	µg/L	100	150	^^	< 100	< 100	[redacted]	< 100
PHC F3 (C16-C34 Hydrocarbons)	µg/L	100	500	^^	[redacted]	150	[redacted]	< 100
PHC F4 (C34-C50 Hydrocarbons)	µg/L	100	500	^^	[redacted]	< 100	[redacted]	< 100
VOLATILE ORGANIC COMPOUNDS (VOCs)								
Acetone	µg/L	10	130,000	-	11	< 10	11	630
Benzene	µg/L	0.1	(430) 44	5 (MAC)	0.2	0.3	0.2	270
Bromodichloromethane	µg/L	0.1	85,000	100 (MAC)	< 0.1	< 0.1	< 0.1	< 5
Bromoform	µg/L	0.2	(770) 380	100 (MAC)	< 0.2	< 0.2	< 0.2	< 10
Bromomethane	µg/L	0.5	(56) 5.6	-	< 0.5	< 0.5	< 0.5	< 30
Carbon Tetrachloride	µg/L	0.1	(8.4) 0.79	5 (MAC)	< 0.1	< 0.1	< 0.1	< 5
Chlorobenzene	µg/L	0.1	630	80 (MAC)	< 0.1	< 0.1	< 0.1	< 5
Chloroform	µg/L	0.1	(22) 2.4	100 (MAC)	< 0.1	< 0.1	< 0.1	< 5
Dibromochloromethane	µg/L	0.2	82,000	100 (MAC)	< 0.2	< 0.2	< 0.2	< 10
1,2-Dichlorobenzene	µg/L	0.2	(9,600) 4,600	200 (MAC)	< 0.2	< 0.2	< 0.2	< 10
1,3-Dichlorobenzene	µg/L	0.2	9,600	-	< 0.2	< 0.2	< 0.2	< 10
1,4-Dichlorobenzene	µg/L	0.2	(67) 8	5 (MAC)	< 0.2	0.2	< 0.2	< 10
Dichlorodifluoromethane (FREON 12)	µg/L	0.5	4,400	-	< 0.5	< 0.5	< 0.5	< 30
1,1-Dichloroethane	µg/L	0.1	(3,100) 320	-	< 0.1	< 0.1	< 0.1	< 5
1,2-Dichloroethane	µg/L	0.2	(12) 1.6	5 (IMAC)	< 0.2	< 0.2	< 0.2	< 10
1,1-Dichloroethylene	µg/L	0.1	(17) 1.6	14 (MAC)	< 0.1	< 0.1	< 0.1	< 5
c-1,2-Dichloroethylene	µg/L	0.1	(17) 1.6	-	< 0.1	0.1	< 0.1	< 5
t-1,2-Dichloroethylene	µg/L	0.1	(17) 1.6	-	< 0.1	< 0.1	< 0.1	< 5
1,2-Dichloropropane	µg/L	0.1	(140) 16	-	< 0.1	< 0.1	< 0.1	< 5
c-1,3-Dichloropropene	µg/L	0.2	(45) 5.2	-	< 0.2	< 0.2	< 0.2	< 10
t-1,3-Dichloropropene	µg/L	0.2	(45) 5.2	-	< 0.2	< 0.2	< 0.2	< 10
Ethylbenzene	µg/L	0.1	2,300	2.4 (AO)	< 0.1	< 0.1	< 0.1	< 5
Ethylene Dibromide	µg/L	0.2	(0.83) 0.25	-	< 0.2	< 0.2	< 0.2	< 10
Hexane	µg/L	0.5	(520) 51	-	< 0.5	< 0.5	< 0.5	< 30
Methylene Chloride	µg/L	0.5	(5,500) 610	50 (MAC)	< 0.5	< 0.5	< 0.5	< 30
Methyl Isobutyl Ketone	µg/L	5	(580,000) 140,000	-	< 5	< 5	< 5	< 300
Methyl Ethyl Ketone	µg/L	5	$(1.5*10^9)$ $4.7*10^5$	-	< 5	< 5	< 5	< 300
Methyl t-Butyl Ether (MTBE)	µg/L	0.2	(1,400) 190	-	< 0.2	< 0.2	< 0.2	< 10
Styrene	µg/L	0.2	(9,100) 1,300	-	< 0.2	< 0.2	< 0.2	< 10
1,1,1,2-Tetrachloroethane	µg/L	0.1	(28) 3.4	-	< 0.1	< 0.1	< 0.1	< 5
1,1,2,2-Tetrachloroethane	µg/L	0.2	(15) 3.2	-	< 0.2	< 0.2	< 0.2	< 10
Tetrachloroethylene	µg/L	0.1	(17) 1.6	30 (MAC)	< 0.1	< 0.1	< 0.1	< 5
Toluene	µg/L	0.2	18,000	24 (AO)	< 0.2	0.3	0.2	260
1,1,1-Trichloroethane	µg/L	0.1	(6,700) 640	-	< 0.1	< 0.1	< 0.1	< 5
1,1,2-Trichloroethane	µg/L	0.2	(30) 4.7	-	< 0.2	< 0.2	< 0.2	< 10
Trichloroethylene	µg/L	0.1	(17) 1.6	5 (MAC)	< 0.1	< 0.1	< 0.1	< 5
Trichlorofluoromethane (FREON 11)	µg/L	0.2	2,500	-	< 0.2	< 0.2	< 0.2	< 10
Vinyl Chloride	µg/L	0.2	(1.7) 0.5	2 (MAC)	< 0.2	< 0.2	< 0.2	< 5
mp-Xylenes	µg/L	0.1	-	-	0.1	0.2	0.2	48
o-Xylene	µg/L	0.1	-	-	< 0.1	< 0.1	0.2	48
Total Xylenes	µg/L	0.1	4,200	300 (AO)	0.1	0.2	0.4	< 10

* = MOE's Soil, Ground Water and Sediment Standards under Part XV.1 of the Environmental Protection Act, July 27, 2009 (Table 3) - All types of Property Use

^ = Ontario Regulation 169/03, Ontario Drinking Water Quality Standards made under the Safe Drinking Water Act, 2002

[redacted] = Concentration equals or exceeds Table 3 criteria

[redacted] = Concentration equals or exceeds ODWQS

[redacted] = Concentration equals or exceeds Table 3 criteria and ODWQS

MDL = Method Detection Limit (lowest level of the parameter that can be quantified with confidence)

\- = Not applicable

( ) = Standard in bracket applies to medium and fine textured soils

Trow

KGEN0016608

Table 1 (continued)
Soil Analysis - July 8, 2010
Petroleum Hydrocarbons, VOCs, Metals, PAHs, PCBs
Wellington Community Centre, Wellington, Ontario

Sample Date																
PARAMETER	UNITS	MDL	CRITERIA (Table 3*) Residential/ Parkland/ Institutional Property Use	CRITERIA (Table 3*) Industrial/ Commercial/ Community Property Use	BH-1 0-0.6m	BH-1 0.8-1.3m	BH-2 1.5-2.1m	BH-2 3.0-3.7m	BH-3 1.5-2.1m	BH-3 Lab Dup 1.5-2.1m	BH-3 3.0-3.7m	BH 4 0-0.6m	BH 4 1.5-2.0m	BH5 0.9-1.5m	BH 5 2.3-2.9m	BH 6 0-0.6m
METALS																
Antimony	µg/g	0.2	7.5	(50) 40	< 0.2	< 0.2	7.3	3.3	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	1.7	< 0.2
Arsenic	µg/g	1	18	18	2	2	11	8	3	-	3	2	2	1	7	2
Barium	µg/g	0.5	390	670	56	53	470	250	73	-	75	62	56	42	170	76
Beryllium	µg/g	0.2	(5) 4	(10) 8	0.4	0.4	0.7	0.6	0.5	-	0.5	0.4	0.5	0.2	0.4	0.2
Boron (Hot Water Soluble)	µg/g	0.05	1.5	2	0.35	0.5	0.87	0.59	0.35	-	0.41	0.26	0.22	0.37	1.1	0.31
Boron	µg/g	5	120	120	< 5	< 5	25	10	< 5	-	< 5	5	< 5	< 5	10	6
Cadmium	µg/g	0.1	1.2	1.9	0.2	0.2	1.3	0.9	0.2	-	0.2	0.2	0.2	0.1	0.5	0.1
Chromium	µg/g	1	160	160	15	14	37	24	19	-	22	15	17	20	21	7
Chromium (VI)	µg/g	0.2	(10) 8	(10) 8	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cobalt	µg/g	0.1	22	(100) 80	5.3	4.8	7.1	6.5	5.7	-	5.8	4.7	5.5	4.4	6.9	2.8
Copper	µg/g	0.5	(180) 140	(300) 230	11	11	92	68	12	-	11	9.6	9.0	9.3	43	4.3
Lead	µg/g	1	120	120	23	24	750	410	25	-	28	14	12	16	260	5
Mercury	µg/g	0.05	(1.8) 0.27	(20) 3.9	< 0.05	< 0.05	0.36	0.32	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	0.20	< 0.05
Molybdenum	µg/g	0.5	6.9	40.0	< 0.5	< 0.5	2.2	1.3	0.6	-	< 0.5	< 0.5	< 0.5	< 0.5	4.3	< 0.5
Nickel	µg/g	0.5	(130) 100	(340) 270	9.7	10	19	17	11	-	12	9.0	10	8.7	22	5.5
Silver	µg/g	0.2	(25) 20	(50) 40	< 0.2	< 0.2	0.9	0.6	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Selenium	µg/g	0.5	2.4	5.5	< 0.5	< 0.5	1.9	0.6	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Thallium	µg/g	0.05	1	3.3	0.06	0.06	0.1	0.06	0.08	-	0.07	0.05	0.05	< 0.05	0.06	< 0.05
Uranium	µg/g	0.05	23	33	0.47	0.37	0.65	0.40	0.43	-	0.44	0.46	0.45	0.36	0.43	0.84
Vanadium	µg/g	5	86	86	18	18	24	21	22	-	22	19	23	17	27	8
Zinc	µg/g	5	340	340	75	72	820	600	76	-	77	57	68	42	230	50
POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)																
Acenaphthene	µg/g	0.02	(58) 7.9	96	< 0.01	< 0.01	< 0.04	0.38	0.01	-	< 0.02	< 0.02	< 0.01	< 0.02	< 0.01	< 0.01
Acenaphthylene	µg/g	0.01	(0.17) 0.15	(0.17) 0.15	0.041	0.027	< 0.2	0.06	0.046	-	0.02	0.03	< 0.005	0.03	0.024	< 0.005
Anthracene	µg/g	0.01	(0.74) 0.67	(0.74) 0.67	0.052	0.041	0.7	1.1	0.11	-	0.03	0.04	< 0.005	0.03	0.025	< 0.005
Benzo(a)anthracene	µg/g	0.02	(0.63) 0.5	0.96	0.17	0.17	1.2	1.6	0.21	-	0.07	0.11	< 0.01	0.13	0.06	< 0.01
Benzo(a)pyrene	µg/g	0.01	0.3	0.3	0.23	0.19	0.9	1.3	0.16	-	0.05	0.12	< 0.005	0.12	0.061	< 0.005
Benzo(b/j)fluoranthene	µg/g	0.02	0.78	0.96	0.35	0.29	1.3	1.8	0.23	-	0.08	0.17	< 0.01	0.18	0.08	< 0.01
Benzo(g,h,i)perylene	µg/g	0.04	(7.8) 6.6	9.6	0.26	0.21	< 0.8	0.76	0.10	-	< 0.04	0.11	< 0.02	0.10	0.06	< 0.02
Benzo(k)fluoranthene	µg/g	0.02	0.78	0.96	0.12	0.10	0.5	0.65	0.08	-	0.03	0.06	< 0.01	0.07	0.03	< 0.01
Chrysene	µg/g	0.02	(7.8) 7	9.6	0.18	0.16	0.9	1.3	0.15	-	0.05	0.09	< 0.01	0.10	0.05	< 0.01
Dibenzo(a,h)anthracene	µg/g	0.04	0.1	0.1	0.05	0.04	< 0.8	0.24	0.03	-	< 0.04	< 0.04	< 0.02	< 0.04	< 0.02	< 0.02
Fluoranthene	µg/g	0.01	0.69	9.6	0.36	0.32	2.5	3.7	0.45	-	0.14	0.17	< 0.005	0.18	0.13	< 0.005
Fluorene	µg/g	0.01	(69) 62	(69) 62	0.009	0.006	0.4	0.55	0.060	-	0.02	< 0.01	< 0.005	0.01	0.009	< 0.005
Indeno(1,2,3-cd)pyrene	µg/g	0.04	(0.48) 0.38	(0.95) 0.76	0.24	0.18	< 0.8	0.82	0.10	-	< 0.04	0.09	< 0.02	0.09	0.05	< 0.02
1-Methylnaphthalene	µg/g	0.01	(3.4) 0.99**	(85) 76**	< 0.005	< 0.005	< 0.2	0.08	0.007	-	< 0.01	< 0.01	< 0.005	< 0.01	0.005	< 0.005
2-Methylnaphthalene	µg/g	0.01			0.006	0.007	< 0.2	0.10	0.008	-	< 0.01	< 0.01	< 0.005	< 0.01	0.005	< 0.005
Naphthalene	µg/g	0.01	(0.75) 0.6	(28) 9.6	0.006	0.006	< 0.2	0.26	< 0.005	-	< 0.01	< 0.01	< 0.005	< 0.01	0.006	< 0.005
Phenanthrene	µg/g	0.01	(7.8) 6.2	(16) 12	0.15	0.12	2.2	3.4	0.37	-	0.11	0.09	< 0.005	0.08	0.077	0.007
Pyrene	µg/g	0.01	78	96	0.31	0.28	1.9	2.7	0.32	-	0.10	0.14	< 0.005	0.16	0.11	< 0.005
POLYCHLORINATED BIPHENOLS (PCBs)																
Total PCBs	µg/g	0.01	0.35	1.1	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	-	< 0.02	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01

* = MOE's Soil, Ground Water and Sediment Standards under Part XV.1 of the Environmental Protection Act, July 27, 2009 (Table 3) - Residential/Parkland/Institutional and Industrial/Commercial/Community Property Use

A = Concentration equals or exceeds Table 3 criteria (Residential/Parkland/Institutional Property Use)

MDL = Method Detection Limit (lowest level of the parameter that can be quantified with confidence)

\- = Not applicable

** = Standard applicable to both 1-Methylnaphthalene and 2-Methylnaphthalene, with the provision that if both are detected the sum of the two must not exceed the standard

* Water supplies with a hardness greater than 200 mg/L are considered poor but tolerable

Trow

KGEN0016517

Table 1
Soil Analysis - July 8, 2010
Petroleum Hydrocarbons, VOCs, Metals, PAHs, PCBs
Wellington Community Centre, Wellington, Ontario

Sample Date																
PARAMETER	UNITS	MDL	CRITERIA (Table 3*) Residential/ Parkland/ Institutional Property Use	CRITERIA (Table 3*) Industrial/ Commercial/ Community Property Use	BH-1 0-0.6m	BH-1 0.6-1.3m	BH-2 1.5-2.1m	BH-2 3.0-3.7m	BH-3 1.5-2.1m	BH-3 1.5-2.1m Lab Dup	BH-3 3.0-3.7m	BH 4 0-0.6m	BH 4 1.5-2.0m	BH5 0.9-1.5m	BH 5 2.3-2.9m	BH 6 0-0.6m
PETROLEUM HYDROCARBONS																
PHC F1 (C6-C10 Hydrocarbons)	µg/g	10	(65) 55	(65) 55	< 10	< 10	< 10	< 10	< 10	-	< 10	< 10	< 10	< 10	< 10	< 10
PHC F2 (C10-C16 Hydrocarbons)	µg/g	10	(150) 98	(250) 230	< 10	< 10	< 10	16	< 10	-	< 10	< 10	< 10	< 10	< 10	< 10
PHC F3 (C16-C34 Hydrocarbons)	µg/g	10	(1,300) 300	(2,500) 1,700	47	14	110	300	< 10	-	22	23	< 10	90	150	< 10
PHC F4 (C34-C50 Hydrocarbons)	µg/g	10	(5,600) 2,800	(6,600) 3,300	33	< 10	150	350	< 10	-	< 10	110	< 10	220	< 10	< 10
PHC F4G-sg (Grav. Heavy Hydrocarbons)	µg/g	100	(5,600) 2,800	(6,600) 3,300	-	-	740	1,800	-	-	-	1,000	600	-	-	-
VOLATILE ORGANIC COMPOUNDS (VOCs)																
Acetone	µg/g	0.1	(28) 16	28 (16)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzene	µg/g	0.002	(0.17) 0.21	(0.4) 0.32	0.003	0.004	0.013	0.011	0.004	0.004	0.005	0.004	0.006	0.005	0.006	0.002
Bromodichloromethane	µg/g	0.002	13	18	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromoform	µg/g	0.002	(0.28) 0.27	(1.7) 0.61	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Bromomethane	µg/g	0.003	0.05	0.05	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Carbon Tetrachloride	µg/g	0.002	(0.12) 0.05	(1.5) 0.21	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Chlorobenzene	µg/g	0.002	(2.7) 2.4	(2.7) 2.4	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Chloroform	µg/g	0.002	(0.17) 0.05	(0.18) 0.47	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dibromochloromethane	µg/g	0.002	9.4	13.0	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,2-Dichlorobenzene	µg/g	0.002	(4.3) 3.4	(8.5) 6.8	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,3-Dichlorobenzene	µg/g	0.002	(6) 4.8	(12) 9.6	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,4-Dichlorobenzene	µg/g	0.002	(0.097) 0.083	(0.84) 0.2	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorodifluoromethane	µg/g	0.005	(25) 16	(25) 16	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.006
1,1-Dichloroethane	µg/g	0.002	(11) 3.5	(21) 17	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,2-Dichloroethane	µg/g	0.002	0.05	0.05	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,1-Dichloroethylene	µg/g	0.002	0.05	(0.48) 0.064	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
c-1,2-Dichloroethylene	µg/g	0.002	(30) 3.4	(37) 55	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
t-1,2-Dichloroethylene	µg/g	0.002	(0.75) 0.084	(9.3) 1.3	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,2-Dichloropropane	µg/g	0.002	(0.085) 0.05	(0.68) 0.16	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
t-1,3-Dichloropropene	µg/g	0.002	(0.083) 0.05	(0.68) 0.16	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
c-1,3-Dichloropropene	µg/g	0.002	(0.083) 0.05	(0.68) 0.16	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylbenzene	µg/g	0.002	(15) 2	(19) 9.5	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethylene Dibromide	µg/g	0.002	0.05	0.05	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hexane	µg/g	0.005	(34) 2.8	(88) 46	0.024	0.037	0.026	0.032	0.045	0.040	0.058	0.032	0.090	0.034	0.028	0.019
Methylene Chloride	µg/g	0.003	(0.96) 0.1	(2) 1.6	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Methyle Isobutyl Ketone	µg/g	0.03	(4.3) 1.7	(210) 31	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Methyl Ethyl Ketone	µg/g	0.03	(44) 16	(88) 70	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Methyl t-Butyl Ether (MTBE)	µg/g	0.002	(1.4) 0.75	(3.2) 11	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Styrene	µg/g	0.002	(2.2) 0.7	(43) 34	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,1,1,2-Tetrachloroethane	µg/g	0.002	(0.05) 0.058	(0.11) 0.087	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,1,2,2-Tetrachloroethane	µg/g	0.002	0.05	(0.094) 0.05	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Tetrachloroethylene	µg/g	0.002	(2.3) 0.28	(21) 4.5	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Toluene	µg/g	0.002	(6) 2.3	(78) 68	0.008	0.013	0.011	0.010	0.010	0.012	0.015	0.012	0.016	0.014	0.009	0.006
1,1,1-Trichloroethane	µg/g	0.002	(3.4) 0.38	(12) 6.1	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
1,1,2-Trichloroethane	µg/g	0.002	0.05	(0.11) 0.05	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Trichloroethylene	µg/g	0.002	(0.52) 0.061	(0.61) 0.91	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Trichlorofluoromethane	µg/g	0.002	(5.8) 4	(5.8) 4	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Vinyl Chloride	µg/g	0.002	(0.022) 0.02	(0.25) 0.032	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
mp-Xylenes	µg/g	0.002	-	-	0.008	0.014	0.007	0.006	0.009	0.011	0.016	0.012	0.014	0.014	0.008	0.005
o-Xylene	µg/g	0.002	-	-	< 0.002	0.003	0.003	< 0.002	< 0.002	0.002	0.003	0.002	0.003	0.003	0.006	< 0.002
Total Xylenes	µg/g	0.002	(25) 3.1	(30) 26	0.008	0.017	0.010	0.008	0.009	0.013	0.019	0.014	0.016	0.016	0.014	0.005

* = MOE's Soil, Ground Water and Sediment Standards under Part XV.1 of the Environmental Protection Act, July 27, 2009 (Table 3) - Residential/Parkland/Institutional and Industrial/Commercial/Community Property Use

9 = Concentration equals or exceeds Table 3 criteria (Residential/Parkland/Institutional Property Use)

MDL = Method Detection Limit (lowest level of the parameter that can be quantified with confidence)

\- = Not applicable

() = Standard in bracket applies to medium and fine textured soils

Table C-3: Analytical Results for Groundwater - BNAs, PAHs, and Phenols
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 4 May-00	Jun-00	Aug-00	Dec-97	Dec-99	May-00	Jul-03	Oct-03	May-04	Oct-04	May-05	Oct-05	May-06	Oct-06	Oct-07	Oct-08
Acenapthene	µg/L	1700	N/V	5.8	<0.10	<0.10	-	-	-	0.08	-	-	0.47	-	0.41	0.62	0.36	0.59	0.24	Damaged	0.57	0.2
5-nitro-Acenapthene	µg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	2000	N/V	N/V	<0.11	<0.11	-	-	-	<0.01	-	-	<0.31	-	<0.11	<0.11	<0.11	<0.11	<0.11	-	<0.11	<0.11
Anthracene	µg/L	12	0.0008	0.012	<0.05	<0.05	-	-	-	**0.03**	-	-	<0.3	-	<0.07	**0.14**	<0.07	**0.1**	**0.06**	-	**0.1**	<0.05
Benzo(a)anthracene	µg/L	5.0	0.0004	0.018	<0.08	<0.08	-	-	-	<0.01	-	-	<0.2	-	<0.08	<0.08	<0.08	<0.08	<0.08	-	<0.08	<0.08
Benzo(a)pyrene	µg/L	1.9	N/V	0.015	<0.01	<0.01	-	-	-	<0.01	-	-	<0.24	-	<0.09	<0.09	<0.09	<0.09	<0.01	-	<0.09	<0.01
Benzo(b)fluoranthene	µg/L	7.0	N/V	N/V	<0.05	<0.05	-	-	-	<0.01	-	-	<0.2	-	<0.03	<0.03	<0.03	<0.03	<0.03	-	<0.03	<0.05
Benzo(g,h,i)perylene	µg/L	0.2	0.00002	N/V	<0.06	<0.06	-	-	-	<0.01	-	-	<0.2	-	<0.06	<0.06	<0.06	<0.06	<0.06	-	-	<0.06
Benzo(k)fluoranthene	µg/L	0.4	0.0002	N/V	<0.06	<0.06	-	-	-	<0.01	-	-	<0.2	-	<0.06	<0.06	<0.06	<0.06	<0.05	-	<0.06	<0.06
Benzylbutylphthalate	µg/L	N/V	0.2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Biphenyl	µg/L	1700	0.2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	µg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethyl)ether	µg/L	110	200	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	µg/L	430	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-Ethylhexyl)phthalate	µg/L	30	0.6	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	N/V	0.05	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Camphene	µg/L	N/V	2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
p-Chloroaniline	µg/L	100	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	N/V	3	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Chloronaphthalene	µg/L	N/V	0.1	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	N/V	0.2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	44000	N/V	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	N/V	0.05	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	3.0	0.0001	N/V	<0.05	<0.05	-	-	-	<0.005	-	-	<0.27	-	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05
m,p-Cresol	µg/L	N/V	1	N/V	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-
p-Cresol	µg/L	N/V	1	N/V	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-
o-Cresol	µg/L	N/V	1	N/V	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	0.25	0.002	N/V	<0.09	<0.09	-	-	-	<0.01	-	-	<0.2	-	<0.09	<0.09	<0.09	<0.09	<0.09	-	<0.09	<0.09
Di-n-butylphthalate	µg/L	N/V	4	19	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl Phthalate	µg/L	N/V	0.2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	7600	2.5	0.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	7600	2.5	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	7600	4	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	1600	0.6	N/V	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	3700	0.2	0.2	-	-	-	-	-	<0.1	-	-	<0.3	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	µg/L	N/V	0.2	0.2	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	30	0.2	N/V	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	21000	10	N/V	-	-	-	-	-	<0.09	-	-	<0.5	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	30	0.2	N/V	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	1500	N/V	N/V	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitrophenol	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	2300	4	N/V	-	-	-	-	-	<0.4	-	-	<0.5	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	N/V	6	N/V	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
Diphenylamine	µg/L	N/V	3	N/V	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	130	0.0008	0.04	<0.12	<0.12	-	-	-	**0.22**	-	-	<0.27	-	<0.12	<0.12	<0.12	<0.12	<0.12	-	<0.12	<0.12
Fluorene	µg/L	290	0.2	3.0	<0.09	<0.09	-	-	-	**0.21**	-	-	**0.61**	-	<0.09	**0.81**	**0.39**	**0.68**	**0.36**	-	**0.57**	**0.20**
Hexachlorobenzene	µg/L	0.62	0.0065	N/V	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	0.87	0.009	1.3	-	-	-	-	-	-	-	-	<0.4	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	N/V	0.06	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	12	1	N/V	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.27	N/V	N/V	<0.03	<0.03	-	-	-	<0.01	-	-	<0.27	-	<0.03	<0.03	<0.03	<0.03	<0.03	-	<0.03	<0.03
Indole	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4,6-Dinitrophenol	µg/L	N/V	0.2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-and 1-methyl Napthalene	µg/L	13000	2	N/V	-	-	-	-	-	<0.10	-	-	0.51	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	5900	7	1.1	<0.12	<0.12	-	-	-	<0.01	-	-	<0.3	-	0.46	0.45	0.4	0.14	0.21	-	0.14	<0.12
Nitrobenzene	µg/L	N/V	0.02	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	N/V	0.5	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	N/V	50	N/V	-	-	-	-	-	<0.03	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	N/V	7	N/V	-	-	-	-	-	2.11	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	130	0.5	0.5	-	-	-	-	-	<0.02	-	-	<0.5	-	-	-	-	-	-	-	-	-
Perylene	µg/L	N/V	0.00007	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	63	0.03	0.4	<0.11	<0.11	-	-	-	**0.63**	-	-	**0.36**	-	<0.11	**0.50**	**0.15**	**0.16**	**0.12**	-	<0.11	<0.11
Phenols*	µg/L	N/V	1	4.0	<0.001	<0.001	**30.0**	**19.5**	**16.0**	-	-	-	-	-	**13**	**25**	**22**	**<2**	**13**	-	**21**	**16**
Phenol	µg/L	26000	5	N/V	-	-	-	-	-	<0.04	-	-	<0.5	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	40	N/V	0.025	<0.12	<0.12	-	-	-	<0.01	-	-	<0.27	-	<0.12	<0.12	<0.12	<0.12	<0.05	-	<0.12	<0.12
2,3,4,5-Tetrachlorophenol	µg/L	N/V	1	1	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	µg/L	N/V	1	1	-	-	-	-	-	<0.04	-	-	<0.5	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	µg/L	N/V	1	1	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	500	0.5	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	630	18	18	-	-	-	-	-	<0.01	-	-	<0.5	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	9700	18	18	-	-	-	-	-	<0.01	-	-	<0.5	-	-	-	-	-	-	-	-	-
2,3,5-Trichlorophenol	µg/L	N/V	18	18	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4-Trichlorophenol	µg/L	N/V	18	18	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1998, reprinted February 1999.

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life". Summary Table, Update December 2003.

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V = No value for parameter in applicable criteria

< = concentration below accompanying method detection limit

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed

‡ = Included above with Benzo(b)fluoranthene.

* = Reported by the laboratory in mg/L, but converted to µg/L for the purpose of this table.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

0.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Sodium = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location

Sodium = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location

Table C-5: Analytical Results for Groundwater - General Chemistry, Anions, Nutrients and Headspace
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 4 May-90	Jun-90	Aug-90	Dec-97	Dec-99	May-00	Jul-03	Oct-03	May-04	Oct-04	May-05	Oct-05	May-06	Oct-06	Oct-07	Oct-08
General Chemistry																						
Alkalinity as CaCO3	mg/L	N/V	<25%	N/V	111	107	-	1,230	1,260	-	-	-	930	-	862	866	925	901	765	Damaged	722	**893**
Biological Oxygen Demand (BOD)	mg/L	N/V	N/V	N/V	-	-	20	19	520	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	N/V	N/V	N/V	6.8	7.2	-	33.0	52.0	36.0	22.3	18	19	-	<5	18	13	27	15	-	13.3	**20.9**
Electrical Conductivity	µS/cm	N/V	N/V	N/V	267	266	-	2,630	2,890	1,850	-	-	1,660	-	1680	1760	1830	1680	1460	-	1400	**1800**
Electrical Conductivity (field)	µS/cm	N/V	N/V	N/V	338	341	-	-	-	-	-	-	1,728	-	1274	1373	1314	1293	955	-	-	**2040**
Hardness	mg CaCO3/L	N/V	N/V	N/V	126	126	-	392.8	649.0	-	-	-	-	-	617	564	685	602	571	-	537	**640**
pH	no units	N/V	6.5 - 8.5	6.5 - 9.0	8.38	8.37	-	7.33	7.16	6.91	-	-	6.50	-	**6.47**	6.51	**6.41**	6.95	6.95	-	7.13	7.23
pH (field)	no units	N/V	6.5 - 8.5	6.5 - 9.0	8.23	8.21	-	-	-	-	-	-	6.51	-	6.62	**6.49**	**5.66**	**6.31**	6.51	-	-	**6.47**
Temperature (T) (field)	°C	N/V	N/A	N/A	13.14	13.03	-	-	-	-	-	-	15.7	-	8.65	14.72	7.22	15.2	8.07	-	-	12.21
Dissolved Oxygen (field)	mg/L	N/V	f (T) >4 - 7	>5.5	10.10	10.07	-	-	-	-	-	-	-	-	-	**4.54**	**0.23**	**1.28**	**5.52**	-	-	**1.22**
Total Dissolved Solids (TDS)	mg/L	N/V	N/V	N/V	-	-	-	1414	1594	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (TOC)	mg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids (TSS)	mg/L	N/V	<10%	<5 - <25	<10	<10	20,570.00	3,136.00	-	-	-	-	-	-	-	-	-	-	-	-	-	**198**
Anions																						
Bromide	mg/L	N/V	N/V	N/V	-	-	1.67	1.20	1.85	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	N/V	N/V	N/V	14.6	14.6	202	200	286	88.0	-	-	46.5	-	36.2	49.8	50.3	53.6	29.2	-	39.5	**53.5**
Fluoride	mg/L	N/V	N/V	0.12	0.07	0.07	<0.10	**0.15**	<0.10	-	-	-	-	-	-	-	-	<0.05	<0.05	-	0.11	0.07
Nitrate as N	mg/L	N/V	N/V	13	<0.05	<0.05	<0.02	<0.20	<0.02	-	-	-	-	-	<0.05	0.38	0.34	<0.05	<0.05	-	<0.05	<0.05
Nitrite as N	mg/L	2	N/V	0.06	<0.05	<0.05	<0.20	0.03	<0.20	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05
Phosphate	mg/L	N/V	N/V	N/V	-	-	<1.00	<1.0	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	N/V	N/V	N/V	-	-	9.79	4.70	0.45	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																						
Ammonia as N	mg/L	N/V	N/V	f (T, pH)	<0.02	<0.02	-	**93**	**88.0**	-	77.8	58.1	**51.45**	-	19.9	**18.5**	53.3	50	37.3	-	2.46	**42.1**
Un-Ionized Ammonia	mg/L	N/V	0.02	0.019	<0.00146	<0.0010	-	-	-	-	-	-	**0.048**	-	0.014	0.015	0.0036	**0.028**	**0.0192**	-	-	**0.027**
Total Kjeldahl Nitrogen	mg/L	N/V	N/V	N/V	0.63	0.60	108	100	112	66.7	83.9	49.2	54.8	-	49.4	64.5	51.8	57.5	38.5	-	36	**58.4**
Total Phosphorus	mg/L	N/V	0.02	N/V	<0.02	0.02	**0.090**	0.005	**0.065**	-	-	-	-	-	**0.58**	**0.61**	**0.66**	**0.87**	**0.7**	-	**1.03**	**0.85**
Other																						
Headspace (field)	ppm	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	76	>500	>500	30	100
Headspace (field)	% LEL	N/V	N/V	N/V	-	-	-	-	-	-	-	-	100	-	>100	95	>100	0	20	5	1	-

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004)

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1996, reprinted February 1999

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V N/V = No value for parameter in applicable criteria N/A = Not applicable

< = concentration below accompanying method detection limit

f (parameter) = Function of the parameter(s) in parenthesis.

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

0.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Sodium = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location

Sodium = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location

Table C-6: Analytical Results for Groundwater - Metals Parameters
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 4 May-90	Jun-90	Aug-90	Dec-97	Dec-99	May-00	Jul-03	Oct-03	May-04	Oct-04	May-05	Oct-05	May-06	Oct-06	Oct-07	Oct-08
Aluminum	mg/L	N/V	*f*(pH) 0.015 - 0.075	*f*(pH, Ca, DOC) 0.005 - 0.1	0.012	0.014	<0.05	<0.05	0.012	-	-	-	0.0110	-	0.00993	0.0120	0.023	0.0047	0.00585	Damaged	0.00227	0.005
Antimony	mg/L	16	0.02	N/V	-	-	-	-	-	-	-	-	<0.00153	-	<0.00153	<0.00153	<0.00153	<0.00150	<0.001	-	-	-
Arsenic	mg/L	0.480	0.005	0.0050	<0.003	<0.003	-	-	-	-	-	-	0.00118	-	0.00076	0.00118	**0.00968**	0.00158	**<0.0006**	-	**<0.0006**	**<0.003**
Barium	mg/L	23	N/V	N/V	0.035	0.034	0.253	0.264	0.255	0.035	-	-	0.315	-	0.22	0.235	0.100	0.284	0.224	-	0.125	**0.305**
Beryllium	mg/L	0.053	*f*(hard) 0.011 - 1.1	N/V	<0.001	<0.001	<0.0005	<0.0005	<0.00003	-	-	-	<0.00184	-	<0.00184	<0.00184	<0.00184	<0.001	<0.001	-	<0.001	<0.001
Bismuth	mg/L	N/V	N/V	N/V	<0.002	<0.002	-	-	-	-	-	-	<0.00033	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.0005	-	<0.0005	<0.002
Boron	mg/L	50	0.2	N/V	0.013	0.013	**0.505**	**0.458**	**0.800**	-	-	-	**0.338**	-	**0.234**	**0.459**	**0.337**	**0.551**	**0.254**	-	**0.293**	**0.427**
Cadmium	mg/L	0.011	*f*(hard) 0.0001 - 0.0005	0.000017	<0.00005	<0.00005	<0.005	<0.005	**0.0013**	<0.001	-	-	<0.00067	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.0002	<0.00005
Calcium	mg/L	N/V	N/V	N/V	42.8	42.8	124	111	189	-	-	-	-	-	201	181	220	192	187	-	180	**210**
Chromium	mg/L	2	0.0099	0.0099	<0.003	<0.003	<0.01	<0.01	0.0006	<0.01	-	-	0.0017	-	0.00062	0.00788	0.00404	0.00715	0.00167	-	0.00075	**0.013**
Cobalt	mg/L	0.100	0.0009	N/V	<0.0005	<0.0005	<0.05	<0.05	<0.003	-	-	-	**0.0023**	-	**0.00182**	**0.0026**	**0.00217**	**0.0025**	0.00169	-	0.00099	**0.003**
Copper	mg/L	0.023	*f*(hard) 0.001 - 0.005	*f*(alk) 0.002 - 0.004	<0.002	<0.002	<0.01	<0.01	<0.0005	<0.05	-	-	0.00125	-	0.00236	<0.00078	0.0172	<0.00080	<0.0008	-	<0.0008	<0.002
Iron	mg/L	N/V	0.3	0.3	0.025	0.021	**41.6**	**41.6**	**9.16**	**44.8**	**1.69**	**90.5**	**47.900**	-	**46.5**	**38.9**	**1.140**	**47.2**	**45.4**	-	<0.005	**49.7**
Lead	mg/L	0.032	*f*(hard) 0.001 - 0.005	*f*(alk) 0.001 - 0.007	<0.001	<0.001	<0.05	<0.05	<0.003	<0.005	-	-	<0.00044	-	<0.00044	<0.00044	0.00354	<0.00044	<0.0005	-	<0.0005	<0.0005
Magnesium	mg/L	N/V	N/V	N/V	4.69	4.76	31.1	28.0	42.8	-	-	-	-	-	28.2	27.4	33	29.6	25.3	-	21.12	**28.2**
Manganese	mg/L	N/V	N/V	N/V	0.020	0.021	0.49	0.36	0.206	0.47	0.44	0.88	0.903	-	0.889	0.597	0.779	0.625	0.997	-	0.796	**0.778**
Mercury	mg/L	0.00012	0.0002*	0.000026	<0.00002	<0.00002	-	-	-	-	-	-	<0.0001	-	<0.00010	<0.0001	<0.00010	<0.00002	<0.00005	-	-	<0.00002
Molybdenum	mg/L	7.3	0.04	0.073	<0.002	<0.002	<0.2	<0.2	<0.01	-	-	-	<0.00047	-	<0.00047	<0.00047	<0.00047	<0.00050	<0.0005	-	<0.0005	<0.002
Nickel	mg/L	1.6	0.025	*f*(alk) 0.025 - 0.15	<0.003	<0.003	<0.05	<0.05	<0.003	-	-	-	0.00141	-	0.00182	0.00123	0.00263	0.00183	0.0009	-	<0.0006	**0.006**
Phosphorus	mg/L	N/V	N/V	N/V	-	-	1.0	1.0	<0.03	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	N/V	N/V	N/V	1.19	1.22	59.4	53.9	73.5	-	-	-	-	-	27.5	31.5	30.9	28.4	20.6	-	21	**31.0**
Selenium	mg/L	0.050	0.1	0.0010	<0.0008	<0.0008	-	-	-	-	-	-	0.00085	-	**0.00124**	**0.00177**	**0.00788**	**0.00179**	<0.00080	-	<0.0008	**0.0015**
Silicon	mg/L	N/V	N/V	N/V	2.16	2.11	8.67	8.34	6.55	-	-	-	-	-	11.8	15.5	11.4	11.4	10.900	-	10.3	**12.0**
Silver	mg/L	0.0012	0.0001	0.0001	<0.0001	<0.0001	<0.005	<0.005	<0.0003	-	-	-	<0.00070	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	-	<0.0001	<0.0001
Sodium	mg/L	N/V	N/V	N/V	8.58	8.73	148	146	389	-	-	-	-	-	46.0	58.8	52.7	44.7	33.5	-	38.4	**58.9**
Strontium	mg/L	N/V	N/V	N/V	0.125	0.123	1.07	1.09	1.09	-	-	-	0.914	-	0.791	0.755	0.808	0.964	0.746	-	0.626	**1.10**
Thallium	mg/L	0.400	0.0003	0.0008	<0.0003	<0.0003	-	-	-	-	-	-	<0.00036	-	<0.00030	<0.00030	**0.00679**	<0.00030	<0.00030	-	<0.0003	<0.0003
Thorium	mg/L	N/V	N/V	N/V	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	N/V	N/V	N/V	<0.002	<0.002	<0.005	<0.005	0.0019	-	-	-	0.00130	-	<0.0020	0.00142	0.00102	0.00168	0.0006	-	<0.0005	**0.002**
Uranium	mg/L	N/V	0.005	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.200	0.006	N/V	<0.002	<0.002	<0.005	<0.005	0.0014	-	-	-	0.00076	-	<0.00040	0.00091	0.00062	<0.00040	<0.0004	-	<0.0004	<0.002
Zinc	mg/L	1.1	0.02	0.03	<0.005	<0.005	**0.06**	**0.04**	0.0027	**0.20**	-	-	**0.0977**	-	0.00842	0.00260	**0.202**	0.00752	0.0118	-	0.006	<0.005
Zirconium	mg/L	N/V	0.004	N/V	-	-	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness	mg CaCO3/L	N/V	N/V	N/V	126	126	-	392.8	649.0	-	-	-	-	-	617	564	685	602	571	-	537	**640**
Alkalinity as CaCO3	mg/L	N/V	<25%	N/V	111	107	-	1230	1260	-	-	-	930	-	862	866	925	901	765	-	722	**893**

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1998, reprinted February 1999.

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V = No value for parameter in applicable criteria.

< = concentration below accompanying method detection limit.

f (parameter) = Function of the parameter(s) in parenthesis.

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed.

* = In a filtered water sample. All groundwater samples collected for metals by Golder Associates were filtered.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

9.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Iron = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location.

Iron = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location.

Table C-7: Analytical Results for Groundwater - Pesticides
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 4 May-80	BH 4 Jun-80	BH 4 Aug-80	BH 4 Dec-87	BH 4 Dec-89	BH 4 May-00	BH 4 Jul-03	BH 4 Oct-03	BH 4 May-04	BH 4 Oct-04	BH 4 May-05	BH 4 Oct-05	BH 4 May-06	BH 4 Oct-06	BH 4 Oct-07	BH 4 Oct-08
Aldrin	µg/L	0.2	0.001†	N/V	-	-	-	<0.0010	0.0008	-	-	-	-	-	-	-	-	-	-	-	-	-
Alpha-BHC	µg/L	N/V	N/V	N/V	-	-	-	0.005	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-
Beta-BHC	µg/L	N/V	N/V	N/V	-	-	-	<0.0020	0.0014	-	-	-	-	-	-	-	-	-	-	-	-	-
Delta-BHC	µg/L	N/V	N/V	N/V	-	-	-	<0.0010	0.0009	-	-	-	-	-	-	-	-	-	-	-	-	-
Gamma-BHC (Lindane)	µg/L	N/V	0.01	0.01	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane	µg/L	0.04	0.05	N/V	-	-	-	<0.0200	<0.0100	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	µg/L	6.0	0.003*	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	µg/L	20		N/V	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	µg/L	0.05		N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4'-DDT	µg/L	0.05		N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	µg/L	0.02	0.001†	N/V	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	µg/L	0.56	0.003*	0.02	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	µg/L	0.56			-	-	-	<0.0020	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan Sulphate	µg/L	N/V	N/V	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	µg/L	0.05	0.002	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin Aldehyde	µg/L	N/V	N/V	N/V	-	-	-	<0.0040	<0.0020	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	µg/L	0.04	0.001*	N/V	-	-	-	<0.0010	**0.0035**	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor Epoxide	µg/L	6.0		N/V	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	µg/L	0.3	0.04	N/V	-	-	-	<0.0030	<0.0015	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	µg/L	N/V	0.001	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	µg/L	N/V	0.008	N/V	-	-	-	<0.0600	<0.0600	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES:

Table 3	= Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004)
PWQO	= Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1998, reprinted February 2003.
GPAL	= Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.
2008 Background	= Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.
N/V	= No value for parameter in applicable criteria.
<	= concentration below accompanying method detection limit.
Underlined	= Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.
-	= Not analyzed
†	= Criterion represents the sum of Aldrin and Dieldrin
*	= Criterion is for the sum of concentrations of the parameters adjacent to the combined cell
12.7	= Shaded cells with bold text represent an exceedance of one or more applicable criterion values.
0.04	= Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.
Aldrin	= Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location
Aldrin	= Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location

Table C-8: Analytical Results for Groundwater - VOCs
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 3 May-96	BH 3 Jun-96	BH 3 Aug-96	BH 3 Dec-97	BH 3 Dec-99	BH 3 May-00	BH 3 Jul-03	BH 3 Oct-03	BH 3 May-04	BH 3 Oct-04	BH 3 May-05	BH 3 Oct-05	BH 3 Nov-05 C2/R2	BH 3 May-06	BH 3 Oct-06	BH 3 Oct-07	BH 3 Oct-08
Chloromethane	µg/L	N/V	700	N/V	<0.4	<0.4	<10.0	-	<2.0	<0.3	-	-	-	-	-	-	<0.28	<0.4	<0.4	<0.4	<0.4	DRY	<0.40
Vinyl Chloride	µg/L	0.5	600	N/V	<0.17	<0.17	<10.0	-	<2.0	<0.2	-	-	-	-	<0.17	<0.17	<0.34	0.17	<0.17	<0.17	<0.17	-	<0.17
Bromomethane	µg/L	3.7	0.9	N/V	<0.2	<0.2	<10.0	-	<2.0	<0.4	-	-	-	-	<0.2	<0.2	<0.46	<0.2	0.73	<0.2	<0.2	-	<0.20
Chloroethane	µg/L	N/V	N/V	N/V	<0.2	<0.2	<25.0	-	<5.0	<0.2	-	-	-	-	<0.2	<0.2	<0.44	<0.2	<0.2	<0.2	<0.2	-	<0.20
Trichlorofluoromethane	µg/L	N/V	N/V	N/V	<0.4	<0.4	<5.0	-	<1.0	-	-	-	-	-	<0.4	<0.4	<0.48	<0.4	<0.4	<0.4	<0.4	-	<0.40
Acetone	µg/L	3,300	N/V	N/V	<0.5	<0.5	-	-	-	-	-	-	-	-	5.6	20	28	6.4	<0.5	<0.50	<0.5	-	<0.50
1,1-Dichloroethene (Dichloroe	µg/L	0.66	40	N/V	<0.3	<0.3	<2.5	-	<0.5	<0.1	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.30
Dichloromethane (Methylene	µg/L	50,000	100	98.1	<0.3	<0.3	<10.0	-	<1.0	<0.2	-	-	-	-	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	-	<0.30
trans-1,2- Dichloroethene	µg/L	100	200	N/V	<0.2	<0.2	<1.0	-	<0.2	<0.07	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Methyl-t-Butyl Ether	µg/L	50,000	200	10,000	<0.2	<0.2	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
1,1-Dichloroethane	µg/L	9,000	200	N/V	<0.3	<0.3	<1.0	-	<0.2	<0.06	-	-	-	-	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	-	<0.30
Methyl Ethyl Ketone	µg/L	50,000	400	N/V	<0.9	<0.9	-	-	-	-	-	-	-	-	<0.9	<0.9	<1.8	<0.9	<0.9	<0.9	<0.9	-	<0.90
cis-1,2- Dichloroethene	µg/L	70	200	N/V	<0.2	<0.2	-	-	-	<0.07	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Chloroform	µg/L	430	N/V	1.8	<0.2	<0.2	<1.0	-	<0.2	<0.1	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
1,2-Dichloroethane	µg/L	17	100	100	<0.2	<0.2	<1.0	-	<0.2	<0.1	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
1,1,1-Trichloroethane	µg/L	200	10	N/V	<0.3	<0.3	<1.0	-	0.5	<0.06	-	-	-	-	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	-	<0.30
Carbon Tetrachloride	µg/L	17	N/V	13.3	<0.2	<0.2	<1.0	-	<0.2	<0.04	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Benzene	µg/L	1,900	100	370	<0.2	<0.2	5.1	-	2.2	3.10	-	-	1.2	3.2	1.7	2.1	<0.4	2.2	0.84	1.8	1.2	-	1.5
1,2-Dichloropropane	µg/L	9.3	0.7	N/V	<0.2	<0.2	<1.0	-	<0.2	<0.03	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Trichloroethylene	µg/L	50	20	21	<0.2	<0.2	<1.0	-	<0.2	-	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Bromodichloromethane	µg/L	50,000	200	N/V	<0.2	<0.2	<1.0	-	<0.2	<0.2	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
cis-1,3-Dichloropropene	µg/L	3.8	N/V	N/V	<0.2	<0.2	<2.5	-	<0.5	<0.04	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Methyl Isobutyl Ketone	µg/L	50,000	N/V	N/V	<0.3	<0.3	-	-	-	-	-	-	-	-	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	-	<0.30
trans-1,3-Dichloropropene	µg/L	N/V	7	N/V	<0.3	<0.3	<2.5	-	<0.5	<0.03	-	-	-	-	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	-	<0.30
1,1,2- Trichloroethane	µg/L	16,000	800	N/V	<0.2	<0.2	<2.5	-	<0.5	<0.07	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Toluene	µg/L	5,900	0.8	2.0	<0.2	<0.2	0.7 ‡	-	0.4	0.3	-	-	0.12	<0.16	<0.2	0.23	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
2-Hexanone	µg/L	N/V	N/V	N/V	<0.3	<0.3	-	-	-	-	-	-	-	-	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	-	<0.30
Dibromochloromethane	µg/L	50,000	40	N/V	<0.1	<0.1	<5.0	-	<1.0	<0.3	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	<0.10
1,2-Dibromoethane (Ethylene	µg/L	3.3	5	N/V	<0.2	<0.2	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.4	<0.2	<0.2	<0.2	<0.2	-	<0.20
Tetrachloroethene	µg/L	5.0	50	111	<0.2	<0.2	<2.5	-	<0.5	<0.04	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	<0.20
1,1,1,2-Tetrachloroethane	µg/L	6.0	20	N/V	<0.1	<0.1	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.26	<0.1	<0.1	<0.1	<0.1	-	<0.10
Chlorobenzene	µg/L	500	15	1.3	<0.1	<0.1	14.5	-	6.9	8.5	-	-	-	-	11	10	7.6	15	5.7	15	12	-	9.6
Ethylbenzene	µg/L	28,000	8	90	<0.1	<0.1	<1.0	-	<0.2	<0.1	-	-	<0.05	<0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	<0.10
m & p Xylenes	µg/L	5,600	32	N/V	<0.2	<0.2	-	-	-	-	-	-	-	-	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.20
Bromoform	µg/L	840	60	N/V	<0.1	<0.1	<10.0	-	<2.0	<0.1	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	<0.10
Styrene	µg/L	940	4	72	<0.1	<0.1	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	<0.10
1,1,2,2-Tetrachloroethane	µg/L	22	70	N/V	<0.1	<0.1	<5.0	-	<1.0	<0.2	-	-	-	-	<0.1	<0.1	<0.4	<0.1	<0.1	<0.1	<0.1	-	<0.10
o Xylenes	µg/L		40	N/V	<0.1	<0.1	-	-	-	-	-	-	-	-	0.4	0.24	<0.2	0.24	<0.1	0.32	0.2	-	<0.10
1,3-Dichlorobenzene	µg/L	7,600	2.5	150	<0.1	<0.1	<1.0	-	<0.2	<0.2	-	-	-	-	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	<0.10
1,4-Dichlorobenzene	µg/L	7,600	4	26	<0.1	<0.1	5.50	-	2.10	3.40	-	-	-	-	3.2	2.5	1.6	4	1.5	3.7	3.5	-	2.7
1,2-Dichlorobenzene	µg/L	7,600	2.5	0.70	<0.1	<0.1	0.9 ‡	-	0.4	<0.1	-	-	-	-	0.5	0.55	<0.2	<0.1	<0.1	0.74	0.79	-	<0.10
1,2,4-Trichlorobenzene	µg/L	500	0.5	24	<0.3	<0.3	-	-	-	-	-	-	-	-	<0.3	<0.3	<0.6	<0.3	<0.3	<0.3	<0.3	-	<0.30
1,3- Dichloropropene	µg/L	3.8	N/V	N/V	<0.30	<0.30	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	<0.30
m, p & o Xylenes	µg/L	5,600	72	N/V	<0.2	<0.2	4.7	-	1.9	0.8	-	-	0.48	<0.56	0.6	0.57	<0.2	0.24	<0.2	0.32	0.2	-	<0.20
2-Chloroethylvinylether	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.06	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1996, reprinted February 1999.

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V = No value for parameter in applicable criteria.

< = concentration below accompanying method detection limit.

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed.

‡ = Detected at a level below stated Method Detection Limit.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

0.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Vinyl Chloride = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location.

Vinyl Chloride = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location.

Table C-3: Analytical Results for Groundwater - BNAs, PAHs, and Phenols
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	MW1-99 May-99	MW1-99 Jun-99	MW1-99 Aug-99	MW1-99 Dec-07	MW1-99 Dec-09	MW1-99 May-00	MW1-03 Jul-03	MW1-03 Oct-03	MW1-04 May-04	MW1-05 Oct-04	MW1-05 May-05	MW1-05 Oct-05	MW1-05 Nov-05 (2)/R1	MW1-06 May-06	MW1-06 Oct-06	MW1-07 Oct-07	MW1-08 Oct-08
Acenapthene	µg/L	1700	N/V	5.8	<0.10	<0.10	-	-	-	0.30	-	-	1.1	1.5	-	1.6	<0.10	1.1	0.94	0.59	1.2	DRY	**0.68**
5-nitro-Acenapthene	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	2000	N/V	N/V	<0.11	<0.11	-	-	-	<0.01	-	-	<0.31	<0.31	-	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	-	**0.54**
Anthracene	µg/L	12	0.0008	0.012	<0.05	<0.05	-	-	-	**0.14**	-	-	**0.59**	**1.6**	-	**1.1**	<0.07	<0.07	**0.59**	**0.42**	**0.25**	-	**1.2**
Benzo(a)anthracene	µg/L	5.0	0.0004	0.018	<0.08	<0.08	-	-	-	<0.01	-	-	<0.2	**1.9**	-	**0.09**	<0.08	<0.08	**0.64**	<0.08	**0.22**	-	**3.4**
Benzo(a)pyrene	µg/L	1.9	N/V	0.015	<0.01	<0.01	-	-	-	<0.01	-	-	<0.24	**1.3**	-	<0.09	<0.09	<0.09	**0.37**	<0.01	**0.2**	-	**2.7**
Benzo(b)fluoranthene	µg/L	7.0	N/V	N/V	<0.05	<0.05	-	-	-	<0.01	-	-	<0.2	1.9	-	0.06	<0.03	<0.03	0.34	<0.03	0.3	-	**3.6**
Benzo(g,h,i)perylene	µg/L	0.2	0.00002	N/V	<0.06	<0.06	-	-	-	<0.01	-	-	<0.2	**0.75**	-	<0.06	<0.06	<0.06	**0.11**	<0.06	**0.17**	-	**1.3**
Benzo(k)fluoranthene	µg/L	0.4	0.0002	N/V	<0.06	<0.06	-	-	-	<0.01	-	-	<0.2	**0.83**	-	<0.06	<0.06	<0.06	**0.43**	<0.05	**0.13**	-	**1.4**
Benzylbutylphthalate	µg/L	N/V	0.2	N/V	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Biphenyl	µg/L	1700	0.2	N/V	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethyl)ether	µg/L	110	200	N/V	-	-	-	-	-	<0.09	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	µg/L	430	N/V	N/V	-	-	-	-	-	<0.2	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
Bis(2-Ethylhexyl)phthalate	µg/L	30	0.6	16	-	-	-	-	-	<0.02	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	N/V	0.05	N/V	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Camphene	µg/L	N/V	2	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
p-Chloroaniline	µg/L	100	N/V	N/V	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	N/V	3	N/V	-	-	-	-	-	<0.09	-	-	-	-	-	-	-	-	-	-	-	-	-
1-Chloronaphthalene	µg/L	N/V	0.1	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	µg/L	N/V	0.2	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	44000	N/V	7	-	-	-	-	-	<0.1	-	-	<0.3	<0.3	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	N/V	0.05	N/V	-	-	-	-	-	<0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	3.0	0.0001	N/V	<0.05	<0.05	-	-	-	<0.005	-	-	<0.27	**2.0**	-	**0.07**	<0.05	<0.05	**0.64**	<0.05	**0.24**	-	**3.1**
m,p-Cresol	µg/L	N/V	1	N/V	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
p-Cresol	µg/L	N/V	1	N/V	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
o-Cresol	µg/L	N/V	1	N/V	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo(a,h)anthracene	µg/L	0.25	0.002	N/V	<0.09	<0.09	-	-	-	<0.01	-	-	<0.2	<0.2	-	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	-	**0.33**
Di-n-butylphthalate	µg/L	N/V	4	19	-	-	-	-	-	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-
Di-n-octyl Phthalate	µg/L	N/V	0.2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	7600	2.5	0.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	7600	2.5	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	7600	4	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	1600	0.6	N/V	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	µg/L	3700	0.2	0.2	-	-	-	-	-	<0.1	-	-	<0.3	<0.3	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	µg/L	N/V	0.2	0.2	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	µg/L	30	0.2	N/V	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	µg/L	21000	10	N/V	-	-	-	-	-	<0.09	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
Dimethyl phthalate	µg/L	30	0.2	N/V	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	µg/L	1500	N/V	N/V	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitrophenol	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	2300	4	N/V	-	-	-	-	-	<0.4	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	µg/L	N/V	6	N/V	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Diphenylamine	µg/L	N/V	3	N/V	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	130	0.0008	0.04	<0.12	<0.12	-	-	-	**1.38**	-	-	**1.7**	**6.3**	-	**1.6**	**0.2**	**0.75**	**2.3**	**0.81**	**0.73**	-	**6.4**
Fluorene	µg/L	290	0.2	3.0	<0.09	<0.09	-	-	-	**0.57**	-	-	**1.3**	**2.1**	-	**2.5**	0.2	**0.79**	**1.1**	**0.96**	**1.3**	-	**1.0**
Hexachlorobenzene	µg/L	0.62	0.0065	N/V	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	0.87	0.009	1.3	-	-	-	-	-	-	-	-	<0.4	<0.4	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	µg/L	N/V	0.06	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	µg/L	12	1	N/V	-	-	-	-	-	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.27	N/V	N/V	<0.03	<0.03	-	-	-	<0.01	-	-	<0.27	**0.79**	-	<0.03	<0.03	<0.03	0.12	<0.03	0.17	-	**1.4**
Indole	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	µg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4,6-Dinitrophenol	µg/L	N/V	0.2	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-and 1-methyl Napthalene	µg/L	13000	2	N/V	-	-	-	-	-	0.32	-	-	1.6	**2.1**	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	5900	7	1.1	<0.12	<0.12	-	-	-	<0.01	-	-	<0.3	<0.3	-	0.24	0.23	0.27	0.3	0.19	0.33	-	<0.12
Nitrobenzene	µg/L	N/V	0.02	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	µg/L	N/V	0.5	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	N/V	50	N/V	-	-	-	-	-	<0.03	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	N/V	7	N/V	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Nitrosodi-n-propylamine	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	130	0.5	0.5	-	-	-	-	-	<0.02	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
Perylene	µg/L	N/V	0.00007	N/V	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	63	0.03	0.4	<0.11	<0.11	-	-	-	**1.69**	-	-	<0.32	**7.3**	-	**5.5**	<0.11	<0.11	**1.9**	**1.9**	**1.7**	-	**4.5**
Phenols*	µg/L	N/V	1	4.0	<0.001	<0.001	**2.5**	**4.0**	**7.0**	-	-	-	-	-	<2	<2	**2**	<2	<1	<1	**1**	-	**5**
Phenol	µg/L	26000	5	N/V	-	-	-	-	-	<0.04	-	-	<0.5	<1.0	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	40	N/V	0.025	<0.12	<0.12	-	-	-	**0.97**	-	-	**0.95**	**4.6**	-	**0.99**	**0.13**	**0.46**	**1.6**	**0.46**	**0.54**	-	**4.9**
2,3,4,5-Tetrachlorophenol	µg/L	N/V	1	1	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	µg/L	N/V	1	1	-	-	-	-	-	<0.04	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	µg/L	N/V	1	1	-	-	-	-	-	<0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/L	500	0.5	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	630	18	18	-	-	-	-	-	<0.01	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	9700	18	18	-	-	-	-	-	<0.01	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-
2,3,5-Trichlorophenol	µg/L	N/V	18	18	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4-Trichlorophenol	µg/L	N/V	18	18	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1996, reprinted February 1999.

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V = No value for parameter in applicable criteria.

< = concentration below accompanying method detection limit.

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed.

‡ = Included above with Benzo(b)fluoranthene.

* = Reported by the laboratory in mg/L, but converted to µg/L for the purpose of this table.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

0.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Sodium = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location.

Sodium = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location.

Table C-5: Analytical Results for Groundwater - General Chemistry, Anions, Nutrients and Headspace
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 6 May-90	BH 6 Jun-90	BH 6 Aug-90	BH 6 Dec-97	BH 6 Dec-98	BH 6 May-00	BH 6 Jul-03	BH 6 Oct-03	BH 6 May-04	BH 6 Oct-04	BH 6 May-05	BH 6 Oct-05	BH 6 Nov-05 (2nd)	BH 6 May-06	BH 6 Oct-06	BH 6 Oct-07	BH 6 Oct-08
General Chemistry																							
Alkalinity as CaCO3	mg/L	N/V	<25%	N/V	111	107	-	722	742	-	-	-	600	598	566	584	550	550	416	566	531	DRY	571
Biological Oxygen Demand (BOD)	mg/L	N/V	N/V	N/V	-	-	13	12	174	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	N/V	N/V	N/V	6.8	7.2	-	12.0	24.0	18.5	14.0	15	14	1	<5	17	6	18	11	12.2	16.4	-	13.2
Electrical Conductivity	µS/cm	N/V	N/V	N/V	267	266	-	1,870	1,780	1,380	-	-	1530	1470	1330	1430	1350	1340	1060	1340	1340	-	1330
Electrical Conductivity (field)	µS/cm	N/V	N/V	N/V	338	341	-	-	-	-	-	-	1646	1690	1029	1720	1393	1014	672	891	1445	-	1590
Hardness	mg CaCO3/L	N/V	N/V	N/V	126	126	-	456.1	609.2	-	-	-	-	-	525	532	522	485	369	514	468	-	516
pH	no units	N/V	6.5 - 8.5	6.5 - 9.0	8.38	8.37	-	7.04	7.75	6.94	-	-	**6.47**	6.58	6.52	**6.48**	7.05	6.90	7.10	7.42	7.57	-	7.15
pH (field)	no units	N/V	6.5 - 8.5	6.5 - 9.0	8.23	8.21	-	-	-	-	-	-	**6.48**	6.5	6.78	**6.26**	6.71	**6.26**	6.60	6.61	6.7	-	6.46
Temperature (T) (field)	°C	N/V	N/A	N/A	13.14	13.03	-	-	-	-	-	-	16.0		8.03	14.5	8.1	15.08	10.8	7.41	15.9	-	15.2
Dissolved Oxygen (field)	mg/L	N/V	f (T) >4 - 7	>5.5	10.10	10.07	-	-	-	-	-	-	-	-	-	-	-	**2.10**	**3.30**	**5.83**	**2.74**	-	2.8
Total Dissolved Solids (TDS)	mg/L	N/V	N/V	N/V	-	-	-	1042	980	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (TOC)	mg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids (TSS)	mg/L	N/V	<10%	<5 - <25	<10	<10	3081.00	7438.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	742
Anions																							
Bromide	mg/L	N/V	N/V	N/V	-	-	2.89	2.20	2.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	N/V	N/V	N/V	14.6	14.6	225	237	188	119	-	-	178	164	96.4	126	117	109	83.6	91.9	130	-	93.9
Fluoride	mg/L	N/V	N/V	0.12	0.07	0.07	<0.10	0.12	<0.10	-	-	-	-	-	-	-	-	<0.05	0.11	<0.05	0.09	-	<0.05
Nitrate as N	mg/L	N/V	N/V	13	<0.05	<0.05	<0.02	<0.20	<0.02	-	-	-	-	-	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	-	<0.05
Nitrite as N	mg/L	2	N/V	0.06	<0.05	<0.05	<0.20	0.01	<0.20	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05
Phosphate	mg/L	N/V	N/V	N/V	-	-	<1.00	<1.0	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	N/V	N/V	N/V	-	-	2.90	<0.50	0.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																							
Ammonia as N	mg/L	N/V	N/V	f (T, pH)	<0.02	<0.02	-	**14**	**33.0**	-	27.7	25.1	**23.19**	30.2	8.01	12.5	4.82	21.7	17.2	16.9	**19.3**	-	25.3
Un-Ionized Ammonia	mg/L	N/V	0.02	0.019	<0.00146	<0.0010	-	-	-	-	-	-	**0.021**	-	0.0080	0.0060	0.00395	0.011	0.0135	0.010	**0.028**	-	0.020
Total Kjeldahl Nitrogen	mg/L	N/V	N/V	N/V	0.63	0.60	26.0	38	36.0	30.3	37.5	34.5	26.5	25.6	22.2	31.2	21.5	24.5	18.4	20	20.1	-	25.4
Total Phosphorus	mg/L	N/V	0.02	N/V	<0.02	0.02	**0.070**	**0.050**	**0.300**	-	-	-	-	-	**0.83**	**0.12**	**0.42**	**2**	**0.85**	**0.67**	**0.34**	-	2.01
Other																							
Headspace (field)	ppm	N/V	N/V	N/V	-	-	-	-	-	-	-	-	0	200	25	175	-	105	-	0	175	-	100
Headspace (field)	% LEL	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	0	0	-	-

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1998, reprinted February 1999.

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V = N/V = No value for parameter in applicable criteria. N/A = Not applicable.

< = concentration below accompanying method detection limit.

f (parameter) = Function of the parameter(s) in parenthesis.

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

0.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Sodium = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location.

Sodium = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location.

Table C-6: Analytical Results for Groundwater - Metals Parameters
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 5 May-90	BH 5 Jun-90	BH 5 Aug-90	BH 5 Dec-97	BH 5 Dec-99	BH 5 May-00	BH 5 Jul-03	BH 5 Oct-03	BH 5 May-04	BH 5 Oct-04	BH 5 May-05	BH 5 Oct-05	BH 5 Nov-05 C2/R1	BH 5 May-06	BH 5 Oct-06	BH 5 Oct-07	BH 5 Oct-08
Aluminum	mg/L	N/V	f(pH) 0.015 - 0.075	f(pH, Ca, DOC) 0.005 - 0.1	0.012	0.014	<0.05	<0.05	0.029	-	-	-	0.00909	0.0097	0.00887	0.0119	0.00165	0.00366	0.00392	0.00183	0.00815	DRY	**0.006**
Antimony	mg/L	16	0.02	N/V	-	-	-	-	-	-	-	-	<0.00153	<0.00153	<0.00153	<0.00153	<0.00153	<0.00150	<0.00150	<0.001	<0.001	-	-
Arsenic	mg/L	0.480	0.005	0.0050	<0.003	<0.003	-	-	-	-	-	-	0.00253	0.00196	0.00092	0.00160	0.00115	0.00168	0.00099	<0.0006	0.00133	-	<0.003
Barium	mg/L	23	N/V	N/V	0.035	0.034	0.411	0.411	0.420	0.053	-	-	0.461	0.544	0.345	0.458	0.277	0.443	0.327	0.432	0.422	-	**0.475**
Beryllium	mg/L	0.053	f(hard) 0.011 - 1.1	N/V	<0.001	<0.001	<0.0005	<0.0005	<0.00003	-	-	-	<0.00184	<0.00184	<0.00184	<0.00184	<0.00184	<0.0010	<0.0010	<0.001	<0.001	-	<0.001
Bismuth	mg/L	N/V	N/V	N/V	<0.002	<0.002	-	-	-	-	-	-	<0.00033	<0.0071	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0005	<0.0005	-	<0.002
Boron	mg/L	50	0.2	N/V	0.013	0.013	**0.269**	**0.262**	**0.405**	-	-	-	**0.229**	**0.348**	0.144	**0.204**	**0.223**	**0.749**	0.176	0.195	**0.231**	-	**0.241**
Cadmium	mg/L	0.011	f(hard) 0.0001 - 0.0005	0.000017	<0.00005	<0.00005	<0.005	<0.005	**0.0039**	<0.001	-	-	<0.00067	<0.00067	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0002	-	<0.00005
Calcium	mg/L	N/V	N/V	N/V	42.8	42.8	162	148	202	-	-	-	-	-	178	181	178	164	128	174	160	-	**178**
Chromium	mg/L	2	0.0099	0.0099	<0.003	<0.003	<0.01	<0.01	0.0007	<0.01	-	-	0.00167	0.00936	0.00076	0.00492	0.00337	0.0045	0.00399	0.00132	0.00324	-	**0.005**
Cobalt	mg/L	0.100	0.0009	N/V	<0.0005	<0.0005	<0.05	<0.05	**0.003**	-	-	-	**0.00148**	**0.00177**	**0.00130**	**0.0015**	<0.00090	**0.0013**	**0.00115**	**0.00136**	**0.00105**	-	**0.002**
Copper	mg/L	0.023	f(hard) 0.001 - 0.005	f(alk) 0.002 - 0.004	<0.002	<0.002	<0.01	<0.01	0.0012	<0.05	-	-	0.00173	<0.00078	**0.00429**	<0.00078	**0.00703**	0.00102	0.0009	<0.0008	0.00111	-	<0.002
Iron	mg/L	N/V	0.3	0.3	0.025	0.021	**42.2**	**39.2**	**28.5**	**44.5**	**1.34**	**0.37**	**43.300**	**46.100**	**43.1**	**42.5**	**2.79**	**36.4**	**27.7**	**49.3**	**18**	-	**41.8**
Lead	mg/L	0.032	f(hard) 0.001 - 0.005	f(alk) 0.001 - 0.007	<0.001	<0.001	<0.05	<0.05	<0.003	<0.005	-	-	<0.00044	<0.00044	0.00079	<0.00044	<0.00044	<0.00044	<0.00044	<0.0005	<0.0005 *	-	<0.0005
Magnesium	mg/L	N/V	N/V	N/V	4.69	4.76	23.1	20.9	24.9	-	-	-	-	-	19.3	19.8	19.2	18.3	0.0122	19.3	16.6	-	**17.4**
Manganese	mg/L	N/V	N/V	N/V	0.020	0.021	0.30	0.28	0.173	0.33	0.3	0.30	0.258	0.254	0.290	0.258	0.319	0.218	0.18	0.269	0.103	-	**0.272**
Mercury	mg/L	0.00012	0.0002*	0.000026	<0.00002	<0.00002	-	-	-	-	-	-	<0.0001	<0.00005	<0.0001	<0.0001	<0.00010	<0.00002	<0.00002	<0.00005	<0.00005	-	<0.00002
Molybdenum	mg/L	7.3	0.04	0.073	<0.002	<0.002	<0.2	<0.2	<0.01	-	-	-	<0.00047	<0.00047	<0.00047	<0.00047	<0.00047	<0.00050	<0.00050	<0.0005	<0.0005	-	<0.002
Nickel	mg/L	1.6	0.025	f(alk) 0.025 - 0.15	<0.003	<0.003	<0.05	<0.05	<0.003	-	-	-	0.00121	0.00097	0.00110	0.00086	0.00089	0.00086	0.00124	0.00086	<0.0006	-	<0.003
Phosphorus	mg/L	N/V	N/V	N/V	-	-	1.0	0.9	0.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	N/V	N/V	N/V	1.19	1.22	15.8	13.4	20.9	-	-	-	-	-	12.2	14.5	11.9	12.2	10.3	10.8	12.1	-	**13.4**
Selenium	mg/L	0.050	0.1	0.0010	<0.0008	<0.0008	-	-	-	-	-	-	**0.00292**	**0.00264**	**0.00298**	**0.00417**	**0.00198**	**0.00168**	**0.0024**	**0.00147**	**0.00146**	-	<0.0008
Silicon	mg/L	N/V	N/V	N/V	2.16	2.11	8.37	8.09	6.28	-	-	-	-	-	10.3	12.3	8.55	11	8.67	10.300	6.350	-	**13.4**
Silver	mg/L	0.0012	0.0001	0.0001	<0.0001	<0.0001	<0.005	<0.005	<0.0003	-	-	-	<0.00070	<0.00070	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001	-	<0.0001
Sodium	mg/L	N/V	N/V	N/V	8.58	8.73	121	116	88.3	-	-	-	-	65.0	56.9	71.9	60.1	51.1	40.8	51.3	55.8	-	**45.7**
Strontium	mg/L	N/V	N/V	N/V	0.125	0.123	1.56	1.58	1.45	-	-	-	1.270	1.290	1.05	1.26	1.11	1.09	0.857	1.08	0.451	-	**1.00**
Thallium	mg/L	0.400	0.0003	0.0008	<0.0003	<0.0003	-	-	-	-	-	-	<0.00036	<0.00036	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.0003	-	<0.0003
Thorium	mg/L	N/V	N/V	N/V	-	-	*<0.05*	*<0.05*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	N/V	N/V	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/L	N/V	N/V	N/V	<0.002	<0.002	<0.005	<0.005	0.0025	-	-	-	<0.00054	0.00079	<0.0020	<0.00050	<0.00050	<0.00050	<0.00050	<0.0005	<0.0005	-	<0.002
Uranium	mg/L	N/V	0.005	N/V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.200	0.006	N/V	<0.002	<0.002	<0.005	<0.005	0.0041	-	-	-	0.00093	0.0007	<0.00040	0.00079	<0.00040	<0.00040	0.0007	<0.0004	0.0006	-	<0.002
Zinc	mg/L	1.1	0.02	0.03	<0.005	<0.005	**0.05**	**0.04**	0.0061	**0.08**	-	-	**0.0438**	0.00346	0.00613	0.0110	**0.03**	0.0074	0.009	0.00798	0.0093	-	<0.005
Zirconium	mg/L	N/V	0.004	N/V	-	-	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardness	mg CaCO3/L	N/V	N/V	N/V	126	126	-	456.1	609.2	-	-	-	-	-	525	532	522	485	369	514	468	-	**516**
Alkalinity as CaCO3	mg/L	N/V	<25%	N/V	111	107	-	722	742	-	-	-	600	598	566	584	550	550	416	566	531	-	**571**

NOTES:

Table 3	= Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).
PWQO	= Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1998, reprinted February 1999.
GPAL	= Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.
2008 Background	= Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.
N/V	= No value for parameter in applicable criteria.
<	= concentration below accompanying method detection limit.
f (parameter)	= Function of the parameter(s) in parenthesis.
Underlined	= Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.
-	= Not analyzed.
*	= In a filtered water sample. All groundwater samples collected for metals by Golder Associates were filtered.
12.7	= Shaded cells with bold text represent an exceedance of one or more applicable criterion values.
0.04	= Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.
Iron	= Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location.
Iron	= Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location.

Table C-7: Analytical Results for Groundwater - Pesticides
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	MH-9 May-98	MH-9 Jun-98	MH-9 Aug-98	MH-9 Dec-97	MH-9 Dec-98	MH-9 May-99	MH-9 Jul-03	MH-9 Oct-03	MH-9 May-04	MH-9 Oct-04	MH-9 May-05	MH-9 Oct-05	MH-9 May-06	MH-9 Oct-06	MH-9 Oct-07	MH-9 Oct-08
Aldrin	µg/L	0.2	0.001†	N/V	-	-	-	0.029	0.0076	-	-	-	-	-	-	<0.02	-	-	-	-	DRY	-
Alpha-BHC	µg/L	N/V	N/V	N/V	-	-	-	0.006	0.0049	-	-	-	-	-	-	<0.01	-	-	-	-	-	-
Beta-BHC	µg/L	N/V	N/V	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	<0.01	-	-	-	-	-	-
Delta-BHC	µg/L	N/V	N/V	N/V	-	-	-	<0.0010	0.0033	-	-	-	-	-	-	<0.01	-	-	-	-	-	-
Gamma-BHC (Lindane)	µg/L	N/V	0.01	0.01	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
Chlordane	µg/L	0.04	0.06	N/V	-	-	-	<0.0200	0.015	-	-	-	-	-	-	<0.10	-	-	-	-	-	-
4,4'-DDD	µg/L	8.0	0.003*	N/V	-	-	-	<0.0020	0.0038	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
4,4'-DDE	µg/L	20		N/V	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
4,4'-DDT	µg/L	0.05		N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
2,4'-DDT	µg/L	0.05		N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
Dieldrin	µg/L	0.02	0.001†	N/V	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	<0.02	-	-	-	-	-	-
Endosulfan I	µg/L	0.56	0.003*	0.02	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
Endosulfan II	µg/L	0.56			-	-	-	<0.0020	<0.0005	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
Endosulfan Sulphate	µg/L	N/V	N/V	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	<0.01	-	-	-	-	-	-
Endrin	µg/L	0.05	0.002	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	<0.04	-	-	-	-	-	-
Endrin Aldehyde	µg/L	N/V	N/V	N/V	-	-	-	<0.0040	<0.0020	-	-	-	-	-	-	<0.01	-	-	-	-	-	-
Heptachlor	µg/L	0.04	0.001*	N/V	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	<0.03	-	-	-	-	-	-
Heptachlor Epoxide	µg/L	0.0		N/V	-	-	-	<0.0010	<0.0005	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
Methoxychlor	µg/L	0.3	0.04	N/V	-	-	-	<0.0030	<0.0015	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
Mirex	µg/L	N/V	0.001	N/V	-	-	-	<0.0020	<0.0010	-	-	-	-	-	-	<0.05	-	-	-	-	-	-
Toxaphene	µg/L	N/V	0.008	N/V	-	-	-	<0.0500	<0.0300	-	-	-	-	-	-	<0.2	-	-	-	-	-	-

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1998, reprinted February

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V = No value for parameter in applicable criteria

< = concentration below accompanying method detection limit

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed

† = Criterion represents the sum of Aldrin and Dieldrin

* = Criterion is for the sum of concentrations of the parameters adjacent to the combined cell.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

0.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Aldrin = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location.

Aldrin = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location.

Table C-8: Analytical Results for Groundwater - VOCs
Closed Zwick's Island Landfill, Belleville, ON

Parameter	Units	Table 3	PWQO	GPAL	2008 Background Back-1	2008 Background Back-2	BH 4 May-90	Jun-90	Aug-90	Dec-97	Dec-99	May-00	Jul-03	Oct-03	May-04	Oct-04	May-05	Oct-05	May-06	Oct-06	Oct-07	Oct-08
Chloromethane	µg/L	N/V	700	N/V	<0.4	<0.4	<10.0	-	<2.0	1.4	-	-	-	-	-	<0.14	<0.14	<0.4	<0.4	Damaged	<0.4	<0.40
Vinyl Chloride	µg/L	0.5	600	N/V	<0.17	<0.17	<10.0	-	<2.0	<0.2	-	-	-	-	<0.17	<0.17	<0.17	<0.17	<0.17	-	<0.17	<0.17
Bromomethane	µg/L	3.7	0.9	N/V	<0.2	<0.2	<10.0	-	<2.0	<0.4	-	-	-	-	<0.2	<0.23	<0.23	<0.2	<0.2	-	<0.2	<0.20
Chloroethane	µg/L	N/V	N/V	N/V	<0.2	<0.2	<25.0	-	<5.0	<0.2	-	-	-	-	0.6	<0.22	<0.22	0.61	<0.2	-	<0.2	<0.20
Trichlorofluoromethane	µg/L	N/V	N/V	N/V	<0.4	<0.4	<5.0	-	<1.0	-	-	-	-	-	<0.4	<0.24	<0.24	<0.4	<0.4	-	<0.4	<0.40
Acetone	µg/L	3,300	N/V	N/V	<0.5	<0.5	-	-	-	-	-	-	-	-	10	28	12	53	<0.50	-	<0.5	<0.50
1,1-Dichloroethene (Dichlorod	µg/L	0.66	40	N/V	<0.3	<0.3	<2.5	-	<0.5	<0.1	-	-	-	-	<0.2	<0.12	<0.20	<0.2	<0.2	-	<0.2	<0.30
Dichloromethane (Methylene	µg/L	50,000	100	98.1	<0.3	<0.3	<10.0	-	<1.0	<0.2	-	-	-	-	<0.3	<0.26	<0.30	<0.3	<0.3	-	<0.3	<0.30
trans-1,2- Dichloroethene	µg/L	100	200	N/V	<0.2	<0.2	<1.0	-	<0.2	<0.07	-	-	-	-	<0.2	<0.12	<0.20	<0.2	<0.2	-	<0.2	<0.20
Methyl-t-Butyl Ether	µg/L	50,000	200	10,000	<0.2	<0.2	-	-	-	-	-	-	-	-	<0.2	<0.07	<0.20	<0.2	<0.2	-	<0.2	<0.20
1,1-Dichloroethane	µg/L	9,000	200	N/V	<0.3	<0.3	<1.0	-	0.5	<0.06	-	-	-	-	<0.3	<0.05	<0.30	<0.3	<0.3	-	<0.3	<0.30
Methyl Ethyl Ketone	µg/L	50,000	400	N/V	<0.9	<0.9	-	-	-	-	-	-	-	-	<0.9	<0.74	<0.90	<0.9	<0.9	-	<0.9	<0.90
cis-1,2- Dichloroethene	µg/L	70	200	N/V	<0.2	<0.2	-	-	-	<0.07	-	-	-	-	<0.2	<0.16	<0.20	<0.2	<0.2	-	<0.2	<0.20
Chloroform	µg/L	430	N/V	1.8	<0.2	<0.2	<1.0	-	<0.2	<0.1	-	-	-	-	<0.2	<0.06	<0.20	<0.2	<0.2	-	<0.2	<0.20
1,2-Dichloroethane	µg/L	17	100	100	<0.2	<0.2	<1.0	-	<0.2	<0.1	-	-	-	-	<0.2	<0.07	<0.20	<0.2	<0.2	-	<0.2	<0.20
1,1,1-Trichloroethane	µg/L	200	10	N/V	<0.3	<0.3	<1.0	-	0.6	<0.06	-	-	-	-	<0.3	<0.08	<0.30	<0.3	<0.3	-	<0.3	<0.30
Carbon Tetrachloride	µg/L	17	N/V	13.3	<0.2	<0.2	<1.0	-	<0.2	<0.04	-	-	-	-	<0.2	<0.2	<0.20	<0.2	<0.2	-	<0.2	<0.20
Benzene	µg/L	1,900	100	370	<0.2	<0.2	9.7	-	9.6	6.60	-	-	2.0	-	1.4	3.4	2.2	3.4	1.1	-	2.9	2.4
1,2-Dichloropropane	µg/L	9.3	0.7	N/V	<0.2	<0.2	<1.0	-	<0.2	<0.03	-	-	-	-	<0.2	<0.12	<0.20	<0.2	<0.2	-	<0.2	<0.20
Trichloroethylene	µg/L	50	20	21	<0.2	<0.2	<1.0	-	<0.2	-	-	-	-	-	<0.2	<0.05	<0.20	<0.2	0.32	-	<0.2	<0.20
Bromodichloromethane	µg/L	50,000	200	N/V	<0.2	<0.2	<1.0	-	<0.2	<0.2	-	-	-	-	<0.2	<0.06	<0.20	<0.2	<0.2	-	<0.2	<0.20
cis-1,3-Dichloropropene	µg/L	3.8	N/V	N/V	<0.2	<0.2	<2.5	-	<0.5	<0.04	-	-	-	-	<0.2	<0.04	<0.20	<0.2	<0.2	-	<0.2	<0.20
Methyl Isobutyl Ketone	µg/L	50,000	N/V	N/V	<0.3	<0.3	-	-	-	-	-	-	-	-	<0.3	<0.38	<0.30	<0.3	<0.3	-	<0.3	<0.30
trans-1,3-Dichloropropene	µg/L	N/V	7	N/V	<0.3	<0.3	<2.5	-	<0.5	<0.03	-	-	-	-	<0.3	<0.06	<0.30	<0.3	<0.3	-	<0.3	<0.30
1,1,2- Trichloroethane	µg/L	16,000	800	N/V	<0.2	<0.2	<2.5	-	<0.5	<0.07	-	-	-	-	<0.2	<0.07	<0.20	<0.2	<0.2	-	<0.2	<0.20
Toluene	µg/L	5,900	0.8	2.0	<0.2	<0.2	0.8	-	1.8	<0.09	-	-	0.21	-	<0.2	0.28	<0.20	0.64	<0.2	-	0.36	0.34
2-Hexanone	µg/L	N/V	N/V	N/V	<0.3	<0.3	-	-	-	-	-	-	-	-	<0.3	<0.70	<0.30	<0.3	<0.3	-	<0.3	<0.30
Dibromochloromethane	µg/L	50,000	40	N/V	<0.1	<0.1	<5.0	-	<1.0	<0.3	-	-	-	-	<0.1	<0.25	<0.10	<0.1	<0.1	-	<0.1	<0.10
1,2-Dibromoethane (Ethylene	µg/L	3.3	5	N/V	<0.2	<0.2	-	-	-	-	-	-	-	-	<0.2	<0.07	<0.20	<0.2	<0.2	-	<0.2	<0.20
Tetrachloroethene	µg/L	5.0	50	111	<0.2	<0.2	<2.5	-	<0.5	<0.04	-	-	-	-	<0.1	<0.07	<0.10	<0.1	<0.1	-	<0.1	<0.20
1,1,1,2-Tetrachloroethane	µg/L	6.0	20	N/V	<0.1	<0.1	-	-	-	-	-	-	-	-	<0.1	<0.13	<0.13	<0.1	<0.1	-	<0.1	<0.10
Chlorobenzene	µg/L	500	15	1.3	<0.1	<0.1	19.6	-	24.0	13.2	-	-	-	-	16	26	25	30	12	-	21	20
Ethylbenzene	µg/L	28,000	8	90	<0.1	<0.1	1.6	-	0.9	<0.1	-	-	<0.05	-	<0.1	<0.1	<0.10	<0.1	<0.1	-	<0.1	<0.10
m & p Xylenes	µg/L	5,600	32	N/V	<0.2	<0.2	-	-	-	-	-	-	-	-	0.3	<0.29	0.12	0.28	<0.2	-	<0.2	0.25
Bromoform	µg/L	840	60	N/V	<0.1	<0.1	<10.0	-	<2.0	<0.1	-	-	-	-	<0.1	<0.36	<0.10	<0.1	<0.1	-	<0.1	<0.10
Styrene	µg/L	940	4	72	<0.1	<0.1	-	-	-	-	-	-	-	-	<0.1	<0.03	<0.10	<0.1	<0.1	-	<0.1	<0.10
1,1,2,2-Tetrachloroethane	µg/L	22	70	N/V	<0.1	<0.1	<5.0	-	<1.0	<0.2	-	-	-	-	<0.1	<0.19	<0.20	<0.1	<0.1	-	<0.1	<0.10
o Xylenes	µg/L		40	N/V	<0.1	<0.1	-	-	-	-	-	-	-	-	0.2	0.12	<0.10	0.11	<0.1	-	<0.1	<0.10
1,3-Dichlorobenzene	µg/L	7,600	2.5	150	<0.1	<0.1	<1.0	-	<0.2	<0.2	-	-	-	-	<0.1	<0.16	<0.10	<0.1	<0.1	-	<0.1	<0.10
1,4-Dichlorobenzene	µg/L	7,600	4	26	<0.1	<0.1	8.70	-	13.80	7.40	-	-	-	-	7.2	6.3	6.9	8.8	2.9	-	2.9	5.1
1,2-Dichlorobenzene	µg/L	7,600	2.5	0.70	<0.1	<0.1	0.7 ‡	-	1.0	0.7	-	-	-	-	<0.1	0.43	<0.10	<0.1	0.2	-	<0.1	<0.10
1,2,4-Trichlorobenzene	µg/L	500	0.5	24	<0.3	<0.3	-	-	-	-	-	-	-	-	<0.3	<0.10	<0.30	<0.3	<0.3	-	<0.3	<0.30
1,3- Dichloropropene	µg/L	3.8	N/V	N/V	<0.30	<0.30	-	-	-	-	-	-	-	-	<0.5	<0.1	-	-	-	-	<0.30	<0.30
m, p & o Xylenes	µg/L	5,600	72	N/V	<0.2	<0.2	20.3	-	21.1	1.2	-	-	0.33	-	0.5	0.39	0.12	0.39	<0.2	-	<0.2	0.25
2-Chloroethylvinylether	µg/L	N/V	N/V	N/V	-	-	-	-	-	<0.06	-	-	-	-	-	-	-	-	-	-	-	-

NOTES:

Table 3 = Standard taken from the Non-Potable Ground Water standards in Table 3 of the "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (March 9, 2004).

PWQO = Objective taken from Table 2 of the MOEE "Provincial Water Quality Objectives", July 1994, updated October 1998, reprinted February 1999.

GPAL = Guideline taken from the CCME "Canadian Water Quality Guidelines for the Protection of Aquatic Life", Summary Table, Update December 2003.

2008 Background = Background range developed from background surface water samples. Comparison for 2008 results only. See text for details.

N/V = No value for parameter in applicable criteria.

< = concentration below accompanying method detection limit.

Underlined = Underlined values in magenta print represent a Method Detection Limit above one or more applicable criterion values.

- = Not analyzed.

‡ = Detected at a level below stated Method Detection Limit.

12.7 = Shaded cells with bold text represent an exceedance of one or more applicable criterion values.

0.04 = Values in bold, red text indicate an exceedance of the 2008 background range. Comparison for 2008 results only. See text for details.

Vinyl Chloride = Parameter in bold text represents concentration above the Method Detection Limit for at least one sampling event, for at least one groundwater sampling location.

Vinyl Chloride = Parameter in a shaded cell represents a concentration above one or more applicable criterion for at least one sampling event, for at least one groundwater sampling location.

Water Quality Review on Conditions at the Picton Drinking Water Treatment Plant

Prepared by Quinte Conservation

This supplement to the conditions report was prepared to compare contaminants found in groundwater samples from the closed Delhi Park landfill and sediment samples close to the landfill with raw water samples at the Picton Drinking Water System. The study team was interested in determining if any of the contaminants found in the landfill are showing up in tests of raw water or if they were missed because they were not being routinely tested. Also, the contaminant conditions were checked in samples collected from Marsh Creek, storm sewer outfalls and from the Picton Sewage Treatment Plant effluent to see if the same contaminants could be found in other sources.

Review of Groundwater Contaminants from the Landfill

Water chemistry results assessing the impacts of the closed Delhi Park Waste Disposal Site in Picton were compared to Table 2 potable groundwater condition standards for the Source Protection Conditions approach. Table 2 standards are designed to be used under Part XV.1 of the *Environmental Protection Act*. To determine the conditions of the closed Delhi Park Waste Disposal Site all available reports and data were reviewed. If any of the contaminants were detected in raw at the Picton Drinking Water System (DWS) then it is likely that human activities have been contaminating the source water. The closed landfill of the closed Delhi Waste Disposal site is just one potential source of contamination along with the effluent coming from storm sewer outfalls and the Picton Sewage Treatment Plant.

In 1989 Water & Earth Science Associates Ltd performed additional monitoring of the closed Delhi Park landfill site (WESA 1989). The study included advancement of eight monitor wells, of which two wells had contamination exceeding Table 2 standards for six parameters. It is important to note that limited testing was completed on the remaining six wells. Contaminants exceeding were Chloroform, 1,1 Dichlorethylene (Vinylidene Chloride), 1,1 Dichlorethane, Ethylbenzene, Trichlorfluoromethane, and 1,4 Dichlorobenzene (Table 1). Based on the technical rules and discussion within section

3.8 of the Conditions report, the closed Delhi Park landfill site is a Condition under the Quinte Region Source Protection program.

Table 1: Contaminants that exceeded Table 2 potable groundwater condition standards in groundwater samples taken by Water and Earth Science Associates Ltd at the closed Delhi Park landfill site (WESA 1989).

Contaminant	**Table 2 Potable Groundwater Condition Standards**	**Unit**	**Well #**	**P1-1**	**P1-2**	**P2-1**	**P2-2**	**P3-1**	**P3-2**	**P4**
1,1 Dichlorethane	5	ug/l	-	-	7.9	-	-	-	-	-
1,1 Dichlorethylene	1.6	ug/l	-	-	2.8	-	-	-	-	-
1,4 Dichlorobenzene	1	ug/l	1.2	-	1.2	-	-	-	-	-
Chloroform	7	ug/L	9.7	-	90.7	-	-	-	-	-
Ethylbenzene	2.4	ug/l	12	-	12	-	-	-	-	-
Trichlorfluoromethane	150	ug/l	-	-	540	-	-	-	-	-

The study team recognized that no threats were identified at the DWS through the Ontario Drinking Water Source Protection Issues Approach and was therefore not looking to determine whether the contaminants exceeded drinking water quality guidelines. However, raw water samples were reviewed to determine whether they are present. All six indicator parameters except for Trichlorfluoromethane were monitored at the Picton DWS through the Ontario Drinking Water Surveillance Program up to November 2007. Five groundwater contaminants were detected in raw water at the Picton DWS through the Ontario Drinking Water Surveillance Program (DWSP) (see Table 2).

Table 2: Summary statistics for the groundwater contaminants observed in raw water samples taken at the Picton Drinking Water System. Contaminants in bold were detected in raw water.

Contaminants	**Unit**	**Count**	**Min**	**Max**	**Average**
1,1 Dichlorethane	ug/l	51	0.05	0.1	0.07
1,1 Dichlorethylene	ug/l	51	0.05	0.10	0.07
1,4 Dichlorobenzene	ug/l	51	0.05	0.1	0.07
Chloroform	ug/l	46	0.10	116	13
Ethylbenzene	ug/l	51	0.05	0.1	0.05
Trichlorfluoromethane		no data			

Data Source: Ontario Ministry of the Environment's Drinking Water Surveillance Program (1991 to 2007)

Review of Sediment Contaminants near Delhi Landfill Site

A review of sediment sample results for the closed Delhi Park landfill site reported in an Environment Canada study revealed that 12 indicator parameters had concentrations greater than their respective Table 1 sediment condition standards (Biberhofer and Dunnett 2006). The sediment standards are designed to be used under Part XV.1 of the *Environmental Protection Act*. Because of their location, the sediment samples reviewed cannot be directly linked to the landfill site, but may better represent ambient conditions in the Picton Bay and Marsh Creek mouth (Figure 1). Nevertheless, the study team investigated sediment sample data and made comparisons to potential sources. The 12 parameters in sediment that exceeded Table 1 sediment condition standards were: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, Zinc, Fluoranthene, Phenanthrene, and PCB (see Table 3 below). All 12 are monitored at the Picton DWS in the DWSP.

Table 3: Contaminants that exceeded Table 1 sediment condition standards in sediment samples taken near the closed Delhi Park landfill site (Biberhofer and Dunnett 2006).

Station **Easting** **Northing**	**Table 1 Sediment Condition Standards**	**Unit**	**2030** 330561 4879138	**2031** 329364 4876486	**EHD-6** 328723 4875036
Arsenic	6	ug/g	10.9	9.49	<5
Cadmium	0.6	ug/g	0.5	1	1.3
Chromium	26	ug/g	41.8	49.1	52
Copper	16	ug/g	35.3	45.1	215
Fluoranthene	0.75	ug/g			1.11
Lead	31	ug/g	60.3	73	89
Mercury	0.2	ug/g	0.137	0.167	0.647
Nickel	16	ug/g	31.8	46.1	9
PCB	0.07	ug/g			0.11
Phenanthrene	0.56	ug/g			0.852
Silver	0.5	ug/g	0.25	0.25	11.3
Zinc	120	ug/g	151	179	504

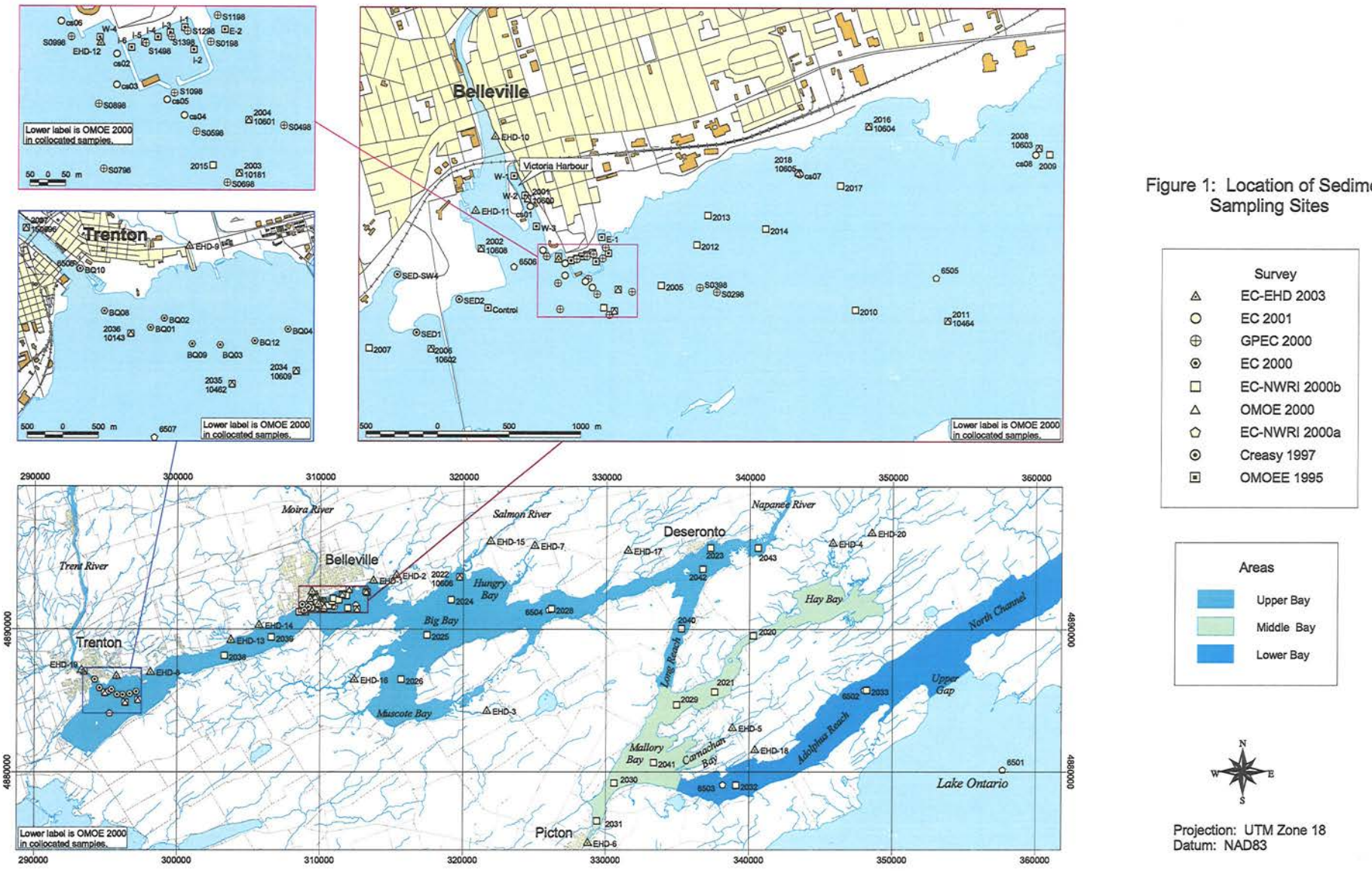

Figure 1: Location of Sediment Sampling Sites

Survey	
△	EC-EHD 2003
○	EC 2001
⊕	GPEC 2000
⊙	EC 2000
□	EC-NWRI 2000b
△	OMOE 2000
⬠	EC-NWRI 2000a
⊙	Creasy 1997
▣	OMOEE 1995

Areas

- Upper Bay
- Middle Bay
- Lower Bay

N W E S

Projection: UTM Zone 18
Datum: NAD83

The study team found that 10 of the contaminants in the sediment were also detected in raw water samples at the DWS. These are shown in Table 4.

Table 4: Summary statistics for the sediment contaminants observed in raw water samples taken at the Picton Drinking Water System. Contaminants in bold were detected in raw water.

Contaminants	Unit	Count	Min	Max	Average
Arsenic	ug/l	52	0.24	1.9	1.08
Cadmium	ug/l	52	0.00	0.094	0.04
Chromium	ug/l	52	0.30	9.2	1.73
Copper	ug/l	52	0.50	3.2	1.50
Fluoranthene	ng/L	1	no measurable response (zero)		
Lead	ug/l	53	0.05	1.3	0.36
Mercury	ug/l	27	0.02	0.02	0.02
Nickel	ug/l	52	0.00	6.06	0.85
PCB	ng/L	33	measurable trace amount		
Phenanthrene	ng/L	1	no measurable response (zero)		
Silver	ug/l	52	0.00	0.05	0.03
Zinc	ug/l	52	0.20	8.9	3.16

Data Source: Ontario Ministry of the Environment's Drinking Water Surveillance Program (1991 to 2007)

Of the 12 sediment and 6 groundwater exceedances, a total of 18 distinct contaminants were found. The summary Table 5 below shows the 15 that were detected in the raw water samples at the Picton intake. There were no data for Trichlorfluoromethane in raw water and the remaining parameters were not detected.

Table 5: Summary of contaminants detected in raw water at the Picton Drinking Water System.

Groundwater Contaminants Detected in Raw Water at Picton Drinking Water System

1,1 Dichlorethane
1,1 Dichlorethylene
1,4 Dichlorobenzene
Chloroform
Ethylbenzene

Sediment Contaminants Detected in Raw Water at Picton Drinking Water System

Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
PCB
Silver
Zinc

Other Sources of Contamination at the Intake

Raw water at the intake is drawn from Picton Bay off the Bay of Quinte. The Picton Bay is also fed by several small creeks including Marsh Creek which drains the largest of the watersheds on the southwest. The Picton Sewage Treatment Plant, several large storm outfalls and runoff from the landfill site all outlet into Marsh Creek just upstream of the mouth of the tributary. Any of these could also influence conditions in the raw water. This section provides a review of the three other potential sources for the contamination measured in the raw water.

Marsh Creek

The study team reviewed water quality in Marsh Creek as recorded in the Provincial Water Quality Monitoring Network (PWQMN) for a site at Bridge Street. The groundwater contaminants found in the landfall are not routinely tested in the PWQMN. Of the 12 sediment contaminants only eight are monitored and all eight are detected in water from the creek. The station is located downstream of the landfill site and sewage treatment plant and would experience surface water impacts from the three sources as well as others. See Table 6 below for the results of the analysis of PWQMN data for the 12 sediment contaminants.

Table 6: Summary statistics of sediment contaminants observed in surface water samples taken at the Provincial Water Quality Monitoring Network Site in Marsh Creek in Picton, 1984 to 2010 (Ontario Ministry of the Environment). Contaminants in bold were detected in surface water samples. ¥ = Contaminants exceeding a water quality standard or objective at the Marsh Creek site between 2006 and 2010.

						Water Quality Standards and Objectives		% Exceeded	
Parameter	**Unit**	**Count**	**Min**	**Max**	**Average**	**PWQO, 1999**	**ODWS, 2006**	**PWQO, 1999**	**ODWS, 2006**
Arsenic	mg/L	39	0.001	0.004	0.001	0.005	0.025	0	0
Cadmium ¥	ug/L	80	0.004	3.50	0.53	0.5	5	25	0
Chromium	ug/L	88	0.031	63	1.94	8.9	50	2	1
Copper ¥	ug/L	115	0.50	34	4.45	5	1000	22	0
Fluoranthene		no data							
Lead ¥	ug/L	100	0	75.00	6.98	5	10	26	8
Mercury	ug/L	25	0.02	0.50	0.12	0.2	1	12	0
Nickel	ug/L	82	0.002	60.60	2.70	25		1	0
PCB		no data							
Phenanthrene		no data							
Silver		no data							
Zinc ¥	ug/L	115	0.50	170	17.3	20	5000	22	0

Sewage Treatment Plant

An engineering report prepared by Paine Engineering (Paine 1995) concluded that the Sewage Treatment Plant effluent was by far the largest contributor of nutrients as well as leading in the production of Chlorides, Total Dissolved Solids, Total Suspended Solids, and the increased Biological Oxygen Demand. The data from the sewage treatment plant was reviewed and the study team found that none of the 18 contaminants found in either the sediment or the landfill groundwater samples are routinely tested in effluent at the sewage treatment plant (Corporation of the County of Prince Edward County). Therefore there is a lack of evidence to draw any conclusion that the sewage treatment plant could be a source of the contaminants nor can it be ruled out.

Storm Sewer Outfalls

Recent sampling of two storm sewer outfalls within the Marsh Creek watershed was completed by Quinte Conservation staff for the Bay of Quinte Pollution Prevention and Control Plan (BQRAP 2010). Storm sewer outfall sampling sites P1 and P2 were two of 11 sampling sites and were located furthest upstream in the creek (Figure 2). The data

for sites P1 and P2 were reviewed for the 12 sediment contaminants to see whether storm outfalls could be a potential source. Only six of the parameters were tested and all six were present. These were: Cadmium, Chromium, Copper, Lead, Nickel and Zinc (see Table 7). No landfill groundwater contaminants were tested in the storm outfall work.

Table 7: Summary statistics for the sediment contaminants observed in storm sewer outlet samples taken by Quinte Conservation staff in 2008 and 2009. Contaminants in bold were detected in storm sewer outlet samples (BQRAP 2010).

		Site P1				Site P2			
	Unit	**Count**	**Min**	**Max**	**Average**	**Count**	**Min**	**Max**	**Average**
Wet-weather samples									
Arsenic		no data				no data			
Cadmium	ug/L	2	0.27	0.39	0.33	5	0.14	1.23	0.68
Chromium	ug/L	2	3.9	3.93	3.92	5	0.82	4.3	2.45
Copper	ug/L	2	6.32	7.85	7.09	5	2.29	11.9	5.94
Fluoranthene		no data				no data			
Lead	ug/L	2	1.93	13.5	7.715	5	0	13.9	3.85
Mercury		no data				no data			
Nickel	ug/L	2	1.02	2.41	1.715	5	0	2.56	0.86
PCB		no data				no data			
Phenanthrene		no data				no data			
Silver		no data				no data			
Zinc	ug/L	2	36	53	44	5	14.5	60.7	33.26
Dry-weather samples									
Arsenic		no data				no data			
Cadmium	ug/L	1	0.519	0.519	0.519	4	0.27	2.39	1.32
Chromium	ug/L	1	1.05	1.05	1.05	4	0.085	1.25	0.86
Copper	ug/L	1	1.52	1.52	1.52	4	1	3.91	2.21
Fluoranthene		no data				no data			
Lead	ug/L	1	4.3	4.3	4.3	4	0	6040	1510
Mercury		no data				no data			
Nickel	ug/L	1	1.33	1.33	1.33	4	0	1.5	0.63
PCB		no data				no data			
Phenanthrene		no data				no data			
Silver		no data				no data			
Zinc	ug/L	1	10.9	10.9	10.9	4	1.06	33	11.4

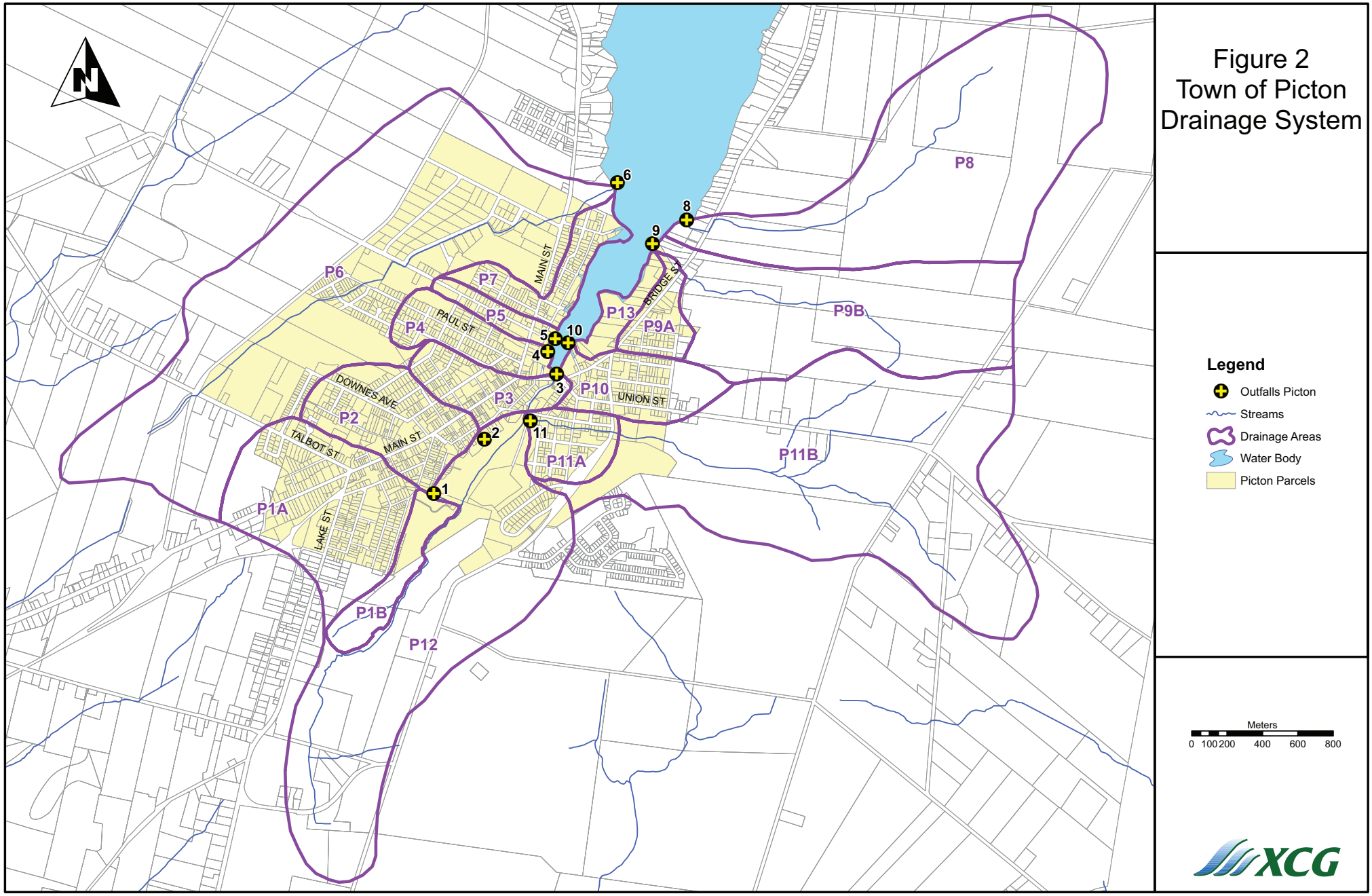
Figure 2
Town of Picton
Drainage System
Legend
Outfalls Picton
Streams
Drainage Areas
Water Body
Picton Parcels
Meters
0 100 200 400 600 800
XCG
P1A
P1B
P2
P3
P4
P5
P6
P7
P8
P9A
P9B
P10
P11A
P11B
P12
P13
MAIN ST
PAUL ST
DOWNES AVE
TALBOT ST
LAKE ST
BRIDGE ST
UNION ST
1
2
3
4
5
6
8
9
10
11

It is interesting to note that generally, all of the contaminants had higher concentrations in wet-weather samples with the exception of Cadmium. Wet weather flows generally contain contaminants that are washed from road surfaces and other urban surface features. Dry-weather flows generally would be comprised of flow inputs from illegal sanitary cross connections and other commercial and industrial connections. The results of the testing suggested the contaminants entering Marsh Creek from the storm sewer system are from surface sources such as municipal roads.

Also, the storm contaminants from the storm outfalls are generally higher in concentration than the creek with the exception of Nickel and Lead. Nickel was consistently higher in the creek sampling and Lead was generally lower in the storm outfalls. The exception was one sample result from Lead in outfall P2 during dry flows that had a count 1,510 ug/L well in excess of the Provincial Water Quality Objective of 5 ug/L. It is likely that Nickel and Lead measured in the creek are derived from other sources in the watershed.

Summary

The closed Delhi Park landfill site was reviewed for its potential impact to the drinking water system in Picton. Six groundwater contaminants from the closed landfill site exceeded Table 2 potable groundwater conditions standards. This made the site a Condition under the Ontario Drinking Water Source Protection Conditions Approach for threats assessment at the Picton drinking water system. Of the six contaminants, five were tested and detected in raw water at the drinking water system.

Twelve contaminants observed in sediment samples taken from Picton Bay exceeded the Table 1 sediment condition standards. All were measured and ten were detected in the raw water at the Picton DWS.

Water quality results for Marsh Creek, the sewage treatment plant effluent and storm sewer outfalls were also reviewed. It was found that of the six groundwater contaminants none were tested in the creek monitoring program. Of the 12 sediment contaminants only eight were monitored and all eight are detected in water from the creek.

The sewage treatment plant effluent is not monitored for any of the six groundwater or 12 sediment contaminants. The storm outfalls monitoring work measured no groundwater contaminants and six of the total 12 sediment contaminants. All six were

detected and most were during periods of wet weather suggesting the source is likely from urban runoff. Nickel and Lead were found in higher concentrations in the Marsh Creek sampling suggesting that they are derived from other sources in the watershed.

It is recommended that existing monitoring programs be continued enabling study of the drinking water system and allowing source tracking of contaminants.

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