COMHAIRLE CHONDAE AN CABHÁIN

Cavan County Council

Annual Environmental Report 2010

Bailieborough Landfill WL0091-1

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Bailieborough Landfill
Annual Environmental Report 2010

Introduction & Site History

Bailieborough Landfill has been operated as waste disposal facility by Cavan County Council since the late 1960s. The landfill is located on the outskirts of the town of Bailieborough, (c. 1 km from town centre), in the town land of Tanderagee, which was a commercially exploited bog. The site was operated as a traditional landfill constructed on peat and relies on the properties of the peat bog for attenuation, dilution and dispersal. The total area of the site comprises 2.23 hectares.

A Waste Licence for the facility was issued by the EPA on 22nd February 2002, when the site officially closed and was thereafter remediated. Condition 11.6 of Waste Licence Ref. 91-1 requires the submission of an Annual Environmental Report (AER) for Bailieborough Landfill facility. This document is produced in order to comply with requirements of Condition 11.6.

The requirements for reporting of Annual Environmental Information arise under individual EPA licences issued under the EPA Acts 1992 – 2008, the Waste Management Acts 1996 – 2008 and other legislation.

This AER will provide information as outlined in Schedule F of the Licence "Content of the Annual Environmental Report".

1. Reporting Period

The reporting period for the purposes of this AER is 1st January 2010 to 31st December 2010.

2. Waste Activities carried out at the facility

There were no waste activities carried out at the facility.

3. Quantity & Composition of waste received, disposed of and recovered during the reporting period and each previous year

There is no longer any waste being accepted at the site. The quantity of waste accepted is zero tonnes.

4. Summary Report on Emissions

The PRTR Regulations are the European Communities (European Pollutant Release and Transfer Register) Regulation 2007, S.I. No. 123 of 2007), which signed into Irish Law on 22 March 2007 the E-PRTR Regulation, (EC) No 166/2006, concerning the establishment of a European Pollutant Release and Transfer Register. The summary of emissions is detailed in the (PRTR) Report which appears in Appendix A of this report. The PRTR has been uploaded onto the EPA website in accordance with our responsibility as Licensee.

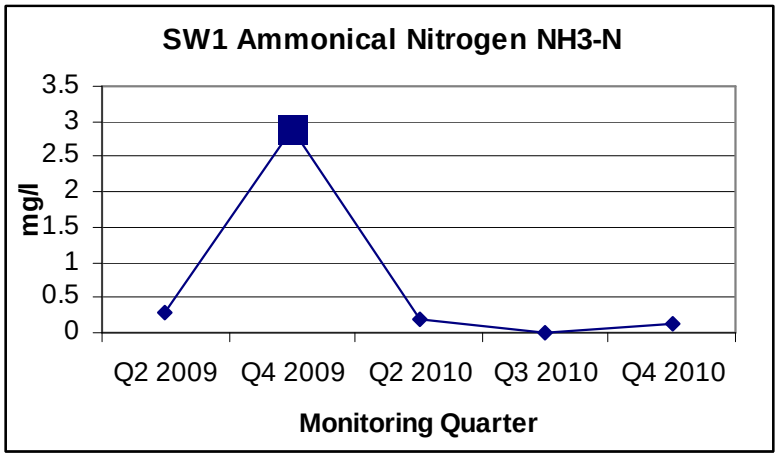
A register of Environmental Monitoring is now established and shall be maintained. Cavan County Council now carries out the full scope of sampling as required by the Licence. Monitoring had been reduced at the time of the restoration works and the full sampling regime had not been re-established until late 2009 when advised by the Agency.

Surface Water

The Agency requested a Hydro-geologists report to be carried out to assess the surface water and groundwater levels, and flow directions in the area surrounding the landfill. Please refer to the attached map in Appendix B for location points etc.

As graph 4.1 shows there was a high Ammonia level recorded in the samples taken at SW1 downstream of the landfill in Q4 2009 but high levels were not recorded in 2010.

Graph 4.1 SW1 Ammonia Results



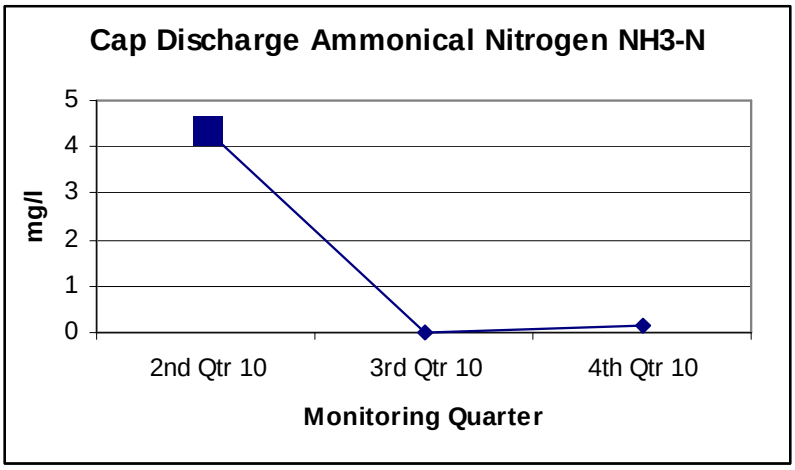
The landfill final cap discharge revealed a high Ammonia result in Q2 2010 of as shown below.

Table 4.1 Cap Discharge

Cap Discharge					
Parameter	**Q1**	**Q2**	**Q3**	**Q4**	**2003 Guidelines**
Ammonical Nitrogen NH_3-N	nt	4.37	Dry	0.17	0.2

There were elevated Iron levels in some samples. This is commonly associated with samples taken from landfills or in the vicinity of landfills.

Graph 4.2 Final Cap Discharge Point Ammonia



The cap discharge levels are noteworthy but going forward it is expected that results will remain in the normal expected range of unpolluted.

Groundwater

The results for 2010 for groundwater well 15D are listed in the following table. This well was drilled to replace MW11D, a previously existing well in a similar location. The results in the table show that the groundwater exceeds guideline values for the protection of groundwater 2003. The landfill is likely to be contributing to these levels. The highlighted cells show the exceedences.

Table 4.2 Groundwater Results

MW15D 2010					
Parameter	**Q1**	**Q2**	**Q3**	**Q4**	***2003 Guidelines***
Ammonical Nitrogen NH_3-N	0.06	0.01	<0.01	0.09	*0.15*
Chloride Cl	48.9	34.7	33.2	20.8	*30*
Phenol	0.014	0.017	0.019	0.025	*0.005*
Iron Fe	0.088	0.022	0.004	0.012	*0.2*
Total Coliforms	2	30	9	2186	*0 / 100mls*

Monitoring Well 15S also revealed slightly elevated levels of Phenols as shown in Graph 4.2.

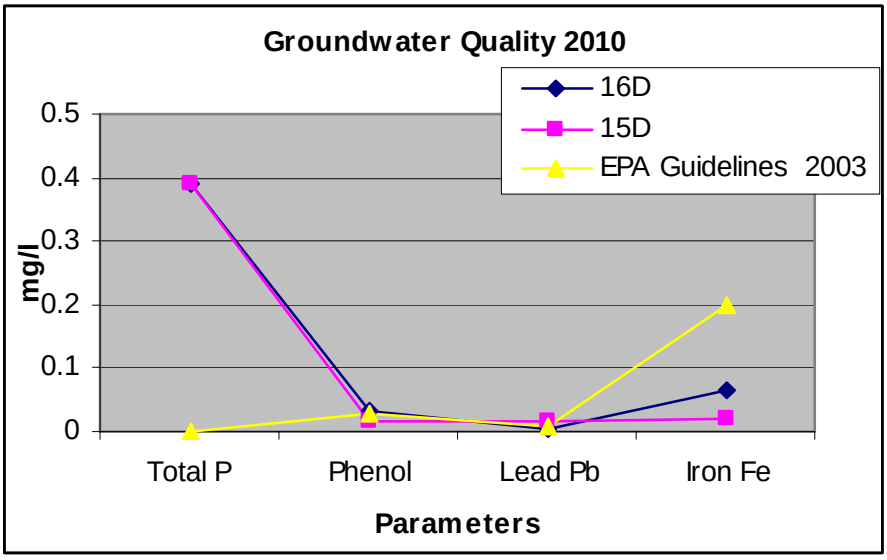
Table 4.3 Phenol Results monitoring well 15S

15S					
Parameter	**Q1**	**Q2**	**Q3**	**Q4**	**2003 Guidelines**
Phenol	0.009	0.012	0.027	0.003	0.005

Groundwater wells 10S, 10D, 16S & 16D also picked up exceedence levels of Phenols and Potassium K as can be seen in Appendix C.

The following graph gives a representation of deep wells that are monitored in the direction of groundwater flow from the landfill. (The EPA guideline values are also on the graph). Total P was the only parameter that showed a significant exceedence.

Graph 4.3 Groundwater Quality



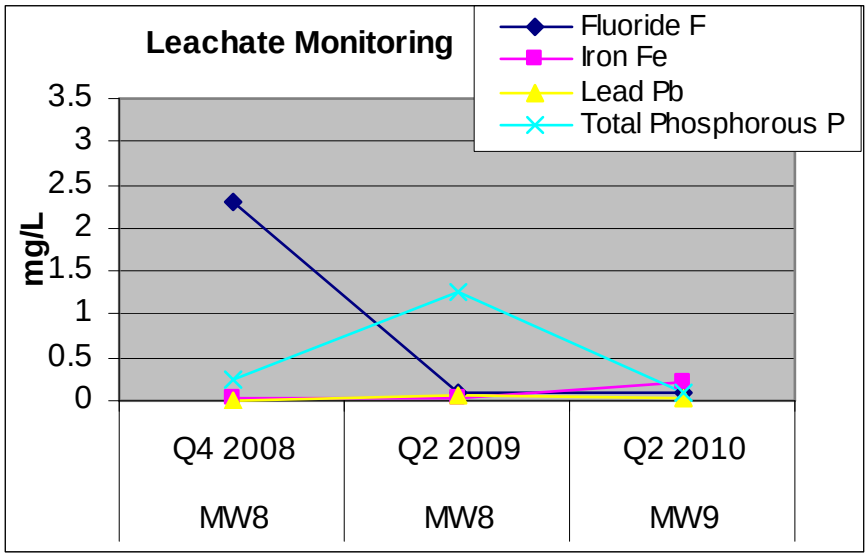
4.2 Emissions to Air

Gas Monitoring on the site reveals typical low levels of Methane & Carbon Dioxide and higher levels of Oxygen. Minor elevations occurred in MW3, MW7, MW8 & MW9 - all located in the centre of the waste body. There was no gas migration recorded in monitoring wells outside of the waste body. The results are typical of a closed landfill. The Landfill Gas Survey 2010 was also completed and submitted to the EPA before March 31st 2011. A copy of the first page of this report is also included in Appendix C. There are no flares on this landfill site.

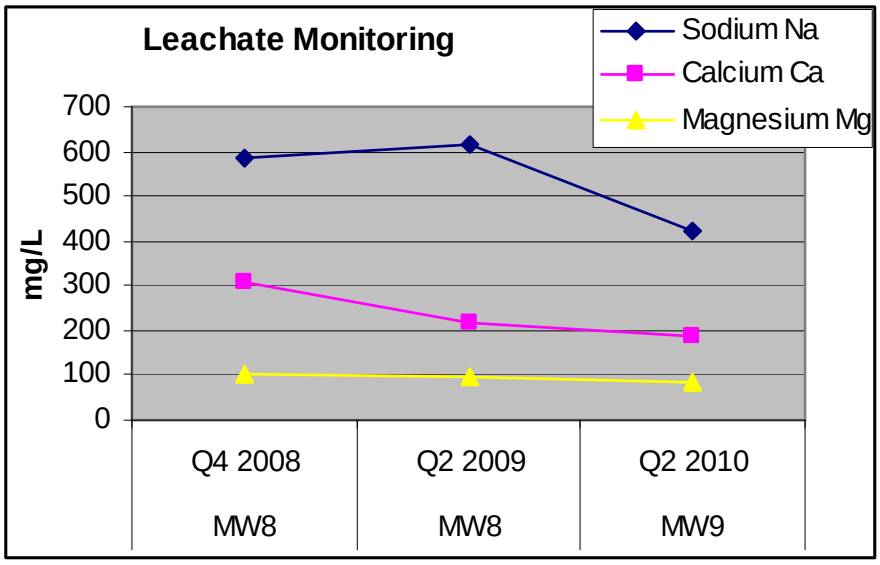
4.3 Leachate Monitoring

Leachate monitoring is carried out annually in accordance with the licence. As can be seen from the following graphs there are no significant elevations and results are typical of a mature landfill.

Graph 4.4(a) Leachate Monitoring



Graph 4.4(b) Leachate Monitoring



5. Summary of results and interpretation of environmental monitoring

Included in Appendix C is a copy of the annual monitoring results as reported by Monitoring Company BHP Laboratories. We are satisfied that we are carrying out the environmental monitoring as specified in the Waste Licence. We are also satisfied that there are no major environmental impacts associated with this facility. We note however that there are signs of impact in the downstream samples and will endeavour to monitor and record as per the licence. The EPA instructed Cavan County Council in late 2010 to appoint an experienced hydro-geologist to study groundwater flows and levels in the landfill area. The results of this study will be presented in the 2011 AER.

6. Resource and energy consumption summary

As there is in-sufficient gas produced to run a gas flare or engine there is no use for the gas resource on site. There is no energy consumed on site.

7. Report on Restoration of the facility

The site is fully restored and the cap intact. There was some horse grazing on the site in the early summer months. Gorse overgrowth has become prolific on the cap. It is planned to remove the gorse in early 2011.

8. Estimated annual and cumulative quantities of landfill gas emitted from the facility

Please refer to the Annual PRTR Report included in Appendix A which deals with the landfill gas emissions calculated using GASSIM.

9. Full title and written summary of any procedures developed by the licensee in the year which relates to the facility operation.

There was no change to or development of any procedures undertaken by the licensee or monitoring contractor in 2010.

10. Reported Incidences and Complaints summaries

There were no incidences in the reporting period 2010. There were no complaints received by the EPA or the Local Authority regarding this facility in the reporting period 2010.

11. Review of Nuisance Controls

As there are no known nuisances associated with this site there are no nuisance controls in place for parameters such as noise or vermin. There is no odour detectable from the site and as these are the main nuisances associated with landfills the licensee has not reviewed the controls. This is backed up by the absence of any complaints regarding the facility. However if any nuisances arise at the facility the licensee will deal with them using appropriate measures and procedures.

12. Report on training of staff

Landfill Operations Manager Sinead Fox- for Cavan County Council deals with in full with any issues identified by the Agency Inspectors or any other party. Sinead has been fully trained in the control of landfill gas, the FAS Waste Management Training Course and carries a Safe Pass.

Table 12.1 Management Structure 2010

Position	Name	Duties
Director of Services Environment	Eoin Doyle	Oversee and assign responsibilities to staff regarding landfill
Senior Executive Officer	John Brannigan	Oversee general supervision, monitoring and reporting of the site.
Landfill Operations Manager	Sinead Fox	Responsible for general supervision, monitoring and reporting of the site.

Contact Person for Sanitary Authority for 2010/ 2011:

John Brannigan
Senior Executive Officer
Waste Management Section
Cavan County Council
Farnham Street,
Cavan

13. Financial Provision

Provision will be made in Cavan County Council Official Estimates for Charges as required under Condition 12 of Waste Licence Ref. 91-1.

14. Any other items specified by the Agency

As requested by the Agency we have included in Appendix B a copy of the most recent Map of the site showing all Monitoring locations.

Appendix A

PRTR Emissions Report

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.11

REFERENCE YEAR	2010

1. FACILITY IDENTIFICATION

Parent Company Name	Cavan County Council
Facility Name	Bailieborough Landfill
PRTR Identification Number	W0091
Licence Number	W0091-01

Waste or IPPC Classes of Activity

No.	class_name
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
3.13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.
4.11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.4	Recycling or reclamation of other inorganic materials.

Address 1	Tanderagee
Address 2	Bailieborough
Address 3	Co Cavan
Address 4	
Country	Ireland
Coordinates of Location	-6.97327 53.9092
River Basin District	IEEA
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Sinead Fox
AER Returns Contact Email Address	sfox@cavancoco.ie
AER Returns Contact Position	Landfill Operations Manager
AER Returns Contact Telephone Number	049-437 8418
AER Returns Contact Mobile Phone Number	087 980 8507
AER Returns Contact Fax Number	049 4332299
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5(a)	Installations for the recovery or disposal of hazardous waste
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	No
Have you been granted an exemption ?	No
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	MAB	GASSIM	0.0	76900.0	0.0	76900.0
03	**Carbon dioxide (CO2)**	C	MAB	GASSIM	0.0	216000.0	0.0	216000.0

ADD NEW ROW | DELETE ROW * * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

ADD NEW ROW | DELETE ROW * * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

ADD NEW ROW | DELETE ROW * * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

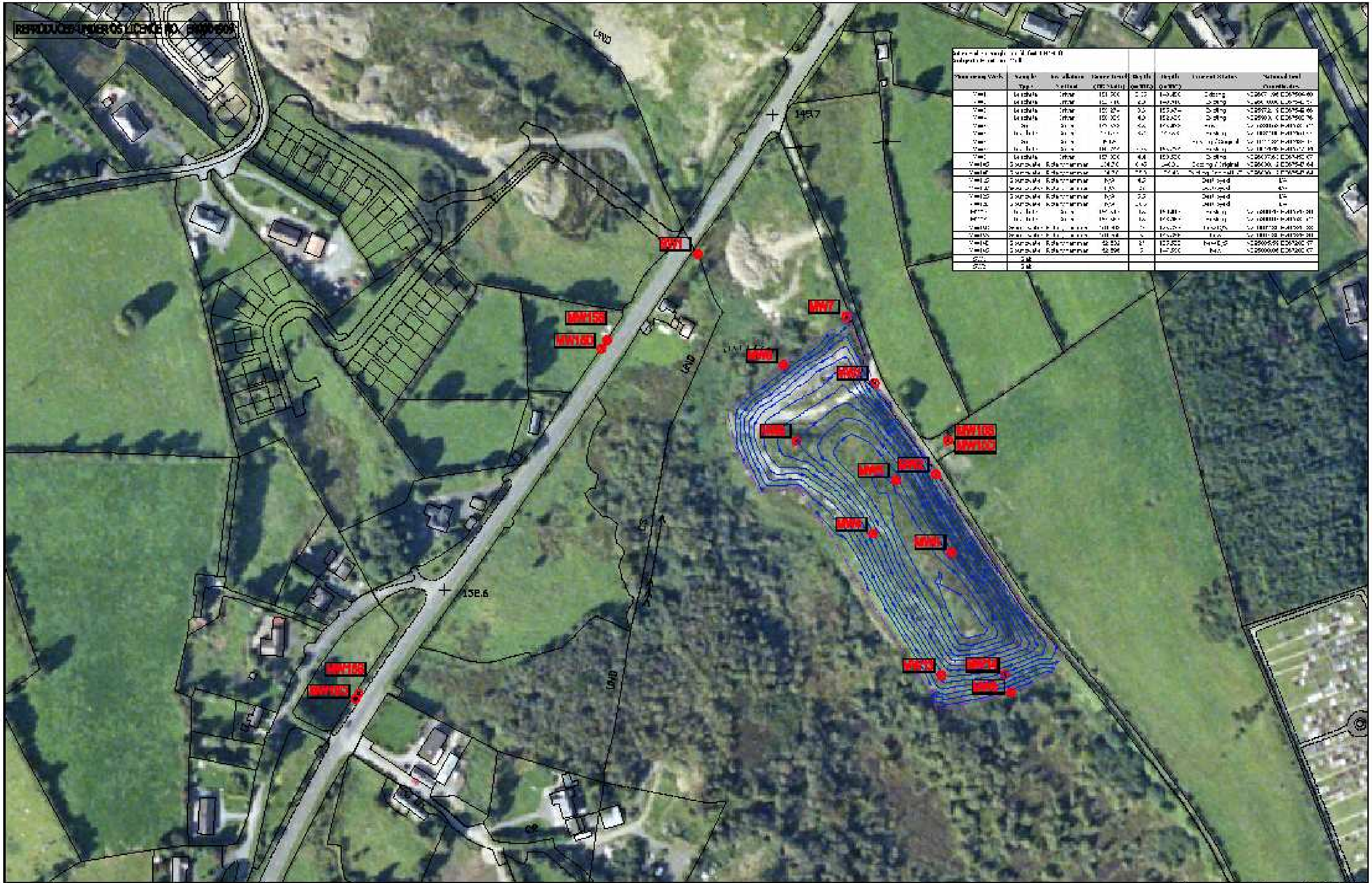
Landfill: Bailieborough Landfill

Please enter summary data on the quantities of methane flared and / or utilised

	T (Total) kg/Year	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Facility Total Capacity m3 per hour	
Total estimated methane generation (as per site model)	76900.0	C	MAB	GASSIM	N/A	
Methane flared	0.0				0.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	76900.0	C	MAB	GASSIM	N/A	

Appendix B

Site Monitoring Locations Map



Client	Project	Drawing title
CAVAN COUNTY COUNCIL THE COURTHOUSE CAVAN	BAILIEBOROUGH LANDFILL (WL91-01)	MONITORING WELL LOCATIONS

Project No.	Type	Drawing No.	Revision
C007214	ST	SK01	-

Appendix C

Site Annual Monitoring Report

&

EPA Annual Gas Survey 2010

BHP/CEM/23

Analysing
Testing
Consulting
Calibrating

Client: Cavan Co. Co

TEST REPORT

BHP
New Road
Thomondgate
Limerick
Ireland
Tel +353 61 455399
Fax + 353 61 455447
E Mail bhpcem2@bhp.ie

BHP Ref No.: 91999-92001

Order No.:

Date Received: 25th May 2010

Date Completed: 30th June 2010

Test Specification: Nil

Item: Bailieborough Landfill Site

Annual Report covering groundwater, leachate and surfacewaters at Bailieborough Landfill for 2010.

Cavan County Council
Courthouse
Cavan Town
Co. Cavan

FTAO: Sinead Fox

Report on Bailieborough Landfill for annual parameters 2010

For and on behalf of BHP Ltd.
llivan
Date Issued: 19th August 2010

Table of Contents

1.0 Introduction :

BHP was contracted by Cavan County Council to carry out environmental monitoring at Bailieborough Landfill site which is located outside Bailieborough town, Co.Cavan. This landfill is no longer operational and is operated under waste license no. 91-1, which was issued to Cavan Co. Co. by the EPA.
This report covers surfacewaters, leachate and groundwaters at Bailieborough for the annual monitoring event of 2010 for the available monitoring locations. Private Well monitoring has been discontinued as all locations within 300m of the site are on the local town supply.

2.0 Sampling :

This monitoring is a continuation of an established monitoring program at Bailieborough Landfill. As such, the borehole locations are as on previously drafted site maps. A site map is attached in the appendices showing the borehole locations. BHP sampled at 5 boreholes. Their individual references are as shown in table 1.

Borehole reference	Static water level (m)
MW 10S	5.92
MW 10D	5.94
MW 15D	1.92
MW 15S	1.92
MW 16D	1.46
MW 16S	1.69

Table 1 : Borehole reference points and levels.

Locations MW12S, MW12D, MW11S and MW11D have been destroyed and have been replaced with new boreholes in the same general area.
Locations for private wells, surfacewaters and landfill gas are also shown in the map.
In order to ensure correct groundwater monitoring, the following steps were taken.

1. Chemical analysis according to standard testing methods (As shown in table 2).

2. Appropriate on-site sampling techniques were utilised.
    - ISO 5667 ; 'Guidance on sampling of groundwaters' was followed which is appropriate for the objective of monitoring groundwater quality.
    - A Waterra inertial lift pump was utilised which is designed for borehole monitoring in that at no time does the pump come in contact with the water sample. By utilising dedicated hosing at each borehole and new sample containers then any possibility of cross-contamination is eliminated.
    - In order to achieve representative sampling, the method used needs to be capable of withdrawing samples whose composition reflects that of the sub-strata (and not that of stagnant water in the standpipe). In order to achieve this, each borehole is purged of several times its volume before any sample is taken. This is estimated on-site using an electronic dip-meter to measure depth of water and then calculating volume of water present (after measuring radius of borehole).

3. Having taken a representative sample, several analysis parameters are time sensitive and therefore need to be measured on-site i.e. pH, temperature, conductivity and dissolved oxygen. All meters are calibrated before each site-visit.
    - pH and temperature are measured using a Hanna HI 9023 C portable pH meter and thermocouple. The pH meter automatically compensates for temperature variations
    - Dissolved oxygen is measured using a Hanna HI 9142 portable oxygen meter.
    - Conductivity is measured using a Hanna HI 9033 multi-range conductivity meter.

4. BHP operates a chain of custody system. The sample site-sheet / chain of custody form can be found in Appendix B.

5. All samples received by the Laboratory were stored between 0 and 4^{o}C. Subsequent analysis of all samples was carried out in accordance with Standard Methods for the examination of water and wastewater, 20th Edition, 1998, published by the American public health association.

The methods and limits of detection are listed in the results section.

Parameters for Laboratory Analysis

PARAMETER	Standard Method Reference *** APHA-AWWA-WEF 20th
pH	4500-H^+B
Temperature	2550B
Conductivity	2510B
COD	5220D
Colour	2120B
Turbidity	2130B
Total Suspended Solids	2540D
Alkalinity	2320B
Ammonia	4500-NH_3-D
TOC	5310A
Total Hardness	2340B
Calcium	3120B
Chloride	4110B
Fluoride	4110B
Nitrate	4110B
Magnesium	3120B
Potassium	3120B
Sodium	3120B
Sulphate	4110B
Phosphate	4110B
Iron	3120B
Aluminium	3120B
SiO_2	3120B
Boron	3120B
Barium	3120B
Cadmium	3120B
Chromium	3120B
Copper	3120B
Lead	3120B
Manganese	3120B
Mercury	3112B
Nickel	3120B
Arsenic	3120B
Zinc	3120B
Tin	3120B
Antimony	3120B
Selenium	3120B
Cobalt	3120B
Beryllium	3120B
Silver	3120B

Table 2 : Table of chemical testing methods adopted by BHP Laboratories

*** APHA = American Public Health Association

AWWA = American Water Works Association
WEF = Water Environment Federation

3.0 Quality Assurance :

The Chemical and Environmental Monitoring laboratory (CEM) operates a rigorous approach to quality assurance. The central elements of the quality control system are outlined.

a) Chain of Custody and Client Instruction

Every sample received at BHP laboratories is inspected by the laboratory manager Pat O'Sullivan or by laboratory administrator, Mary Hehir.

A client instruction is required to start analysis.

All samples are then given a unique BHP reference number before storage between 0 and 4^{o}C.

b) Training and Competence

All analysts conducting work at BHP are fully trained. Training involves demonstration of accuracy and precision of analysis. All analysts are subject to periodic reviews in their training. All training is fully documented and retrievable.

c) Validation

BHP procedures are subjected to a rigorous validation which includes the following;

- Evaluation of instrument detection limits and limits of detection.
- Evaluation of operator characteristics including bias, precision and uncertainty of measurement.
- Demonstration of Linearity.
- Evaluation of the standard error on the mean and evaluation of any systematic biases.
- Evaluation of total uncertainty and uncertainty budgets.
- Evaluation of the uncertainty in measurement at a regulatory limit.
- Demonstration of repeatability.
- Evaluation of Matrix effects.

d) Quality Control (Skewhart) Charts

Analysis in the CEM laboratory is monitored using control charts. Each analysis will have at least 3 charts monitoring;

- Certified Reference Material recovery
- Precision of analysis
- Accuracy of analysis

Batchs of analyses are rejected if any of the control charts indicate a loss in control.

e) Interlaboratory Testing

The CEM laboratory are members of the W.R.C Aquacheck Scheme. The Laboratory also participates in the Environmental Protection Agency's Intercalibration Programme and is listed on the Agency's Register of Quality Approved Testing Laboratories.

The Laboratory participates on a bi-annual basis in the British Gas Interlaboratory Proficiency Schemes for the analysis of contaminated soils and waters.

4.0 Results :

The results are presented in the tables following at the end of the next section

5.0 Discussion/Interpretation

5.1 Groundwaters

The locations of the various groundwater monitoring locations are shown in Appendix B. The results of the chemical and microbiological analysis conducted on the groundwaters are presented in Section 5.

All results are assessed against the interim guideline values for specific substances in ground water taken from the publication, 'Towards setting guideline values for the protection of groundwater in Ireland, Interim Report' as published by the EPA, 2003. The limits for the relevant parameters are outlined here.

Parameter	**Unit**	**Limit**
pH	pH unit	6.5-9.5
Temperature	^{o}C	No abnormal change
Electrical Conductivity	$uScm^{-1}$	1000
Ammonia (NH_3-N)	mg/l	0.15
Dissolved Oxygen	%	No abnormal change
Total Oxidised Nitrogen	mg/l	No abnormal change
Nitrite (NO_2)	mg/l	0.25
Nitrate (NO_3)	mg/l	25
Chloride	mg/l	30
Total Organic Carbon	mg/l	No abnormal change
Iron	mg/l	0.2
Potassium	mg/l	5
Sodium	mg/l	150
Phenol	mg/l	0.005
Visual Inspection	-	No abnormal change
Total Coliforms	cfu/100mls	0
Faecal Coliforms	cfu/100mls	0
Calcium	mg/l	200
Cadmium	mg/l	0.005
Total Chromium	mg/l	0.03
Copper	mg/l	0.03
Iron	mg/l	0.2
Lead	mg/l	0.01
Magnesium	mg/l	50
Manganese	mg/l	0.05
Potassium	mg/l	5
Sodium	mg/l	150
Zinc	mg/l	0.1
Mercury	mg/l	0.001
Phenol	mg/l	0.0005
Total Phosphorus	mg/l	0.03
Flouride	mg/l	1
List I/II Organics	mg/l	0.001

The current status and history of the groundwater wells are listed in the following table.

Groundwater Well	Current Status
MW11S	Destroyed and Replaced with MW15S
MW11D	Destroyed and Replaced with MW15D
MW12S	Destroyed and Replaced with MW16S
MW12D	Destroyed and Replaced with MW16D
MW10S	Current
MW10D	Current
MW15S	New well (April 2009)
MW15D	New well (April 2009)
MW16S	New well (April 2009)
MW16D	New well (April 2009)

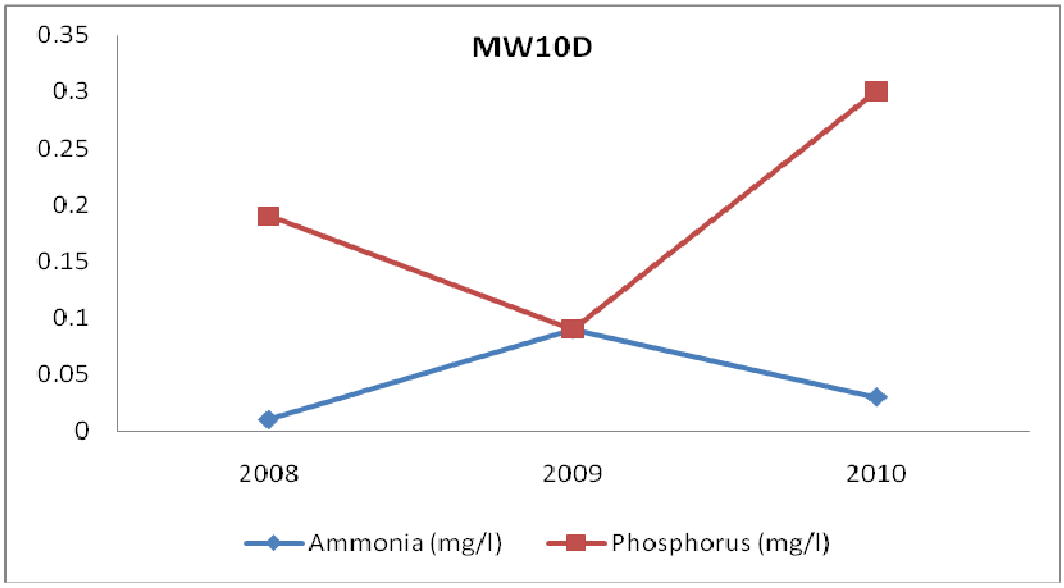
These changes have resulted in a deviation in notation from waste licence 91-1 however BHP have continued in the same vein of sampling and analysis by simply replacing the requirements previously for MW11 and MW12 to MW15 and MW16.

Interpretation:

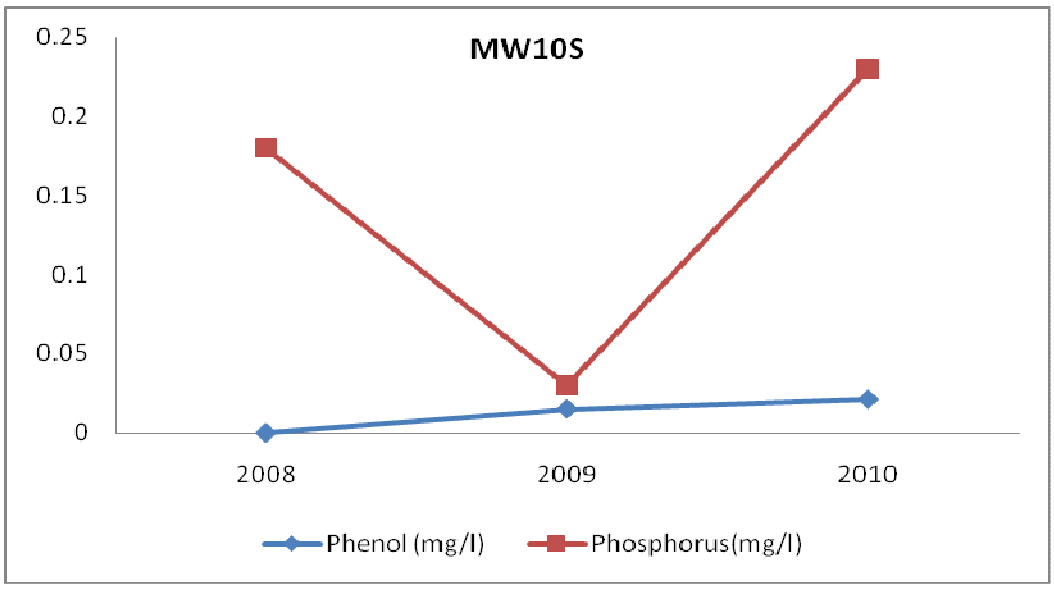
Overall the quality of the groundwater varied across the site and signs of contamination existed in all sampled groundwater wells in the vicinity of the landfill.

MW10D exceeded the interim guideline values for the protection of groundwater in Ireland for total coliforms on the quarterly set (1cfu/100mls). The exceedence is minor and is quite treatable should the water be considered for drinking purposes. Exceedences were noted for lead and phosphorus for the annual set of analysis.

The following graph illustrates the levels seen for ammonia and phosphors between 2008 and 2010.



MW10S exceeded the interim guideline values for the protection of groundwater in Ireland for potassium and phenols on the quarterly set. Exceedences were noted for iron, lead and phosphorus on the annual set of analysis.
The following graph illustrates the improving phenol and phosphorus concentrations over the past 3 years.



MW15D exceeded the interim guideline values for the protection of groundwater in Ireland for chloride and total coliforms for the quarterly set as was the case in Quarter 1, 2010. Exceedences were noted for lead, phenol and phosphorus for the annual set of monitoring.

MW15S exceeded the interim guideline values for the protection of groundwater in Ireland for ammonia, phenols and total coliforms for the quarterly set of analysis. Exceedences were noted for lead and phosphorus for the annual set of monitoring.

MW16D exceeded the interim guideline values for the protection of groundwater in Ireland for total coliforms and phenols on the quarterly set of analysis. Exceedences were noted for chromium and phosphorus for the annual set of monitoring.

MW16S exceeded the interim guideline values for the protection of groundwater in Ireland for phenols on the quarterly set. The total coliform bacteria results are trending downwards along while all others are stable. Exceedences were noted for lead and phosphorus for the annual set of monitoring.

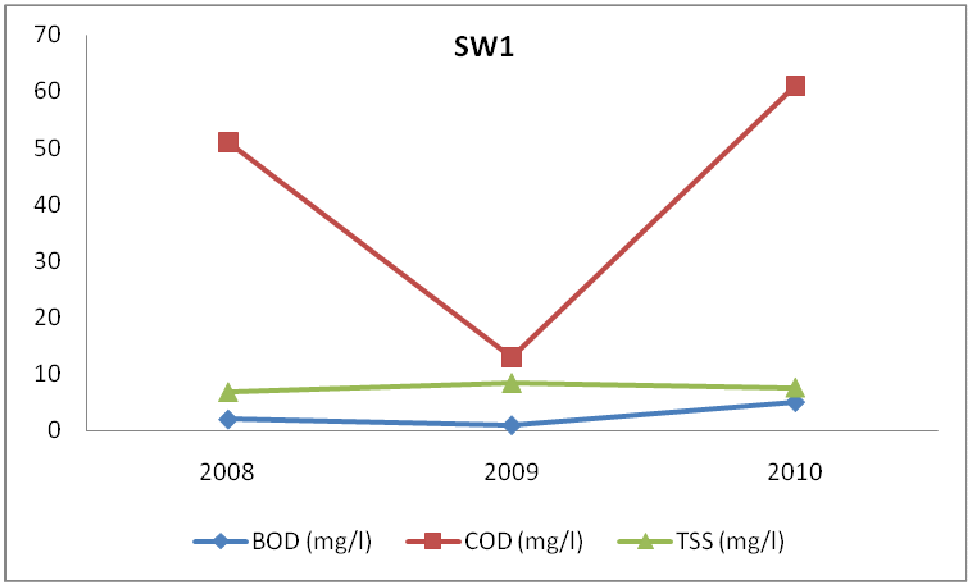
No comparison can be made for Wells 15D, 15S, 16D and 16S as the wells are new and were not tested previously. Further conclusions can be drawn for the next annual sampling event in 2011.

5.2 Surface Waters

4 surface waters were sampled in the vicinity of the landfill. These have been assessed against the surface water limits as outlined in the European Communities (Quality of Surface water intended for the abstraction of drinking water) Regulations, 1989. The limit values for the relevant parameters are outlined here.

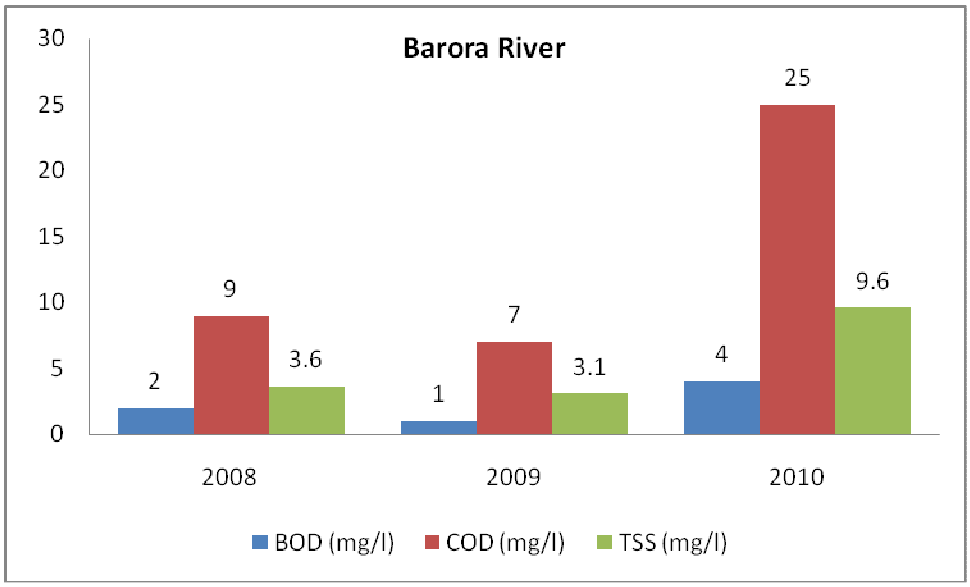
Parameter	Unit	A1 water	A2 water	A3 water
pH	pH unit	5.5-8.5	5.5-9.0	5.5-9.0
Conductivity	$uScm^{-1}$	1000	1000	1000
Ammonia (as N)	mg/l	0.2	1.5	4.0
Dissolved Oxygen	%	-	-	-
COD	mg/l	-	-	40
BOD	mg/l	5	5	7
TSS	mg/l	50	50	50
Chloride	mg/l	250	250	250
Temperature	^{o}C	25	25	25
Nitrate	mg/l	50	50	50
Sulphate	mg/l	200	200	200
Cadmium	mg/l	0.005	0.005	0.005
Chromium	mg/l	0.05	0.05	0.05
Copper	mg/l	0.05	0.1	0.1
Iron	mg/l	0.2	2	2
Lead	mg/l	0.05	0.05	0.05
Manganese	mg/l	0.05	0.3	1
Zinc	mg/l	3	5	5
Mercury	mg/l	0.001	0.001	0.001
OrthoPhosphate	mg/l	0.5	0.7	0.7

SW1 is classed as a category A3 in Quarter 2 due to an elevated COD result of 61 mg/l.



SW2 is classed as a category A3 in Quarter 2 due to elevated ammonia, BOD, COD and suspended solids.

The surface water taken from the Barora River is classed as a category A1 in Quarter 2.



The surface water taken from the final cap was brown and turbid and is classified as a category A3 water due to elevated ammonia and BOD.

5.3 Leachate

One leachate sample MW9 was available in Q2, 2010 for the annual monitoring. The results are typical for MW9. The leachate has been previously high in ammonia and organic content and this feature has continued.

Leachate consists of water that has become contaminated by wastes as it passes through a waste disposal site. It contains waste constituents that are soluble, not retained by soil, and not degraded chemically or biochemically. Some potentially harmful leachate constituents are products of chemical or biochemical transformations of wastes. If this leachate is allowed to migrate from the site, it may pose a threat to surrounding surface and ground waters.

Leachate composition within any landfill is unique. The characteristics of the leachate will depend on the waste types being deposited. The principal factors which can influence the generation of leachate include.

a) Waste composition
b) Phase of waste decomposition
c) Waste density
d) Meteorological conditions
e) Depth of landfill

f) Moisture content
g) Rate of water movement

The chemical composition of leachate will vary depending on the age of the landfill.

Analytical Interpretation:

The biological qualities of leachate will vary with time and can be monitored from assessing the BOD : COD ratio. The results for the MW9 leachate are presented in the table for 2010.

Leachate I.D	BOD	COD	Ratio
MW9 (Q2)	5	35	0.14

Ratios in the range of 0.4 to 0.6 are indicative that the organic matter in the leachate is readily degradable (young/medium aged landfill). When a BOD:COD ratio is typically in the range 0.05 to 0.2, this suggests a mature landfill.

The results for this monitoring period indicate that the leachate is typical of a mature to medium aged landfill which is the case.

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____Discharge from Cap _____**

Surface Water Monitoring

Parameter BHP Reference	**Results (mg/l)** **Date** 2nd Qtr 10	 **Date**	10/05/1262 **Date**	 **Date**	**S.I No.294/1989 Quality of surfacewater intended for the adstraction of drinking water (A1)**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
pH			6.97		5.5-8.5	0 -14	Electrochemical
Temperature ^{o}C			17.8		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}			504		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N			4.37		0.2	0.01 mg/l	Photometric
Chemical Oxygen Demand			31		40	1 mg/l	Photometric
Biochemical Oxygen Demand			14		5	1 mg/l	Electrochemical
Dissolved Oxygen (% Sat. 0_2)			38.6		>60	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON			1.93			0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)			215			1 mg/l	Titration
Total Suspended Solids			40.8		50	1 mg/l	Gravimetric
Chloride Cl			18.4		250	0.22 mg/l	IC
Nitrite NO_2			<0.1			0.10 mg/l	IC
Nitrate NO_3			8.6		50	0.10 mg/l	IC
Sulphate SO_4			7.1		200	0.20 mg/l	IC

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____Discharge from Cap _____**

Surface Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**S.I No.294/1989 Quality of surfacewater intended for the adstraction of drinking water (A1)**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1262				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
Calcium Ca			30.2			0.01 mg/l	ICP
Cadmium Cd			0.004		0.005	0.0035 mg/l	ICP
Total Chromium Cr			0.011		0.05	0.01 mg/l	ICP
Copper Cu			0.033		0.05	0.015 mg/l	ICP
Iron Fe			0.169		0.2	0.03 mg/l	ICP
Lead Pb			0.001		0.05	0.002 mg/l	ICP
Magnesium Mg			5.12			0.01 mg/l	ICP
Manganese Mn			0.015		0.05	0.014 mg/l	ICP
Potassium K			4.52			0.10 mg/l	ICP
Sodium Na			15.4			0.03 mg/l	ICP
Zinc Zn			0.011		3	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
OrthoPhosphate P			0.4		0.5	0.01 mg/l	Photometric
Odour			None			-	Olefactory
Visual Inspection			Brown, Turbid			-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____SW 2 _____**

Surface Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**S.I No.294/1989 Quality of surfacewater intended for the adstraction of drinking water (A1)**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1265				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
pH			6.53		5.5-8.5	0 -14	Electrochemical
Temperature ^{o}C			14.9		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}			382		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N			0.75		0.2	0.01 mg/l	Photometric
Chemical Oxygen Demand			175		40	1 mg/l	Photometric
Biochemical Oxygen Demand			17		5	1 mg/l	Electrochemical
Dissolved Oxygen (% Sat. 0_2)			72.7		>60	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON			0.94			0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)			176			1 mg/l	Titration
Total Suspended Solids			78		50	1 mg/l	Gravimetric
Chloride Cl			19.4		250	0.22 mg/l	IC
Nitrite NO_2			<0.1			0.10 mg/l	IC
Nitrate NO_3			4.2		50	0.10 mg/l	IC
Sulphate SO_4			13.6		200	0.20 mg/l	IC

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____SW2_____**

Surface Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**S.I No.294/1989 Quality of surfacewater intended for the adstraction of drinking water (A1)**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1265				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
Calcium Ca			31.2			0.01 mg/l	ICP
Cadmium Cd			<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr			0.04		0.05	0.01 mg/l	ICP
Copper Cu			0.008		0.05	0.015 mg/l	ICP
Iron Fe			0.069		0.2	0.03 mg/l	ICP
Lead Pb			0.008		0.05	0.002 mg/l	ICP
Magnesium Mg			6.12			0.01 mg/l	ICP
Manganese Mn			0.026		0.05	0.014 mg/l	ICP
Potassium K			5.24			0.10 mg/l	ICP
Sodium Na			13.5			0.03 mg/l	ICP
Zinc Zn			0.006		3	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
OrthoPhosphate P			0.26		0.5	0.01 mg/l	Photometric
Odour			None			-	Olefactory
Visual Inspection			Brown, Turbid			-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____MW 10S _____** **Ground Water Monitoring**

Parameter BHP Reference	**Results (mg/l)** 08/10/945 **Date** 4th Qtr 08	09/04/796 **Date** 2nd Qtr 09	10/05/1266 **Date** 2nd Qtr 10	**Date**	**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
pH	6.66	7.12	6.9		6.5 - 9.5	0 -14	Electrochemical
Temperature ^{o}C	7.8	10.3	12.2		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}	416	374	378		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N	<0.01	0.11	0.02		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. 0_2)	100	97	95.1		No abnormal change	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON	<0.1	0.45	1.04		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)	170	143	144		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	0.6	20	0.5		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	0.117	0.018	0.003		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	3262	1488	86.4			1 mg/l	Evaporation
Boron B	0.043	0.395	0.121		1	0.05 mg/l	ICP
Chloride Cl	10.91	17.64	28.1		30	0.22 mg/l	IC
Nitrite NO_2	<0.1	<0.1	<0.10		0.1	0.10 mg/l	IC
Water Level	5.82	5.9	5.92			M	Dip Meter
Nitrate NO_3	<0.1	2.02	4.6		25	0.10 mg/l	IC
Sulphate SO_4	28.43	12.9	12.4		200	0.20 mg/l	IC
Total Coliforms	3810	35	110		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	199	None Found	None Found		0	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____MW 10S _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)** 08/10/945 **Date** 4th Qtr 08	09/04/796 **Date** 2nd Qtr 09	10/05/1266 **Date** 2nd Qtr 10	**Date**	**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
Calcium Ca	34.4	45.42	38.7		200	0.01 mg/l	ICP
Cadmium Cd	<0.0035	<0.0035	<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr	0.033	<0.01	0.011		0.03	0.01 mg/l	ICP
Copper Cu	<0.015	<0.015	<0.015		0.03	0.015 mg/l	ICP
Iron Fe	0.124	0.119	0.224		0.2	0.03 mg/l	ICP
Lead Pb	0.007	0.008	0.018		0.01	0.001 mg/l	ICP
Magnesium Mg	49.27	60.4	45.9		50	0.01 mg/l	ICP
Manganese Mn	<0.014	<0.014	<0.014		0.05	0.014 mg/l	ICP
Potassium K	16.12	15.99	12.14		5	0.10 mg/l	ICP
Sodium Na	19.11	20.23	24.8		150	0.03 mg/l	ICP
Zinc Zn	<0.011	<0.011	<0.011		0.1	0.011 mg/l	ICP
Mercury Hg	<0.0005	<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
Phenol	<0.001	0.015	0.021		0.0005	0.001 mg/l	Photometric
Total Phosphorous P	0.18	0.03	0.23		0.03	0.01 mg/l	Photometric
Fluoride F	0.15	0.31	<0.08		1	0.08 mg/l	IC
List I Organics *	<0.01	<0.01	<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *	<0.01	<0.01	<0.001		0.001	0.01 mg/l	GC - MS
Odour	None	None	None		No abnormal change	-	Olefactory
Visual Inspection	Turbid/Brown	Turbid/Brown	Turbid/Brown		No abnormal change	-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____MW 10D _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
	08/10/946	09/04/797	10/05/1267				
	Date	**Date**	**Date**	**Date**			
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
pH	6.87	7.92	7.09		6.5 - 9.5	0 -14	Electrochemical
Temperature ^{o}C	8.4	10.3	11.9		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}	448	462	457		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N	0.01	0.09	0.03		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. 0_2)	61.7	97.1	95.8		No abnormal change	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON	0.28	0.12	1.59		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)	165	179	152		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	<0.4	17.3	1.5		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	0.004	0.001	0.001		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	327	234	67.1			1 mg/l	Evaporation
Boron B	0.019	0.079	0.087		1	0.05 mg/l	ICP
Chloride Cl	8.28	7.67	17.3		30	0.22 mg/l	IC
Nitrite NO_2	<0.1	<0.1	<0.10		0.1	0.10 mg/l	IC
Water Level	5.82	5.9	5.94			M	Dip Meter
Nitrate NO_3	1.27	0.51	7.1		25	0.10 mg/l	IC
Sulphate SO_4	130.9	62.7	8.6		200	0.20 mg/l	IC
Total Coliforms	None Found	2	1		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	None Found	None Found	None Found		0	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____MW 10D _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)** 08/10/946 **Date** 4th Qtr 08	09/04/797 **Date** 2nd Qtr 09	10/05/1267 **Date** 2nd Qtr 10	**Date**	**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
Calcium Ca	33.45	23.61	28.54		200	0.01 mg/l	ICP
Cadmium Cd	<0.0035	<0.0035	<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr	<0.01	<0.01	0.012		0.03	0.01 mg/l	ICP
Copper Cu	<0.015	<0.015	<0.015		0.03	0.015 mg/l	ICP
Iron Fe	<0.03	0.07	0.033		0.2	0.03 mg/l	ICP
Lead Pb	0.006	0.008	0.014		0.01	0.001 mg/l	ICP
Magnesium Mg	17.08	10.94	9.87		50	0.01 mg/l	ICP
Manganese Mn	<0.014	<0.014	<0.014		0.05	0.014 mg/l	ICP
Potassium K	1.74	1.37	1.95		5	0.10 mg/l	ICP
Sodium Na	30.55	24.2	26.5		150	0.03 mg/l	ICP
Zinc Zn	<0.011	<0.011	<0.011		0.1	0.011 mg/l	ICP
Mercury Hg	<0.0005	<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
Phenol	<0.001	0.002	0.002		0.0005	0.001 mg/l	Photometric
Total Phosphorous P	0.19	0.09	0.3		0.03	0.01 mg/l	Photometric
Fluoride F	0.12	0.21	<0.08		1	0.08 mg/l	IC
List I Organics *	<0.01	<0.01	<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *	<0.01	<0.01	<0.001		0.001	0.01 mg/l	GC - MS
Odour	None	None	None		No abnormal change	-	Olefactory
Visual Inspection	Straw, Turbid	Straw	Straw		No abnormal change	-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____MW 15S _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1268				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
pH			6.52		6.5 - 9.5	0 -14	Electrochemical
Temperature ^{o}C			12.6		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}			683		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N			1.03		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. 0_2)			65.8		No abnormal change	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON			2		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)			29		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			7.3		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.002		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			459.3			1 mg/l	Evaporation
Boron B			0.102		1	0.05 mg/l	ICP
Chloride Cl			29.6		30	0.22 mg/l	IC
Nitrite NO_2			<0.10		0.1	0.10 mg/l	IC
Water Level			1.92			M	Dip Meter
Nitrate NO_3			8.9		25	0.10 mg/l	IC
Sulphate SO_4			7.1		200	0.20 mg/l	IC
Total Coliforms			6		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____MW 15S _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1268				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
Calcium Ca			31.5		200	0.01 mg/l	ICP
Cadmium Cd			<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr			0.017		0.03	0.01 mg/l	ICP
Copper Cu			0.016		0.03	0.015 mg/l	ICP
Iron Fe			0.186		0.2	0.03 mg/l	ICP
Lead Pb			0.021		0.01	0.001 mg/l	ICP
Magnesium Mg			10.14		50	0.01 mg/l	ICP
Manganese Mn			0.033		0.05	0.014 mg/l	ICP
Potassium K			3.12		5	0.10 mg/l	ICP
Sodium Na			28.4		150	0.03 mg/l	ICP
Zinc Zn			<0.011		0.1	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
Phenol			0.012		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.12		0.03	0.01 mg/l	Photometric
Fluoride F			<0.08		1	0.08 mg/l	IC
List I Organics *			<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *			<0.001		0.001	0.01 mg/l	GC - MS
Odour			None		No abnormal change	-	Olefactory
Visual Inspection			Turbid,Brown		No abnormal change	-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____MW 15D _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1269				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
pH			7.8		6.5 - 9.5	0 -14	Electrochemical
Temperature ^{o}C			11.2		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}			339		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N			0.01		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. 0_2)			98.2		No abnormal change	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON			0.86		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)			151		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			1.6		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.001		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			42.9			1 mg/l	Evaporation
Boron B			0.086		1	0.05 mg/l	ICP
Chloride Cl			34.7		30	0.22 mg/l	IC
Nitrite NO_2			<0.10		0.1	0.10 mg/l	IC
Water Level			1.92			M	Dip Meter
Nitrate NO_3			3.8		25	0.10 mg/l	IC
Sulphate SO_4			14.9		200	0.20 mg/l	IC
Total Coliforms			30		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____MW 15D _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1269				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
Calcium Ca			35.7		200	0.01 mg/l	ICP
Cadmium Cd			<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr			0.012		0.03	0.01 mg/l	ICP
Copper Cu			<0.015		0.03	0.015 mg/l	ICP
Iron Fe			0.022		0.2	0.03 mg/l	ICP
Lead Pb			0.015		0.01	0.001 mg/l	ICP
Magnesium Mg			12.14		50	0.01 mg/l	ICP
Manganese Mn			<0.014		0.05	0.014 mg/l	ICP
Potassium K			2.45		5	0.10 mg/l	ICP
Sodium Na			26.4		150	0.03 mg/l	ICP
Zinc Zn			<0.011		0.1	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
Phenol			0.017		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.39		0.03	0.01 mg/l	Photometric
Fluoride F			<0.08		1	0.08 mg/l	IC
List I Organics *			<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *			<0.001		0.001	0.01 mg/l	GC - MS
Odour			None		No abnormal change	-	Olefactory
Visual Inspection			Turbid,Straw		No abnormal change	-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____MW 16S _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1270				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
pH			6.73		6.5 - 9.5	0 -14	Electrochemical
Temperature ^{o}C			10.9		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}			297		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N			<0.01		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. 0_2)			93.7		No abnormal change	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON			0.54		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)			109		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			8.5		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.002		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			88.6			1 mg/l	Evaporation
Boron B			0.145		1	0.05 mg/l	ICP
Chloride Cl			19.4		30	0.22 mg/l	IC
Nitrite NO_2			<0.10		0.1	0.10 mg/l	IC
Water Level			1.69			M	Dip Meter
Nitrate NO_3			2.4		25	0.10 mg/l	IC
Sulphate SO_4			21.6		200	0.20 mg/l	IC
Total Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____MW 16S _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1270				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
Calcium Ca			28.6		200	0.01 mg/l	ICP
Cadmium Cd			<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr			0.028		0.03	0.01 mg/l	ICP
Copper Cu			<0.015		0.03	0.015 mg/l	ICP
Iron Fe			0.056		0.2	0.03 mg/l	ICP
Lead Pb			0.014		0.01	0.001 mg/l	ICP
Magnesium Mg			8.99		50	0.01 mg/l	ICP
Manganese Mn			<0.014		0.05	0.014 mg/l	ICP
Potassium K			1.57		5	0.10 mg/l	ICP
Sodium Na			23.9		150	0.03 mg/l	ICP
Zinc Zn			<0.011		0.1	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
Phenol			0.029		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.29		0.03	0.01 mg/l	Photometric
Fluoride F			0.11		1	0.08 mg/l	IC
List I Organics *			<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *			<0.001		0.001	0.01 mg/l	GC - MS
Odour			None		No abnormal change	-	Olefactory
Visual Inspection			Turbid,Brown		No abnormal change	-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2) **Monitoring Point / Grid Reference:_____MW 16D _____** **Ground Water Monitoring**

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1271				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
pH			7.31		6.5 - 9.5	0 -14	Electrochemical
Temperature ^{o}C			11		25	$^{-}5^{o}C$ to $100^{o}C$	Electronic Thermocouple
Electrical Conductivity ECuScm^{-1}			315		1000	1.0uScm^{-1}	Electrochemical
Ammonical Nitrogen NH_3-N			0.01		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. 0_2)			98.5		No abnormal change	1.2 % Saturation 0_2	Electrochemical
Total Oxidised Nitrogen TON			0.76		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as $CaCO_3$)			118		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			7.4		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.006		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			41.2			1 mg/l	Evaporation
Boron B			0.095		1	0.05 mg/l	ICP
Chloride Cl			11.2		30	0.22 mg/l	IC
Nitrite NO_2			<0.10		0.1	0.10 mg/l	IC
Water Level			1.46			M	Dip Meter
Nitrate NO_3			3.4		25	0.10 mg/l	IC
Sulphate SO_4			18.2		200	0.20 mg/l	IC
Total Coliforms			770		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2) **Monitoring Point / Grid Reference:_____MW 16D _____**

Ground Water Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Interim Report Guideline values for the protection of groundwater EPA 2003**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1271				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
Calcium Ca			31.2		200	0.01 mg/l	ICP
Cadmium Cd			<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr			0.031		0.03	0.01 mg/l	ICP
Copper Cu			<0.015		0.03	0.015 mg/l	ICP
Iron Fe			0.064		0.2	0.03 mg/l	ICP
Lead Pb			0.006		0.01	0.001 mg/l	ICP
Magnesium Mg			10.12		50	0.01 mg/l	ICP
Manganese Mn			0.021		0.05	0.014 mg/l	ICP
Potassium K			3.12		5	0.10 mg/l	ICP
Sodium Na			25.8		150	0.03 mg/l	ICP
Zinc Zn			<0.011		0.1	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
Phenol			0.034		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.39		0.03	0.01 mg/l	Photometric
Fluoride F			0.08		1	0.08 mg/l	IC
List I Organics *			<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *			<0.001		0.001	0.01 mg/l	GC - MS
Odour			None		No abnormal change	-	Olefactory
Visual Inspection			Turbid,Brown		No abnormal change	-	Visual

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.
Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 1) **Monitoring Point / Grid Reference:_____MW 08 _____** **Leachate Monitoring**

Parameter BHP Reference	**Results (mg/l)** 08/10/949 **Date** 4th Qtr 08	09/04/803 **Date** 2nd Qtr 09	10/05/1271 **Date** 2nd Qtr 10	**Date**	**Sampling method (grab, drift etc.)**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
Boron B	0.207	0.212	n/a		Grab	0.05 mg/l	ICP
Calcium Ca	307.5	218.2	Well too		Grab	0.01 mg/l	ICP
Cadmium Cd	<0.0035	<0.0035	shallow		Grab	0.0035 mg/l	ICP
Total Chromium Cr	<0.01	<0.01	To		Grab	0.01 mg/l	ICP
Copper Cu	<0.015	<0.015	sample		Grab	0.015 mg/l	ICP
Total Cyanide Cn	0.16	0.003	n/a		Grab	0.001 mg/l	Colourimetrically
Fluoride F	2.3	<0.08	n/a		Grab	0.08 mg/l	IC
Iron Fe	<0.03	<0.03	n/a		Grab	0.03 mg/l	ICP
Lead Pb	0.006	0.053	n/a		Grab	0.001 mg/l	ICP
Magnesium Mg	101	97.43	n/a		Grab	0.01 mg/l	ICP
Manganese Mn	<0.014	0.024	n/a		Grab	0.014 mg/l	ICP
Mercury Hg	<0.0005	<0.0005	n/a		Grab	0.0005 mg/l	AAS
Sulphate SO_4	8.42	13.7	n/a		Grab	0.20 mg/l	IC
Potassium K	110.9	163.1	n/a		Grab	0.10 mg/l	ICP
Sodium Na	586	617.5	n/a		Grab	0.03 mg/l	ICP
Total Phosphorous P	0.26	1.25	n/a		Grab	0.01 mg/l	Photometric
Zinc Zn	<0.011	<0.011	n/a		Grab	0.011 mg/l	ICP
Total Coliforms	4500	2000	n/a		Grab	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	118	10	n/a		Grab	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Bailieborough Landfill Site

Client: Cavan Co. Co., Courthouse, Cavan, Co. Cavan.

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 1) **Monitoring Point / Grid Reference:_____MW 09 _____**

Leachate Monitoring

Parameter BHP Reference	**Results (mg/l)**				**Sampling method (grab, drift etc.)**	**Normal Analytical Range or Limit of detection (LOD)**	**Analysis method / technique**
			10/05/1272				
	Date	**Date**	**Date**	**Date**			
			2nd Qtr 10				
Boron B			0.331		Grab	0.05 mg/l	ICP
Calcium Ca			187.4		Grab	0.01 mg/l	ICP
Cadmium Cd			0.046		Grab	0.0035 mg/l	ICP
Total Chromium Cr			0.094		Grab	0.01 mg/l	ICP
Copper Cu			0.086		Grab	0.015 mg/l	ICP
Total Cyanide Cn			0.018		Grab	0.001 mg/l	Colourimetrically
Fluoride F			<0.08		Grab	0.08 mg/l	IC
Iron Fe			0.221		Grab	0.03 mg/l	ICP
Lead Pb			0.04		Grab	0.001 mg/l	ICP
Magnesium Mg			85.1		Grab	0.01 mg/l	ICP
Manganese Mn			0.133		Grab	0.014 mg/l	ICP
Mercury Hg			<0.0005		Grab	0.0005 mg/l	AAS
Sulphate SO_4			86		Grab	0.20 mg/l	IC
Potassium K			89.5		Grab	0.10 mg/l	ICP
Sodium Na			421		Grab	0.03 mg/l	ICP
Total Phosphorous P			0.08		Grab	0.01 mg/l	Photometric
Zinc Zn			0.033		Grab	0.011 mg/l	ICP
Total Coliforms			1		Grab	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		Grab	1 to 2419 cfu/100ml	Quanti Cult

A survey of landfill sites to determine the quantity of methane flared and or recovered in utilisation plants for 2010

Please choose from the drop down menu the license number for your site	W0091
Please choose from the drop down menu the name of the landfill site	Bailieborough Landfill
Please enter the number of flares operational at your site in 2010	Select
Please enter the number of engines operational at your site in 2010	Select
Total methane flared	0 kg/year
Total methane utilised in engines	0 kg/year

Please note that the closing date for reciept of completed surveys is 31/03/2011

Introduction

The Office of Climate Licensing and Resource Use (OCLR) of the Environmental Protection Agency acts as the inventory agency in Ireland with responsibility for compiling and reporting national greenhouse gas inventories to the European Commission and the United Nations Framework Convention on Climate Change. In addition to meeting international commitments Ireland's national greenhouse gas inventory informs national agencies and Government departments as they face the challenge to curb emissions and meet Ireland's targets under the Kyoto Protocol. The national inventory also informs data suppliers, making them aware of the importance of their contributions to the inventory process and a means of identifying areas where input data may be improved.

It is on this basis that the Environmental Protection Agency is asking landfill operators to partake in this survey so that the most uptodate information on methane flaring and recovery in utilisation plants at landfills sites is used in calculating the contribution of the waste sector to national greenhouse gas emissions

The Environmental Protection Agency wishes to thank you for partaking in this survey. If you have any questions about the survey and how to complete it please view the "Help sheet" worksheet. If however, your query is not answered by viewing the "Help sheet" worksheet please contact:

LFGProject@epa.ie

If an operator wishes to enter more precise information than the data options in the drop down menus, please contact LFGProject@epa.ie for a version of the survey that will allow you to do so

Once completed please send the completed file as an attachment clearly stating the name and or license number of the landfill site (e.g. W000 Xanadu landfill_2010) to:

LFGProject@epa.ie

Appendix D

Declaration of True Copy

Cavan County Council

Comhairle Chontae an Chabháin

Teach Na Cúirte
An Cabháin

Courthouse
Cavan

Declaration

Cavan County Council hereby certifies that the content of the full pdf. AER W0091-012010AER.pdf uploaded to the EPA website is a true copy of the original AER.

Signed Sinead Fox Dated 24/March 2011

Sinead Fox
Landfill Operations Manager
Cavan County Council

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