

COMHAIRLE CHONDAE AN CABHÁIN

Cavan County Council



Annual Environmental Report

2010

Ballyjamesduff Landfill WL0093-1

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Ballyjamesduff Landfill WL93-01

Annual Environmental Report 2010

1. Introduction & Site History

Ballyjamesduff Landfill has been operated as waste disposal facility by Cavan County Council since the late 1960s. It is located off the Derrylurgan road, approximately 600m north of Ballyjamesduff town on the eastern side of the Derrylurgan road. The site is predominantly bog and comprises some 1.62 hectares. 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.

A Waste Licence for the facility was issued by the EPA on 7th March 2002, Ref WL 93-1. Condition 11.4 of Waste Licence Ref. 93-1 requires the submission of an Annual Environmental Report (AER) for Ballyjamesduff Landfill facility. This document is produced in order to comply with requirements of Condition 11.4. The reporting period for the purposes of this AER is 1st January 2010 to 31st December 2010.

The site at Ballyjamesduff was closed in early March 2002. Prior to closing the site a temporary cap was placed on site.

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 2010 when advised by the Agency.

Surface Water

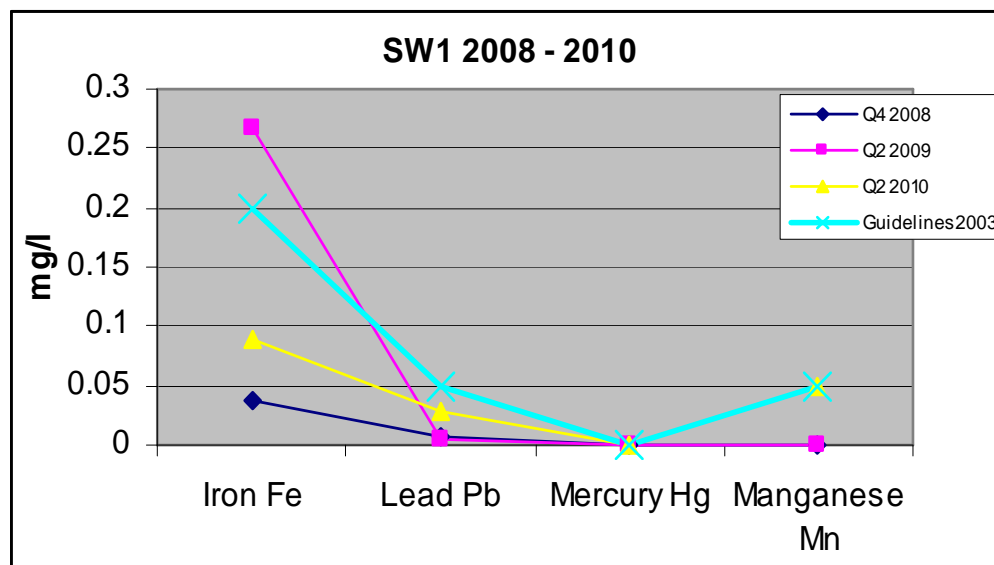
Two surface waters points were sampled in the vicinity of the landfill. These have been assessed against the surface water limits as outlined in the European Communities (Drinking Water) (No.2) Regulations 2007.

Location SW1 upstream of the landfill is classed as a category A1. However in late 2010 the **EPA** annual sample analysis revealed an elevated mercury result. In subsequent samples mercury elevations was not recorded nor was it found in any sampling carried out on behalf of Cavan County Council. See table 4.1 below.

Table 4.1 Mercury Results

Parameter	Q2 2010 CCC	Q4 2010 EPA	Guidelines 2003
Mercury	<0.0005 mg/l	0.00797mg/l	0.001mg/l

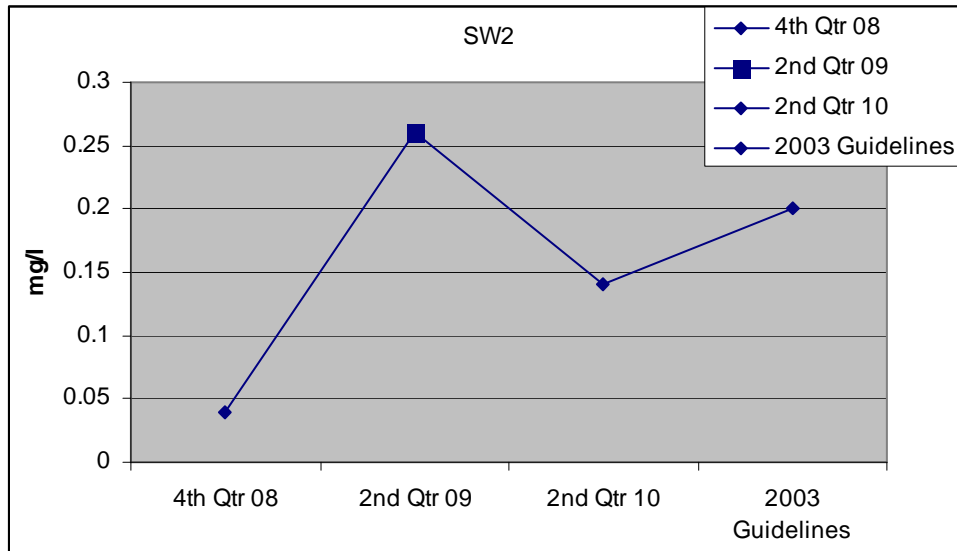
Graph 4.1 SW1 Results



SW1 - can be seen from the yellow trend line shows all given parameters within allowable limits as set by the 2003 guidelines.

Location SW2 immediately downstream of the landfill is classed as a category A1 and no change was noted in 2010. Samples were within allowable limits.

Graph 4.2 SW2 Results

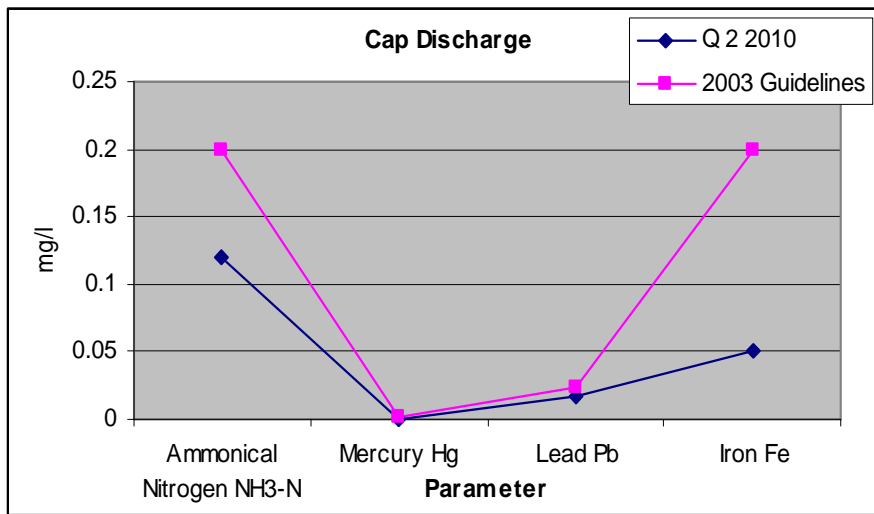


The table below shows results for monitoring for SW2. An elevated level of dissolved Oxygen occurred in Q2 2010 but was back to normal levels in other samples.

Table 4.2 SW2 Monitoring

SW2	Chloride Cl mg/l	Dissolved Oxygen (% Sat. O ₂)
Q2 2010	37.2	18.3
Q2 2010 (b)	29.9	91.2
Q4 2010	41.8	94.2
2003 Guidelines	250	60

Graph 4.3 Final Cap discharge

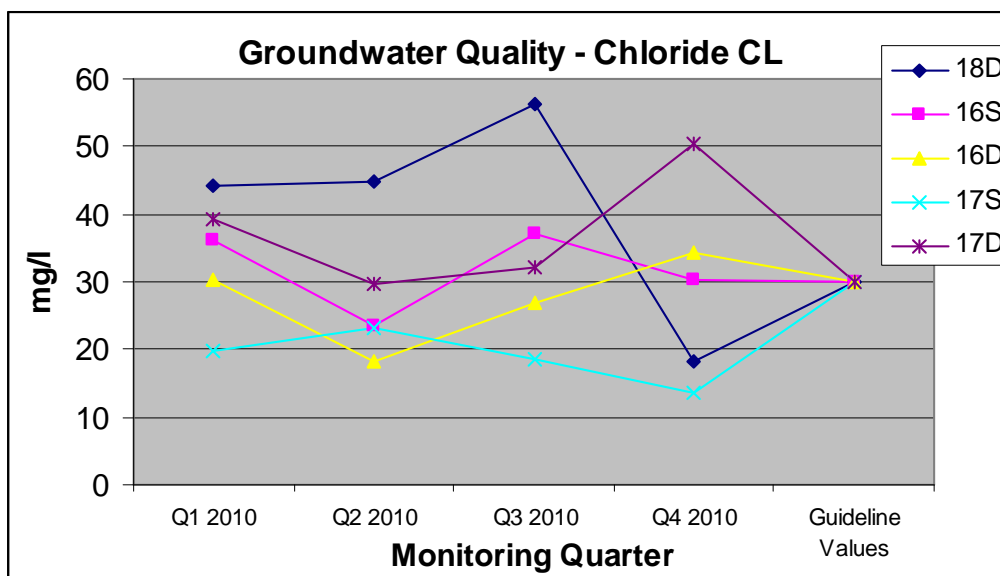


As can be seen from the graph all the parameters shown are within allowable limits.

Groundwater

Chloride levels for monitoring wells 3, 4 & 10 are shown in the following graph. Monitoring well 3 is in exceedence in three quarters for 2010 for Chloride and MW4 is in exceedence in quarter 4.

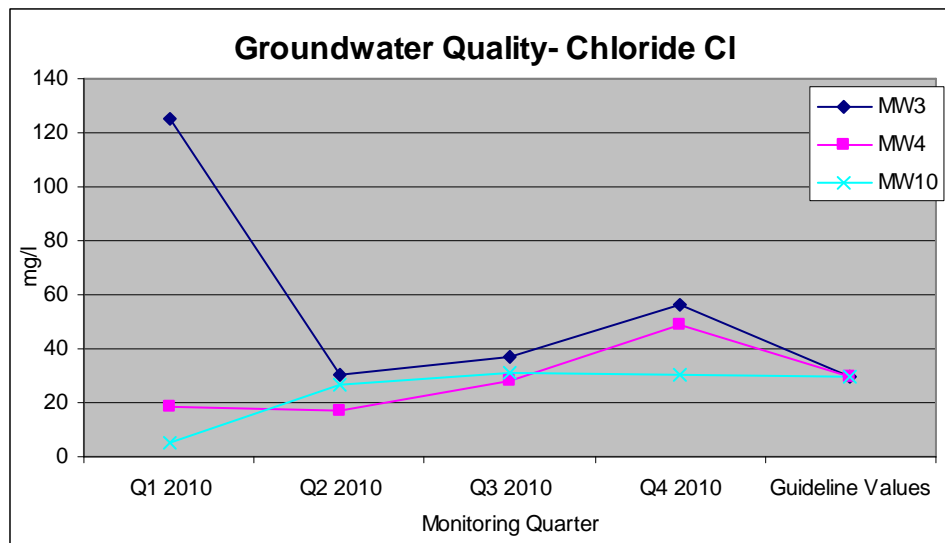
Graph 4.4 Groundwater Quality - Chloride



Monitoring Wells 16D was in exceedence slightly in quarter 4
 16S was in exceedence in quarters 1 and 3
 17S was in not in exceedence in 2010
 17D was in exceedence in quarters 1, 3 and 4
 18D was in exceedence in quarters 1, 2 and 3.

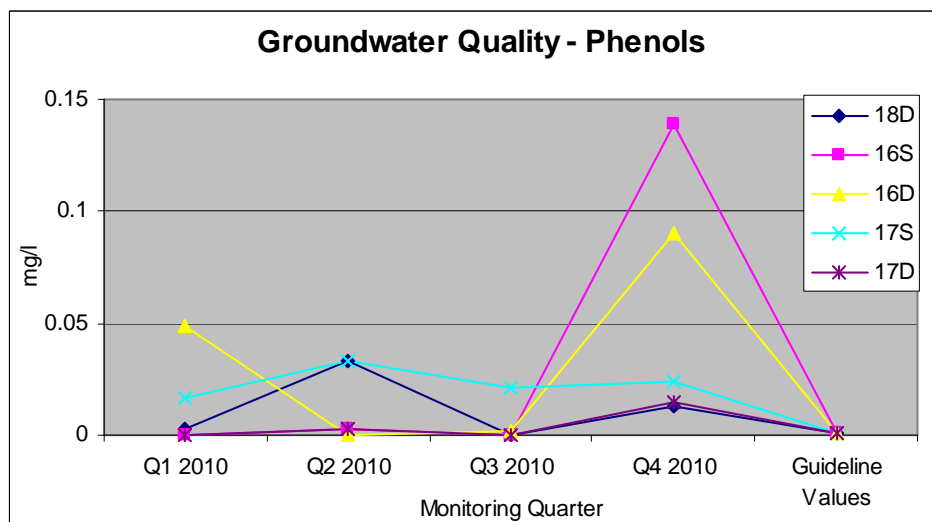
In the graph below it can be seen that MW3 is in exceedence for quarters 1, 3 and 4 for Chloride. MW4 is elevated in quarter 4.

Graph 4.5 Groundwater Quality - Chloride



Graph 4.6 Groundwater Quality – Phenols

There are frequent elevated levels picked up for Phenols as can be seen in the graph below.



Phenols -

16D is in exceedence slightly in quarters 1 and 4

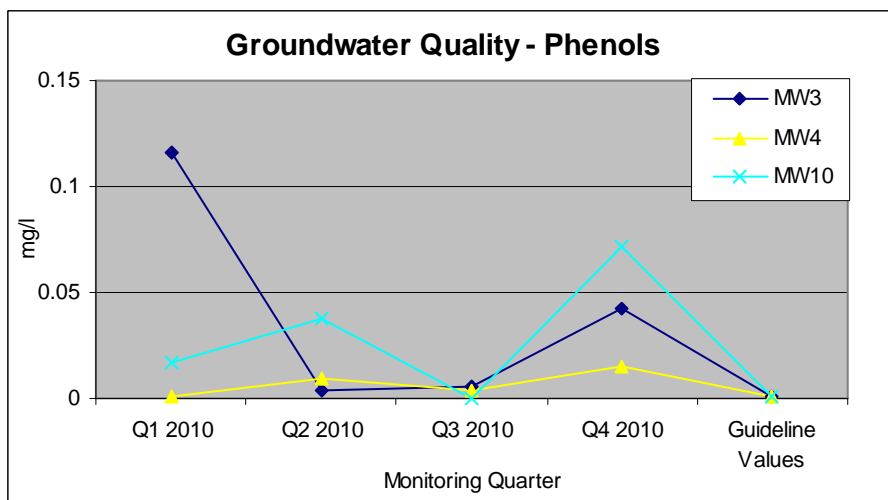
16S is in exceedence in quarter 4

17S is in exceedence in for all samples in 2010

17D is in exceedence in quarter 4

18D is in exceedence in quarters 2 and 4

Graph 4.7 Groundwater Quality – Phenols



As is shown on the graph there were elevated levels recorded in Phenol on a number of occasions during the year.

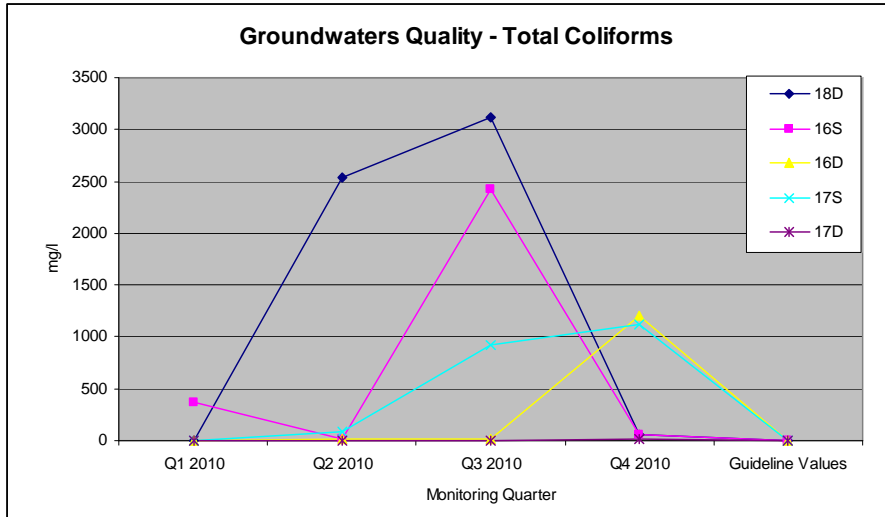
MW3 was in exceedence in quarters 1 and four

MW4 was in exceedence slightly in quarter 4

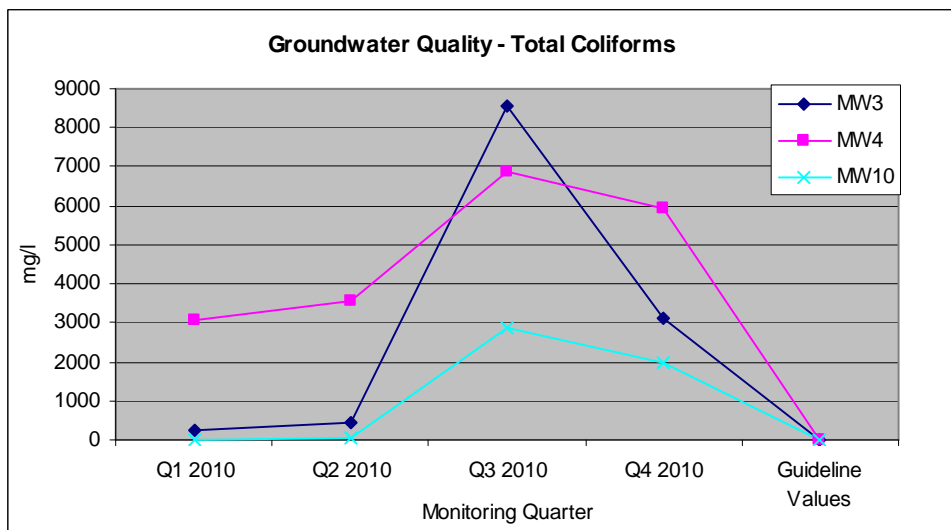
MW10 was in exceedence in quarters 1, 2 and 4

High counts of total coliforms are recorded in many of the samples taken in 2010 as is shown in graphs 4.8 and 4.9.

Graph 4.8 Groundwater Quality – Total Coliforms

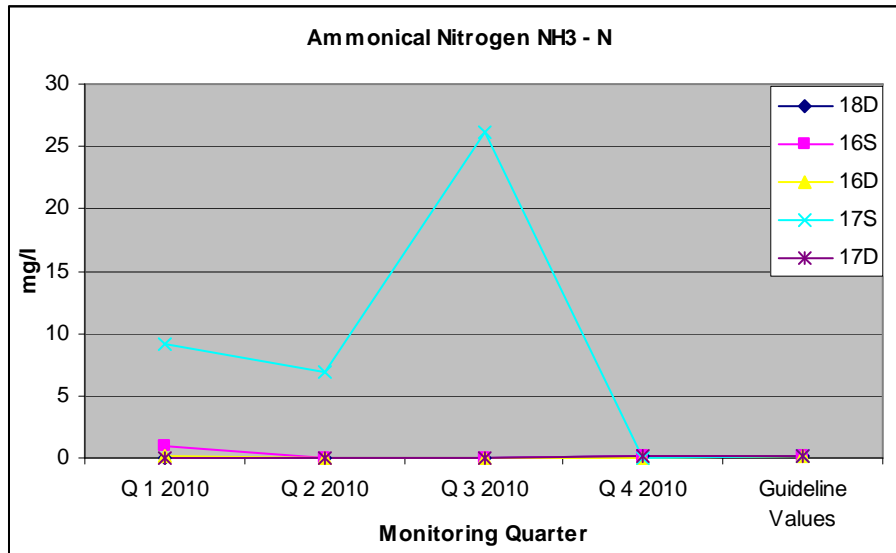


Graph 4.9 Groundwater Quality – Total Coliforms



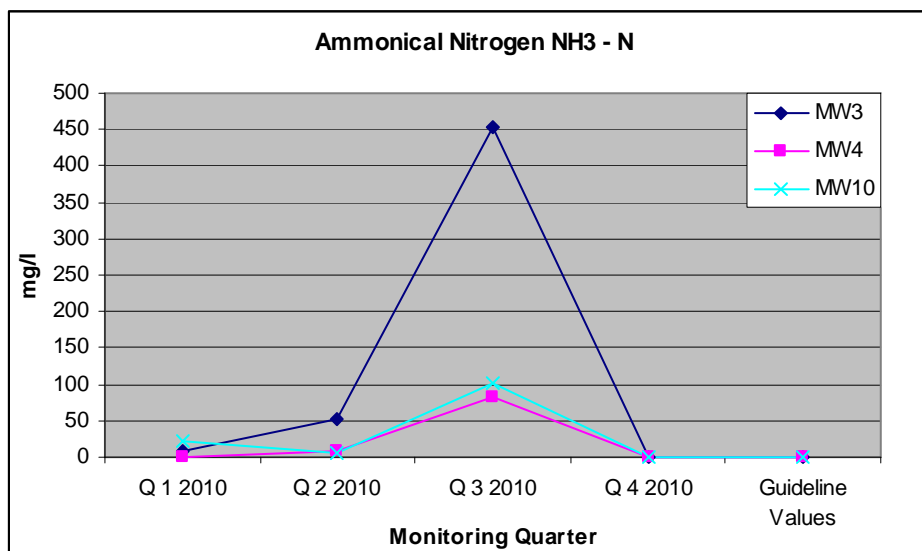
As can be seen from graph 4.10 there are consistently high levels of Ammonia in groundwater monitoring well 17S in quarters 1, 2 & especially in quarter 3. The rest of the wells in this graph show low levels.

Graph 4.10 Groundwater Quality – Ammonical Nitrogen NH₃ -N



Graph 4.11 Groundwater Quality – Ammonical Nitrogen NH₃ –N

Quarters 2 & 3 in this graph revealed very high Ammonia results for MW3 and all the other wells tested in this quarter. The laboratory results and quality control have since been re-verified.



Leachate Monitoring

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

Table 4.3 Leachate Monitoring Results

MW9	Q2 2010	Guideline Values
Cadmium Cd	0.007	0.005
Lead Pb	0.013	0.01
Phenol	0.042	0.0005
Total Phosphorous P	0.03	0.03
Ammonical Nitrogen NH ₃ -N	9.5	0.15
Potassium K	5.14	5
Electrical Conductivity ECuScm ⁻¹	1090	1000
Residue on Evaporation	11992	

As can be seen from the table of results for leachate wells MW7 and MW8 in Appendix C there were no elevations reported for annual leachate monitoring.

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 giving very slight CO₂ elevations. 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 A. There are no flares on this landfill site. The annual PRTR was submitted as stated in section 4. Gas Monitoring Results have been submitted quarterly as per the waste licence.

5. Summary of results and interpretation of environmental monitoring

As reported in section 4 there were a number of elevations recorded in 2010. 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 will continue to monitor and report as per the licence requirement.

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 in 2010.

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 by the FAS Waste Management Training Course, carries a Safe Pass and has been trained in Landfill Gas Management.

Table 12.1 Management Structure 2010 - 2011

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. Any other items specified by the Agency

As per the licence 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

&

Landfill Survey Return

AER Returns Workbook

Version 1.1.11

REFERENCE YEAR	2010
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1. FACILITY IDENTIFICATION

Parent Company Name	Cavan County Council
Facility Name	Ballyjamesduff Landfill
PRTR Identification Number	W0093
Licence Number	W0093-01

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	Derrylurgan
Address 2	Ballyjamesduff
Address 3	Co Cavan
Address 4	
Country	Ireland
Coordinates of Location	-7.20884 53.8687
River Basin District	IEGBNISH
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	049-4378418
AER Returns Contact Mobile Phone Number	087 980 8507
AER Returns Contact Fax Number	
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?	

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR#: W0093 | Facility Name : Ballyjamesduff Landfill | Filename : W0093_2010(1)PRTR.xls | Return Year : 2010 |

04/04/2011 14:28

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASERS TO AIR		Please enter all quantities in this section in KGs						
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
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
03	Carbon dioxide (CO2)	C	MAB	GASSIM	0.0	135000.0	0.0	135000.0
01	Methane (CH4)	C	MAB	GASSIM	0.0	48200.0	0.0	48200.0

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

RELEASERS TO AIR		Please enter all quantities in this section in KGs						
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
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)

RELEASERS TO AIR		Please enter all quantities in this section in KGs						
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
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: Ballyjamesduff Landfill

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

T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour	
		Method Code	Designation or Description		
Total estimated methane generation (as per site model)	48200.0	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)	48200.0	C	MAB	GASSIM	N/A

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	<input type="text" value="W0093"/>
Please choose from the drop down menu the name of the landfill site	<input type="text" value="Ballyjamesduff Landfill"/>
Please enter the number of flares operational at your site in 2010	<input type="text" value="Select"/>
Please enter the number of engines operational at your site in 2010	<input type="text" value="Select"/>
Total methane flared	<input type="text" value="0"/> kg/year
Total methane utilised in engines	<input type="text" value="0"/> kg/year

Please note that the closing date for receipt 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 up to date information on methane flaring and recovery in utilisation plants at landfill 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 B

Site Monitoring Locations Map

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS TO MCCC

Malachi Cullen

Consulting Engineers Ltd.

Old Bridge House, Grand Street, Ardara, Co. Wick
Telephone: 053 932864 Fax: 053 932834 Email: info@malachicullen.ie

Project: **BALLYJAMESDUFF LANDFILL (WLR9-01)**

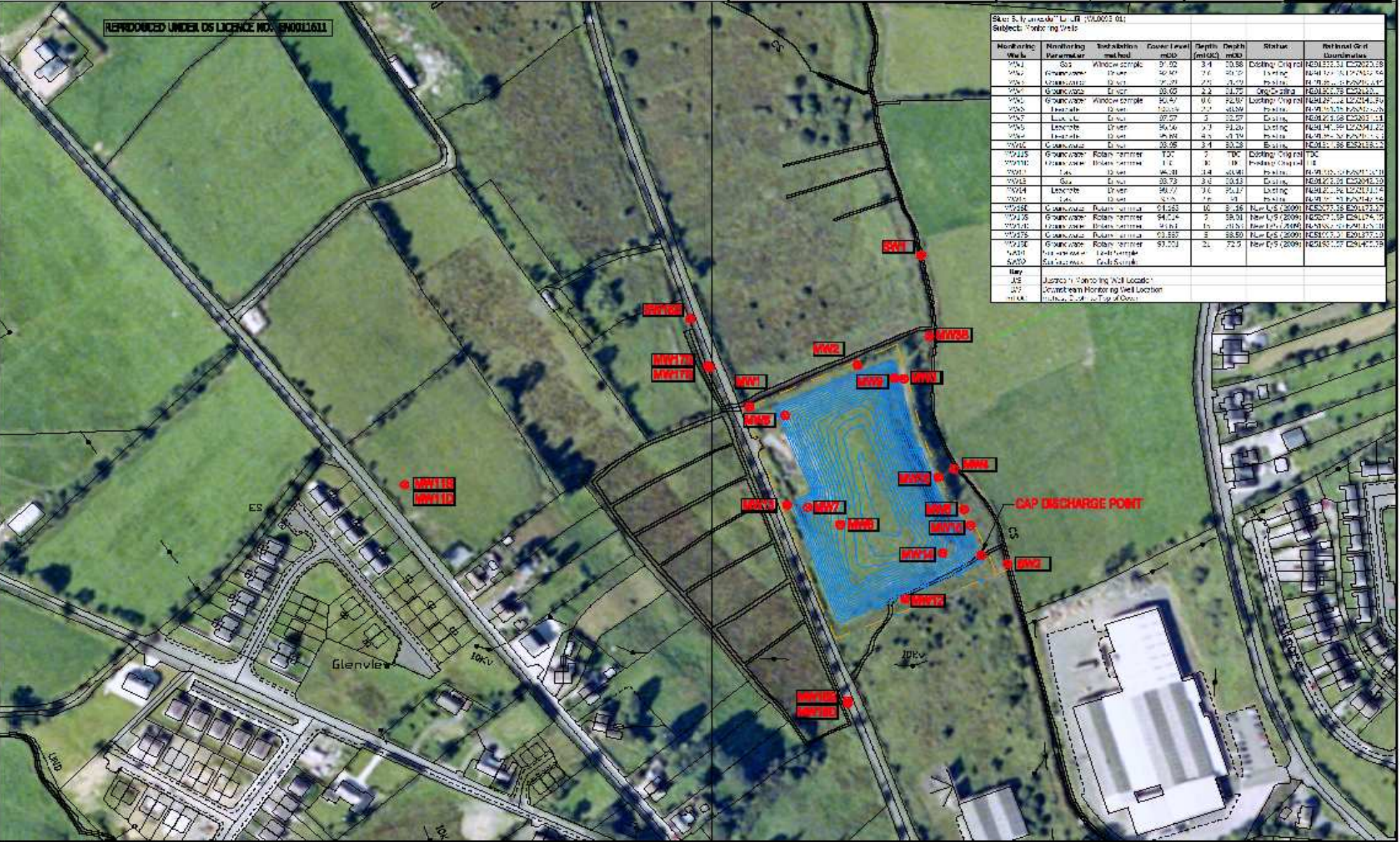
Drawing Title: **MONITORING WELL LOCATIONS**

Drawn: FE Date: MAY 2011 Scale: AS 1:1000

Author:

Page Number: **11-015**

Drawing Number: **BK 03** No: **D**



Site: Bally James Duff Landfill (WLR9-01)
Subject: Monitoring Wells

Monitoring Well	Monitoring Parameter	Installation method	Cover Level mOD	Depth (mOD)	Depth (mSL)	Status	Retrievable Coordinates
MW1	Sol	Window sample	91.02	3.1	10.88	Closing Original	HE0132.51 ES2013.58
MW2	Groundwater	Driven	90.47	7.6	45.19	Existing	HE0132.51 ES2013.58
MW3	Groundwater	Driven	91.01	2.1	21.09	Existing	HE0132.51 ES2013.58
MW4	Groundwater	Driven	91.05	2.2	21.25	Existing	HE0132.51 ES2013.58
MW5	Groundwater	Window sample	90.47	0.0	92.87	Closing Original	HE0132.51 ES2013.58
MW6	Leachate	Driven	100.74	2.1	45.09	Existing	HE0132.51 ES2013.58
MW7	Leachate	Driven	97.07	3	22.07	Existing	HE0132.51 ES2013.58
MW8	Leachate	Driven	85.06	2.3	91.26	Closing	HE0132.51 ES2013.58
MW9	Leachate	Driven	98.80	4.8	11.19	Existing	HE0132.51 ES2013.58
MW10	Groundwater	Driven	93.06	3.1	30.28	Existing	HE0132.51 ES2013.58
MW11	Groundwater	Rotary perme	1.0	7	10	Closing Original	TAC
MW12	Groundwater	Rotary perme	1.0	10	10	Existing Original	TAC
MW13	Sol	Driven	96.31	1.4	10.61	Existing	HE0132.51 ES2013.58
MW14	Leachate	Driven	96.77	3.0	25.87	Closing	HE0132.51 ES2013.58
MW15	Sol	Driven	91.01	1.1	11	Existing	HE0132.51 ES2013.58
MW16	Groundwater	Rotary perme	01.00	10	8.16	New I/S (2009)	HE0132.51 ES2013.58
MW17	Groundwater	Rotary perme	94.04	7	58.01	New I/S (2009)	HE0132.51 ES2013.58
MW18	Groundwater	Rotary perme	91.81	15	20.51	New I/S (2009)	HE0132.51 ES2013.58
MW19	Groundwater	Rotary perme	93.55	8	38.80	New I/S (2009)	HE0132.51 ES2013.58
MW20	Groundwater	Rotary perme	93.03	2	72.9	New I/S (2009)	HE0132.51 ES2013.58
MW21	Leachate	Leach sample					
MW22	Leachate	Leach sample					

Key:
 I/S Justified Monitoring Well Location
 Existing Monitoring Well Location
 mOD: Depth to Top of Cover

Appendix C

Annual Monitoring Report

BHP/CEM/23

Analysing
Testing
Consulting
Calibrating

TEST REPORT



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

Client: Cavan Co. Co

BHP Ref No.: 91940-91942

Order No.:

Date Received: 24th May 2010

Date Completed: 30th June 2010

Test Specification: Nil

Item: Ballyjamesduff Landfill Site

Annual Report covering groundwater, surfacewater and leachate monitoring at Ballyjamesduff Landfill

**Cavan County Council
Courthouse
Cavan Town
Co. Cavan**

FTAO: Sinead Fox

Report on Ballyjamesduff Landfill for the annual parameters for 2010

For and on behalf of BHP Ltd.

Pat O'Sullivan

Date Issued: 18th August 2010

Test results relate only to this item. This test report shall not be duplicated except in full and with the permission of the test laboratory

AER 2009 BJD W0093

Table of Contents

1.0	Introduction
2.0	Sampling / Analysis
3.0	Quality Assurance
4.0	Results
5.0	Discussion

Appendix A: Site Sampling Sheet/Chain of Custody

Appendix B: Site map showing sampling locations

Appendix C: List I/II organics

1.0 Introduction :

BHP were contracted by Cavan County Council to carry out environmental monitoring at Ballyjamesduff Landfill site which is located outside Ballyjamesduff town, Co.Cavan. This landfill is no longer operational and is operated under waste license no. 93-1, which was issued to Cavan Co. Co. by the EPA.

This report covers surfacewater, groundwater and leachate monitoring at Ballyjamesduff for the annual monitoring event of 2010 for the available sampling locations.

2.0 Sampling :

This monitoring is a continuation of an established monitoring program at Ballyjamesduff 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 11 boreholes. Their individual references are as shown in table 1.

Table 1 : Borehole reference points and levels.

Borehole reference	Static water level (m)
MW 11S	2.8
MW 11D	11.94
MW 16S	0.98
MW 16D	Full
MW 17S	1.43
MW 17D	0.4
MW3	2.08
MW4	1.33
MW9	3.36
MW10	1.80
MW18	Full

Locations for 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°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 20 th
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°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

Batches 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 following tables.



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 1)

Monitoring Point / Grid Reference: _____ **MW 8** _____

Leachate Monitoring

Parameter BHP Reference	Results (mg/l)				Sampling method (grab, drift etc.)	Normal Analytical Range or Limit of detection (LOD)	Analysis method / technique
			10/05/1158				
	Date	Date	Date	Date			
			2nd Qtr 10				
Boron B			0.586		Grab	0.05 mg/l	ICP
Calcium Ca			118.7		Grab	0.01 mg/l	ICP
Cadmium Cd			0.004		Grab	0.0035 mg/l	ICP
Total Chromium Cr			0.017		Grab	0.01 mg/l	ICP
Copper Cu			0.025		Grab	0.015 mg/l	ICP
Total Cyanide Cn			0.004		Grab	0.001 mg/l	Colourimetrically
Fluoride F			0.26		Grab	0.08 mg/l	IC
Iron Fe			2.127		Grab	0.03 mg/l	ICP
Lead Pb			0.012		Grab	0.001 mg/l	ICP
Magnesium Mg			31.24		Grab	0.01 mg/l	ICP
Manganese Mn			0.127		Grab	0.014 mg/l	ICP
Mercury Hg			<0.0005		Grab	0.0005 mg/l	AAS
Sulphate SO ₄			89.4		Grab	0.20 mg/l	IC
Potassium K			8.94		Grab	0.10 mg/l	ICP
Sodium Na			36.54		Grab	0.03 mg/l	ICP
Total Phosphorous P			0.34		Grab	0.01 mg/l	Photometric
Zinc Zn			0.026		Grab	0.011 mg/l	ICP
Total Coliforms			752		Grab	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		Grab	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 9

Leachate **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
			10/05/1151				
	Date	Date	Date	Date			
			2nd Qtr 10				
pH			7.09		6.5 - 9.5	0 -14	Electrochemical
Temperature °C			12.6		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity E _{CuScm} ⁻¹			1090		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N			9.5		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)			88.6		No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON			1.04		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)			541		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			15		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.001		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			11992			1 mg/l	Evaporation
Boron B			0.477		1	0.05 mg/l	ICP
Chloride Cl			28.2		30	0.22 mg/l	IC
Nitrite NO ₂			<0.1		0.1	0.10 mg/l	IC
Water Level			3.36			M	Dip Meter
Nitrate NO ₃			4.6		25	0.10 mg/l	IC
Sulphate SO ₄			45.7		200	0.20 mg/l	IC
Total Coliforms			2		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

Cavan Co. Co., Courthouse, Cavan, Co.

Client:

Cavan.

Site Address:

Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 9

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
			10/05/1151				
	Date	Date	Date	Date			
			2nd Qtr 10				
Calcium Ca			68.4		200	0.01 mg/l	ICP
Cadmium Cd			0.007		0.005	0.0035 mg/l	ICP
Total Chromium Cr			<0.01		0.03	0.01 mg/l	ICP
Copper Cu			<0.015		0.03	0.015 mg/l	ICP
Iron Fe			0.067		0.2	0.03 mg/l	ICP
Lead Pb			0.013		0.01	0.001 mg/l	ICP
Magnesium Mg			21.4		50	0.01 mg/l	ICP
Manganese Mn			0.014		0.05	0.014 mg/l	ICP
Potassium K			5.14		5	0.10 mg/l	ICP
Sodium Na			48.7		150	0.03 mg/l	ICP
Zinc Zn			0.013		0.1	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
Phenol			0.042		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.03		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 Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 1)

Monitoring Point / Grid Reference: MW 7

Leachate Monitoring

Parameter BHP Reference	Results (mg/l)				Sampling method (grab, drift etc.)	Normal Analytical Range or Limit of detection (LOD)	Analysis method / technique
	08/10/944	09/04/756	10/05/1157				
	Date	Date	Date	Date			
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
Boron B	0.277	0.313	0.412		Grab	0.05 mg/l	ICP
Calcium Ca	127.7	135.6	124.5		Grab	0.01 mg/l	ICP
Cadmium Cd	<0.0035	<0.0035	0.004		Grab	0.0035 mg/l	ICP
Total Chromium Cr	<0.01	0.012	0.018		Grab	0.01 mg/l	ICP
Copper Cu	<0.015	0.021	0.017		Grab	0.015 mg/l	ICP
Total Cyanide Cn	0.09	0.011	0.007		Grab	0.001 mg/l	Colourimetrically
Fluoride F	<0.08	0.25	0.38		Grab	0.08 mg/l	IC
Iron Fe	3.509	3.856	1.136		Grab	0.03 mg/l	ICP
Lead Pb	0.009	0.011	0.009		Grab	0.001 mg/l	ICP
Magnesium Mg	17.19	18.96	25.41		Grab	0.01 mg/l	ICP
Manganese Mn	0.092	0.124	0.089		Grab	0.014 mg/l	ICP
Mercury Hg	<0.0005	<0.0005	<0.0005		Grab	0.0005 mg/l	AAS
Sulphate SO ₄	<0.2	1.8	122		Grab	0.20 mg/l	IC
Potassium K	7.14	11.56	13.42		Grab	0.10 mg/l	ICP
Sodium Na	12.61	25.62	22.75		Grab	0.03 mg/l	ICP
Total Phosphorous P	19.5	14.2	0.17		Grab	0.01 mg/l	Photometric
Zinc Zn	<0.011	<0.011	0.021		Grab	0.011 mg/l	ICP
Total Coliforms	281	3540	136		Grab	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	10	152	None Found		Grab	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 11S

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
	08/10/940	09/04/754	10/05/1143				
	Date	Date	Date	Date			
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
pH	6.46	6.58	7.19		6.5 - 9.5	0 - 14	Electrochemical
Temperature °C	9.2	8.9	11.6		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity ECuScm ⁻¹	447	521	1149		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.01	0.04	0.02		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)	58.8	65.4	95.3		No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.27	0.47	1.55		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	206	227	332		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	2.6	3.8	5.9		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	<0.001	0.002	0.003		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	355.3	368	1030			1 mg/l	Evaporation
Boron B	<0.05	0.107	0.088		1	0.05 mg/l	ICP
Chloride Cl	20.84	21.8	14.8		30	0.22 mg/l	IC
Nitrite NO ₂	<0.1	<0.1	<0.10		0.1	0.10 mg/l	IC
Water Level	2.00	2.25	2.8			M	Dip Meter
Nitrate NO ₃	1.2	2.1	6.9		25	0.10 mg/l	IC
Sulphate SO ₄	16.34	37.1	26.4		200	0.20 mg/l	IC
Total Coliforms	2810	1542	93		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 Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 11S

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
	08/10/940	09/04/754	10/05/1143				
	Date	Date	Date	Date			
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
Calcium Ca	50.06	41.33	43.6		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	<0.01		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	<0.03	0.056		0.2	0.03 mg/l	ICP
Lead Pb	0.006	0.007	0.013		0.01	0.001 mg/l	ICP
Magnesium Mg	12.95	13.74	11.52		50	0.01 mg/l	ICP
Manganese Mn	<0.014	<0.014	0.032		0.05	0.014 mg/l	ICP
Potassium K	2.5	2.22	2.19		5	0.10 mg/l	ICP
Sodium Na	19.02	21.42	18.54		150	0.03 mg/l	ICP
Zinc Zn	<0.011	<0.011	0.013		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	0.001	0.003		0.0005	0.001 mg/l	Photometric
Total Phosphorous P	0.11	<0.01	0.01		0.03	0.01 mg/l	Photometric
Fluoride F	0.21	0.26	0.31		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, turbid	Straw, turbid		No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 11D

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
	08/10/941	09/04/753	10/05/1144				
	Date	Date	Date	Date			
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
pH	7.65	7.48	7.56		6.5 - 9.5	0 - 14	Electrochemical
Temperature °C	9	11.1	12.1		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity E _{CuScm} ⁻¹	411	408	452		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.02	0.08	<0.01		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)	96.5	95.8	92.4		No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.2	0.35	1.66		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	217	215	228		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	4.6	5.2	<0.4		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	0.004	0.003	0.001		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	393	342	286			1 mg/l	Evaporation
Boron B	0.296	0.094	0.101		1	0.05 mg/l	ICP
Chloride Cl	12	15.4	13.8		30	0.22 mg/l	IC
Nitrite NO ₂	<0.1	<0.1	<0.1		0.1	0.10 mg/l	IC
Water Level	10.6	11.36	11.94			M	Dip Meter
Nitrate NO ₃	0.9	1.54	7.4		25	0.10 mg/l	IC
Sulphate SO ₄	15.41	22.1	14.9		200	0.20 mg/l	IC
Total Coliforms	84	65	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 Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 11D

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
	08/10/940	09/04/754	10/05/1144				
	Date	Date	Date	Date			
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
Calcium Ca	70.06	37.8	52.1		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	<0.01		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	0.124	0.008		0.2	0.03 mg/l	ICP
Lead Pb	0.006	<0.002	0.005		0.01	0.001 mg/l	ICP
Magnesium Mg	9.66	8.81	7.99		50	0.01 mg/l	ICP
Manganese Mn	<0.014	<0.014	0.018		0.05	0.014 mg/l	ICP
Potassium K	1.42	1.86	2.01		5	0.10 mg/l	ICP
Sodium Na	17.96	20.12	19.54		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	0.01	0.008	0.002		0.0005	0.001 mg/l	Photometric
Total Phosphorous P	0.62	0.16	0.04		0.03	0.01 mg/l	Photometric
Fluoride F	0.23	0.25	0.19		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 change	-	Olefactory
Visual Inspection	Straw, Turbid	Straw, Turbid	Clear, Straw		No abnormal change	-	Visual

Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, 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
		09/04/749	10/05/114 5				
	Date	Date	Date	Date			
		2nd Qtr 09	2nd Qtr 10				
pH		7.31	7.54		6.5 - 9.5	0 - 14	Electrochemical
Temperature °C		9.6	10.9		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity E _{CuScm} ⁻¹		411	583		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N		0.12	0.02		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)		94.8	91.9		No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON		0.48	0.69		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)		279	232		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC		4.1	0.8		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn		0.001	0.002		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation		502	1988			1 mg/l	Evaporation
Boron B		0.307	0.274		1	0.05 mg/l	ICP
Chloride Cl		21.1	23.6		30	0.22 mg/l	IC
Nitrite NO ₂		<0.1	<0.1		0.1	0.10 mg/l	IC
Water Level		1.31	0.98			M	Dip Meter
Nitrate NO ₃		2.12	3.1		25	0.10 mg/l	IC
Sulphate SO ₄		21.1	17.6		200	0.20 mg/l	IC
Total Coliforms		8	16		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms		None Found	None Found		0	1 to 2419 cfu/100ml	Quanti Cult

Chemical Analysis Report for Ballyjamesduff Landfill Site

Cavan Co. Co., Courthouse, Cavan, Co.

Client: Cavan.

Site Address: Ballyjamesduff, 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
		09/04/749	10/05/114 5				
	Date	Date	Date	Date			
		2nd Qtr 09	2nd Qtr 10				
Calcium Ca		51	48.2		200	0.01 mg/l	ICP
Cadmium Cd		<0.0035	<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr		<0.01	<0.01		0.03	0.01 mg/l	ICP
Copper Cu		<0.015	<0.015		0.03	0.015 mg/l	ICP
Iron Fe		0.089	0.024		0.2	0.03 mg/l	ICP
Lead Pb		<0.002	0.003		0.01	0.001 mg/l	ICP
Magnesium Mg		22.71	18.42		50	0.01 mg/l	ICP
Manganese Mn		0.479	0.056		0.05	0.014 mg/l	ICP
Potassium K		2.12	1.9		5	0.10 mg/l	ICP
Sodium Na		23.45	25.4		150	0.03 mg/l	ICP
Zinc Zn		<0.011	<0.011		0.1	0.011 mg/l	ICP
Mercury Hg		<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
Phenol		0.009	0.003		0.0005	0.001 mg/l	Photometric
Total Phosphorous P		0.32	0.02		0.03	0.01 mg/l	Photometric
Fluoride F		<0.08	0.28		1	0.08 mg/l	IC
List I Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
Odour		None	None		No abnormal change	-	Olefactory
Visual Inspection		Straw, Turbid	Brown, Turbid		No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co. Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 16D

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference	09/04/748	10/05/1146					
	2nd Qtr 09	2nd Qtr 10					
pH	7.14	7.53			6.5 - 9.5	0 - 14	Electrochemical
Temperature °C	11.5	10.5			25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity ECuScm ⁻¹	394	545			1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.08	0.03			0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)	91.8	94.1			No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.35	1.08			No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	230	190			No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	1.4	4.5			No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	0.002	0.001			0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	450	338				1 mg/l	Evaporation
Boron B	0.358	0.274			1	0.05 mg/l	ICP
Chloride Cl	25.8	18.4			30	0.22 mg/l	IC
Nitrite NO ₂	<0.1	<0.1			0.1	0.10 mg/l	IC
Water Level	0.31	Full				M	Dip Meter
Nitrate NO ₃	1.54	4.8			25	0.10 mg/l	IC
Sulphate SO ₄	32.3	12.3			200	0.20 mg/l	IC
Total Coliforms	67	9			0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	None Found	None Found			0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 16D

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference		09/04/748	10/05/1146				
		2nd Qtr 09	2nd Qtr 10				
Calcium Ca		44.7	43.7		200	0.01 mg/l	ICP
Cadmium Cd		<0.0035	<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr		<0.01	<0.01		0.03	0.01 mg/l	ICP
Copper Cu		<0.015	<0.015		0.03	0.015 mg/l	ICP
Iron Fe		0.124	0.067		0.2	0.03 mg/l	ICP
Lead Pb		<0.002	0.005		0.01	0.001 mg/l	ICP
Magnesium Mg		11.42	9.87		50	0.01 mg/l	ICP
Manganese Mn		0.057	0.011		0.05	0.014 mg/l	ICP
Potassium K		1.86	2.08		5	0.10 mg/l	ICP
Sodium Na		19.87	25.4		150	0.03 mg/l	ICP
Zinc Zn		<0.011	0.017		0.1	0.011 mg/l	ICP
Mercury Hg		<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
Phenol		0.004	<0.001		0.0005	0.001 mg/l	Photometric
Total Phosphorous P		0.22	0.03		0.03	0.01 mg/l	Photometric
Fluoride F		<0.08	0.56		1	0.08 mg/l	IC
List I Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
Odour		None	None		No abnormal change	-	Olefactory
Visual Inspection		Straw, Turbid	Straw		No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 17S

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference	09/04/750	10/05/1147					
	2nd Qtr 09	2nd Qtr 10					
pH	6.99	6.92			6.5 - 9.5	0 - 14	Electrochemical
Temperature °C	11.8	11.1			25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity ECuScm ⁻¹	404	564			1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.12	6.9			0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)	94.1	75.3			No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.7	2.79			No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	183	254			No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	2.9	6			No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	0.001	0.003			0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	300	4558				1 mg/l	Evaporation
Boron B	0.087	0.157			1	0.05 mg/l	ICP
Chloride Cl	22.1	23.2			30	0.22 mg/l	IC
Nitrite NO ₂	<0.1	<0.1			0.1	0.10 mg/l	IC
Water Level	Full	1.43				M	Dip Meter
Nitrate NO ₃	3.12	12.4			25	0.10 mg/l	IC
Sulphate SO ₄	64.8	33.9			200	0.20 mg/l	IC
Total Coliforms	13	80			0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	2	None Found			0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co. Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 17S

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference		09/04/750 2nd Qtr 09	10/05/1147 2nd Qtr 10				
Calcium Ca		45.09	52.1		200	0.01 mg/l	ICP
Cadmium Cd		<0.0035	0.004		0.005	0.0035 mg/l	ICP
Total Chromium Cr		<0.01	<0.01		0.03	0.01 mg/l	ICP
Copper Cu		<0.015	<0.015		0.03	0.015 mg/l	ICP
Iron Fe		0.078	0.012		0.2	0.03 mg/l	ICP
Lead Pb		<0.002	0.012		0.01	0.001 mg/l	ICP
Magnesium Mg		8.45	9.11		50	0.01 mg/l	ICP
Manganese Mn		0.024	0.024		0.05	0.014 mg/l	ICP
Potassium K		2.02	2.12		5	0.10 mg/l	ICP
Sodium Na		20.14	18.99		150	0.03 mg/l	ICP
Zinc Zn		<0.011	0.013		0.1	0.011 mg/l	ICP
Mercury Hg		<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
Phenol		0.002	0.033		0.0005	0.001 mg/l	Photometric
Total Phosphorous P		0.02	0.05		0.03	0.01 mg/l	Photometric
Fluoride F		<0.08	0.12		1	0.08 mg/l	IC
List I Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
Odour		None	None		No abnormal change	-	Olefactory
Visual Inspection		Straw, Turbid	Brown, Turbid		No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 17D

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference	09/04/751	10/05/1148					
	2nd Qtr 09	2nd Qtr 10					
pH	7.08	7.38			6.5 - 9.5	0 - 14	Electrochemical
Temperature °C	12.9	11.4			25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity ECuScm ⁻¹	387	530			1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.05	0.01			0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)	90.5	90			No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.44	4.2			No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	231	243			No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	10.5	2.2			No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	0.002	0.001			0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	1506	300				1 mg/l	Evaporation
Boron B	0.219	0.187			1	0.05 mg/l	ICP
Chloride Cl	256.1	29.8			30	0.22 mg/l	IC
Nitrite NO ₂	<0.1	<0.1			0.1	0.10 mg/l	IC
Water Level	Full	0.4				M	Dip Meter
Nitrate NO ₃	1.98	18.7			25	0.10 mg/l	IC
Sulphate SO ₄	63.2	14.2			200	0.20 mg/l	IC
Total Coliforms	2358	6			0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	125	125			0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 17D

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference		09/04/751 2nd Qtr 09	10/05/1148 2nd Qtr 10				
Calcium Ca		203	79.8		200	0.01 mg/l	ICP
Cadmium Cd		<0.0035	<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr		0.184	<0.01		0.03	0.01 mg/l	ICP
Copper Cu		0.142	<0.015		0.03	0.015 mg/l	ICP
Iron Fe		0.568	0.004		0.2	0.03 mg/l	ICP
Lead Pb		<0.002	0.013		0.01	0.001 mg/l	ICP
Magnesium Mg		160	78.4		50	0.01 mg/l	ICP
Manganese Mn		0.048	<0.014		0.05	0.014 mg/l	ICP
Potassium K		15.24	4.85		5	0.10 mg/l	ICP
Sodium Na		78.9	45.7		150	0.03 mg/l	ICP
Zinc Zn		<0.011	0.027		0.1	0.011 mg/l	ICP
Mercury Hg		<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
Phenol		0.012	0.003		0.0005	0.001 mg/l	Photometric
Total Phosphorous P		0.09	0.03		0.03	0.01 mg/l	Photometric
Fluoride F		0.17	0.21		1	0.08 mg/l	IC
List I Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
List II Organics *		<0.01	<0.001		0.001	0.01 mg/l	GC - MS
Odour		None	None		No abnormal change	-	Olefactory
Visual Inspection		Turbid	Clear		No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Bailieborough, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 18D

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference	09/04/752	10/05/1153					
	2nd Qtr 09	2nd Qtr 10					
pH	7.02	7.43			6.5 - 9.5	0 - 14	Electrochemical
Temperature °C	10.6	11.6			25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity EC _u Scm ⁻¹	412	532			1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.08	0.01			0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)	95.4	89.6			No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.19	1.67			No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	233	242			No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC	5.1	<0.4			No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn	0.001	<0.001			0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation	294	354				1 mg/l	Evaporation
Boron B	0.083	0.078			1	0.05 mg/l	ICP
Chloride Cl	42.1	44.8			30	0.22 mg/l	IC
Nitrite NO ₂	<0.1	<0.1			0.1	0.10 mg/l	IC
Water Level	Full	Full				M	Dip Meter
Nitrate NO ₃	0.86	7.4			25	0.10 mg/l	IC
Sulphate SO ₄	41.6	8.6			200	0.20 mg/l	IC
Total Coliforms	68	2540			0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	1	None Found			0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Bailieborough, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 18D

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference	09/04/752	10/05/1153					
	2nd Qtr 09	2nd Qtr 10					
Calcium Ca	43.41	39.77			200	0.01 mg/l	ICP
Cadmium Cd	<0.0035	<0.0035			0.005	0.0035 mg/l	ICP
Total Chromium Cr	<0.01	<0.01			0.03	0.01 mg/l	ICP
Copper Cu	<0.015	<0.015			0.03	0.015 mg/l	ICP
Iron Fe	0.087	0.024			0.2	0.03 mg/l	ICP
Lead Pb	<0.002	0.026			0.01	0.001 mg/l	ICP
Magnesium Mg	10.78	11.87			50	0.01 mg/l	ICP
Manganese Mn	0.062	<0.014			0.05	0.014 mg/l	ICP
Potassium K	8.12	7.54			5	0.10 mg/l	ICP
Sodium Na	21.4	23.7			150	0.03 mg/l	ICP
Zinc Zn	<0.011	0.011			0.1	0.011 mg/l	ICP
Mercury Hg	<0.0005	<0.0005			0.001	0.0005 mg/l	AAS
Phenol	0.008	0.033			0.0005	0.001 mg/l	Photometric
Total Phosphorous P	0.22	0.01			0.03	0.01 mg/l	Photometric
Fluoride F	0.19	<0.08			1	0.08 mg/l	IC
List I Organics *	<0.01	<0.001			0.001	0.01 mg/l	GC - MS
List II Organics *	<0.01	<0.001			0.001	0.01 mg/l	GC - MS
Odour	None	None			No abnormal change	-	Olefactory
Visual Inspection	Straw, Turbid	Straw, Clear			No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co. Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 3

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference			10/05/1149				
			2nd Qtr 10				
pH			7.36		6.5 - 9.5	0 - 14	Electrochemical
Temperature °C			11.5		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity EC _u Scm ⁻¹			1095		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N			51.5		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)			1.9		No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON			2		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)			469		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			104		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.008		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			18480			1 mg/l	Evaporation
Boron B			0.457		1	0.05 mg/l	ICP
Chloride Cl			30.2		30	0.22 mg/l	IC
Nitrite NO ₂			<0.1		0.1	0.10 mg/l	IC
Water Level			2.08			M	Dip Meter
Nitrate NO ₃			8.9		25	0.10 mg/l	IC
Sulphate SO ₄			26.1		200	0.20 mg/l	IC
Total Coliforms			435		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co. Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 3

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference			10/05/1149				
			2nd Qtr 10				
Calcium Ca			59.8		200	0.01 mg/l	ICP
Cadmium Cd			<0.0035		0.005	0.0035 mg/l	ICP
Total Chromium Cr			<0.01		0.03	0.01 mg/l	ICP
Copper Cu			<0.015		0.03	0.015 mg/l	ICP
Iron Fe			0.084		0.2	0.03 mg/l	ICP
Lead Pb			0.01		0.01	0.001 mg/l	ICP
Magnesium Mg			16.57		50	0.01 mg/l	ICP
Manganese Mn			0.016		0.05	0.014 mg/l	ICP
Potassium K			8.75		5	0.10 mg/l	ICP
Sodium Na			45.7		150	0.03 mg/l	ICP
Zinc Zn			0.026		0.1	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
Phenol			0.004		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.1		0.03	0.01 mg/l	Photometric
Fluoride F			0.98		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, Black		No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 4

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference			10/05/1150				
			2nd Qtr 10				
pH			7.03		6.5 - 9.5	0 - 14	Electrochemical
Temperature °C			15.7		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity EC _u Scm ⁻¹			920		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N			6.9		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)			1.6		No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON			4.36		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)			212		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			99		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.005		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			14012			1 mg/l	Evaporation
Boron B			0.587		1	0.05 mg/l	ICP
Chloride Cl			17.4		30	0.22 mg/l	IC
Nitrite NO ₂			<0.1		0.1	0.10 mg/l	IC
Water Level			1.33			M	Dip Meter
Nitrate NO ₃			19.4		25	0.10 mg/l	IC
Sulphate SO ₄			33.9		200	0.20 mg/l	IC
Total Coliforms			3580		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			1		0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 4

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference			10/05/1150				
			2nd Qtr 10				
Calcium Ca			68.4		200	0.01 mg/l	ICP
Cadmium Cd			0.009		0.005	0.0035 mg/l	ICP
Total Chromium Cr			<0.01		0.03	0.01 mg/l	ICP
Copper Cu			<0.015		0.03	0.015 mg/l	ICP
Iron Fe			0.09		0.2	0.03 mg/l	ICP
Lead Pb			0.01		0.01	0.001 mg/l	ICP
Magnesium Mg			15.7		50	0.01 mg/l	ICP
Manganese Mn			0.021		0.05	0.014 mg/l	ICP
Potassium K			7.54		5	0.10 mg/l	ICP
Sodium Na			54.8		150	0.03 mg/l	ICP
Zinc Zn			0.017		0.1	0.011 mg/l	ICP
Mercury Hg			<0.0005		0.001	0.0005 mg/l	AAS
Phenol			0.009		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.04		0.03	0.01 mg/l	Photometric
Fluoride F			0.84		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	-	Olfactory
Visual Inspection			Turbid, Black		No abnormal change	-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: MW 10

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference			10/05/1152				
			2nd Qtr 10				
pH			6.87		6.5 - 9.5	0 - 14	Electrochemical
Temperature °C			10.6		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity EC _u Scm ⁻¹			1145		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N			4.2		0.15	0.01 mg/l	Photometric
Dissolved Oxygen (% Sat. O ₂)			89.7		No abnormal change	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON			0.88		No abnormal change	0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)			474		No abnormal change	1 mg/l	Titration
Total Organic Carbon TOC			89.7		No abnormal change	0.4	Persulphate Oxidation
Total Cyanide Cn			0.002		0.01	0.001 mg/l	Colourimetrically
Residue on Evaporation			3152			1 mg/l	Evaporation
Boron B			0.241		1	0.05 mg/l	ICP
Chloride Cl			26.4		30	0.22 mg/l	IC
Nitrite NO ₂			<0.1		0.1	0.10 mg/l	IC
Water Level			1.8			M	Dip Meter
Nitrate NO ₃			3.92		25	0.10 mg/l	IC
Sulphate SO ₄			39.7		200	0.20 mg/l	IC
Total Coliforms			71		0	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms			None Found		0	1 to 2419 cfu/100ml	Quanti Cult



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: MW 10

Ground Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference			10/05/1152				
			2nd Qtr 10				
Calcium Ca			58.9		200	0.01 mg/l	ICP
Cadmium Cd			0.003		0.005	0.0035 mg/l	ICP
Total Chromium Cr			<0.01		0.03	0.01 mg/l	ICP
Copper Cu			<0.015		0.03	0.015 mg/l	ICP
Iron Fe			0.033		0.2	0.03 mg/l	ICP
Lead Pb			0.017		0.01	0.001 mg/l	ICP
Magnesium Mg			25.7		50	0.01 mg/l	ICP
Manganese Mn			0.014		0.05	0.014 mg/l	ICP
Potassium K			4.87		5	0.10 mg/l	ICP
Sodium Na			39.4		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			0.038		0.0005	0.001 mg/l	Photometric
Total Phosphorous P			0.03		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 Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: SW 1

Surface Water Monitoring

Parameter	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
	08/10/942 Date 4th Qtr 08	09/04/759 Date 2nd Qtr 09	10/05/1154 Date 2nd Qtr 10				
pH	6.59	7.43	7.44		5.5-8.5	0 -14	Electrochemical
Temperature °C	4.5	12.7	17.4		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity EC _u Scm ⁻¹	182.5	259	336		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.03	0.23	0.21		0.2	0.01 mg/l	Photometric
Chemical Oxygen Demand	31	25	34		40	1 mg/l	Photometric
Biochemical Oxygen Demand	4	3	3		5	1 mg/l	Electrochemical
Dissolved Oxygen (% Sat. O ₂)	99.6	97.7	92.9		>60	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.26	0.52	2			0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	60	88	111			1 mg/l	Titration
Total Suspended Solids	<1	5.6	6		50	1 mg/l	Gravimetric
Chloride Cl ⁻	12.23	15.93	26.8		250	0.22 mg/l	IC
Nitrite NO ₂ ⁻	<0.1	<0.1	<0.1			0.10 mg/l	IC
Nitrate NO ₃ ⁻	1.14	2.29	8.9		50	0.10 mg/l	IC
Sulphate SO ₄ ²⁻	11.63	18.51	28.9		200	0.20 mg/l	IC



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: _____ SW1 _____

Surface Water Monitoring

Parameter	Results (mg/l)				S.I No.294/1989 Quality of surfacewater intended for the adstraction of drinking water (Al)	Normal Analytical Range or Limit of detection (LOD)	Analysis method / technique
	Date	Date	Date	Date			
BHP Reference	08/10/942	09/04/759	10/05/1154				
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
Calcium Ca	19.73	20.98	21.5		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	<0.01		0.05	0.01 mg/l	ICP
Copper Cu	<0.015	<0.015	<0.015		0.05	0.015 mg/l	ICP
Iron Fe	0.037	0.267	0.089		0.2	0.03 mg/l	ICP
Lead Pb	0.006	0.005	0.027		0.05	0.002 mg/l	ICP
Magnesium Mg	3.14	2.9	5.14			0.01 mg/l	ICP
Manganese Mn	<0.014	<0.014	0.049		0.05	0.014 mg/l	ICP
Potassium K	2.61	1.77	2.87			0.10 mg/l	ICP
Sodium Na	9.41	7.74	10.52			0.03 mg/l	ICP
Zinc Zn	<0.011	<0.011	0.014		3	0.011 mg/l	ICP
Mercury Hg	<0.0005	<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
OrthoPhosphate P	0.06	<0.01	0.03		0.5	0.01 mg/l	Photometric
Odour	None	None	None			-	Olefactory
Visual Inspection	Straw, Turbid					-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: _____ SW 2 _____

Surface Water Monitoring

Parameter	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
	Date	Date	Date	Date			
BHP Reference	08/10/943	09/04/760	10/05/1156				
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
pH	7.23	7.49	7.44		5.5-8.5	0 -14	Electrochemical
Temperature °C	4.5	12.5	18.1		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity EC _u Scm ⁻¹	199	261	331		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N	0.04	0.26	0.14		0.2	0.01 mg/l	Photometric
Chemical Oxygen Demand	21	18	28		40	1 mg/l	Photometric
Biochemical Oxygen Demand	3	2	3		5	1 mg/l	Electrochemical
Dissolved Oxygen (% Sat. O ₂)	99.1	97.9	92.1		>60	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON	0.24	0.43	2.16			0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)	60	84	112			1 mg/l	Titration
Total Suspended Solids	<1	4.5	10		50	1 mg/l	Gravimetric
Chloride Cl	12.86	14.2	34.2		250	0.22 mg/l	IC
Nitrite NO ₂	<0.1	<0.1	<0.1			0.10 mg/l	IC
Nitrate NO ₃	1.08	1.93	9.6		50	0.10 mg/l	IC
Sulphate SO ₄	25.16	16.92	32.4		200	0.20 mg/l	IC



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: SW2

Surface Water Monitoring

Parameter	Results (mg/l)				S.I No.294/1989 Quality of surfacewater intended for the adstraction of drinking water (Al)	Normal Analytical Range or Limit of detection (LOD)	Analysis method / technique
	Date	Date	Date	Date			
BHP Reference	08/10/943	09/04/760	10/05/1156				
	4th Qtr 08	2nd Qtr 09	2nd Qtr 10				
Calcium Ca	19.75	22.7	23.4		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	<0.01		0.05	0.01 mg/l	ICP
Copper Cu	<0.015	0.015	<0.015		0.05	0.015 mg/l	ICP
Iron Fe	0.035	0.197	0.101		0.2	0.03 mg/l	ICP
Lead Pb	0.006	0.003	0.013		0.05	0.002 mg/l	ICP
Magnesium Mg	3.22	3.12	4.86			0.01 mg/l	ICP
Manganese Mn	<0.014	<0.014	0.054		0.05	0.014 mg/l	ICP
Potassium K	2.77	1.81	2.58			0.10 mg/l	ICP
Sodium Na	6.63	7.93	8.45			0.03 mg/l	ICP
Zinc Zn	<0.011	<0.011	0.012		3	0.011 mg/l	ICP
Mercury Hg	<0.0005	<0.0005	<0.0005		0.001	0.0005 mg/l	AAS
OrthoPhosphate P	0.05	0.08	0.07		0.5	0.01 mg/l	Photometric
Odour	None	None	None			-	Olefactory
Visual Inspection	Straw, Turbid					-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 2)

Monitoring Point / Grid Reference: _____ **Discharge from final cap** _____

Surface Water Monitoring

Parameter	Results				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
	(mg/l)						
BHP Reference			10/05/1156				
	Date	Date	Date	Date			
			2nd Qtr 10				
pH			7.39		5.5-8.5	0 -14	Electrochemical
Temperature °C			14.3		25	-5°C to 100°C	Electronic Thermocouple
Electrical Conductivity ECuScm ⁻¹			839		1000	1.0uScm ⁻¹	Electrochemical
Ammonical Nitrogen NH ₃ -N			0.12		0.2	0.01 mg/l	Photometric
Chemical Oxygen Demand			30		40	1 mg/l	Photometric
Biochemical Oxygen Demand			2		5	1 mg/l	Electrochemical
Dissolved Oxygen (% Sat. O ₂)			18.3		>60	1.2 % Saturation O ₂	Electrochemical
Total Oxidised Nitrogen TON			2.29			0.10 mg/l	Calculated from IC
Total Alkalinity (as CaCO ₃)			334			1 mg/l	Titration
Total Suspended Solids			7		50	1 mg/l	Gravimetric
Chloride Cl			37.2		250	0.22 mg/l	IC
Nitrite NO ₂			<0.1			0.10 mg/l	IC
Nitrate NO ₃			10.2		50	0.10 mg/l	IC
Sulphate SO ₄			16.7		200	0.20 mg/l	IC



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 2 of 2)

Monitoring Point / Grid Reference: _____ **Discharge from final cap** _____

Surface Water Monitoring

Parameter	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
		Date			
BHP Reference		10/05/1156			
		2nd Qtr 10			
Calcium Ca	28.7			0.01 mg/l	ICP
Cadmium Cd	0.004		0.005	0.0035 mg/l	ICP
Total Chromium Cr	0.021		0.05	0.01 mg/l	ICP
Copper Cu	<0.015		0.05	0.015 mg/l	ICP
Iron Fe	0.024		0.2	0.03 mg/l	ICP
Lead Pb	0.017		0.05	0.002 mg/l	ICP
Magnesium Mg	5.27			0.01 mg/l	ICP
Manganese Mn	0.009		0.05	0.014 mg/l	ICP
Potassium K	4.56			0.10 mg/l	ICP
Sodium Na	15.42			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	0.06		0.5	0.01 mg/l	Photometric
Odour	None			-	Olefactory
Visual Inspection	Straw, Brown			-	Visual



Chemical Analysis Report for Ballyjamesduff Landfill Site

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

Site Address: Ballyjamesduff, Co.Cavan

(Sheet 1 of 1)

Monitoring Point / Grid Reference: _____ MW 7 _____

Leachate Monitoring

Parameter	Results (mg/l)				Sampling method (grab, drift etc.)	Normal Analytical Range or Limit of detection (LOD)	Analysis method / technique
	08/10/944 Date 4th Qtr 08	09/04/756 Date 2nd Qtr 09	10/05/1157 Date 2nd Qtr 10				
BHP Reference							
Boron B	0.277	0.313	0.412		Grab	0.05 mg/l	ICP
Calcium Ca	127.7	135.6	124.5		Grab	0.01 mg/l	ICP
Cadmium Cd	<0.0035	<0.0035	0.004		Grab	0.0035 mg/l	ICP
Total Chromium Cr	<0.01	0.012	0.018		Grab	0.01 mg/l	ICP
Copper Cu	<0.015	0.021	0.017		Grab	0.015 mg/l	ICP
Total Cyanide Cn	0.09	0.011	0.007		Grab	0.001 mg/l	Colourimetrically
Fluoride F	<0.08	0.25	0.38		Grab	0.08 mg/l	IC
Iron Fe	3.509	3.856	1.136		Grab	0.03 mg/l	ICP
Lead Pb	0.009	0.011	0.009		Grab	0.001 mg/l	ICP
Magnesium Mg	17.19	18.96	25.41		Grab	0.01 mg/l	ICP
Manganese Mn	0.092	0.124	0.089		Grab	0.014 mg/l	ICP
Mercury Hg	<0.0005	<0.0005	<0.0005		Grab	0.0005 mg/l	AAS
Sulphate SO ₄	<0.2	1.8	122		Grab	0.20 mg/l	IC
Potassium K	7.14	11.56	13.42		Grab	0.10 mg/l	ICP
Sodium Na	12.61	25.62	22.75		Grab	0.03 mg/l	ICP
Total Phosphorous P	19.5	14.2	0.17		Grab	0.01 mg/l	Photometric
Zinc Zn	<0.011	<0.011	0.021		Grab	0.011 mg/l	ICP
Total Coliforms	281	3540	136		Grab	1 to 2419 cfu/100ml	Quanti Cult
Faecal Coliforms	10	152	None Found		Grab	1 to 2419 cfu/100ml	Quanti Cult

Appendix D

Declaration of True Copy



Cavan County Council

Comhairle Chontae an Chabháin

Teach Na Cúirte
An Cabhain



Courthouse
Cavan

Declaration

Ballyjamesduff Landfill WL0093/1

Cavan County Council hereby certifies that the content of the full pdf. AER W0093-012010AER.pdf uploaded to the EPA website is a true copy of the original AER.

Signed

Dated

30/ March 2011

Sinead Fox
Landfill Operations Manager
Cavan County Council