COMHAIRLE CHONDAE AN CABHÁIN

Cavan County Council

Annual Environmental Report 2011

Belturbet Landfill WL 92-1

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Boylan Engineering (Eng. & Environmental Consultancy) was commissioned by Cavan County Council to prepare the following Annual Environmental Report.

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1.0 INTRODUCTION

Belturbet Landfill has been operated as waste disposal facility by Cavan County Council since the late 1979. The site was operated as a traditional landfill and is located on the Belturbet - Ballyconnell road (R200) approximately 4.5km west of Belturbet on the north side. The site was originally operated as a limestone quarry and comprises of some 1.65 acres. The rock is composed of the Darty Limestone Formation from the Lower Carboniferous period.

A Waste Licence for the facility was issued by the EPA on 13th February 2002, Ref WL 92-1. Condition 11.4 of Waste Licence requires the submission of an Annual Environmental Report for Belturbet Landfill facility. This document is produced in order to comply with requirements of Condition 11.4. The site at Belturbet was closed in February 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".

2.0 REPORTING PERIOD

The reporting period for the purposes of this AER is 1st January 2011 to 31st December 2011.

3.0 WASTE ACTIVITIES CARRIED OUT AT THE FACILITY

There were no waste activities carried out at the facility.

4.0 QUANTITY AND COMPOSITION OF THE WASTE

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

5.0 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 sampling as required by the Licence.

5.1 Surface Water

Killynaher Lake is part of the Lough Oughter System and is a Special Area of Conservation. The lake quality is A2 status.

Table 5.1 Surface water summary results

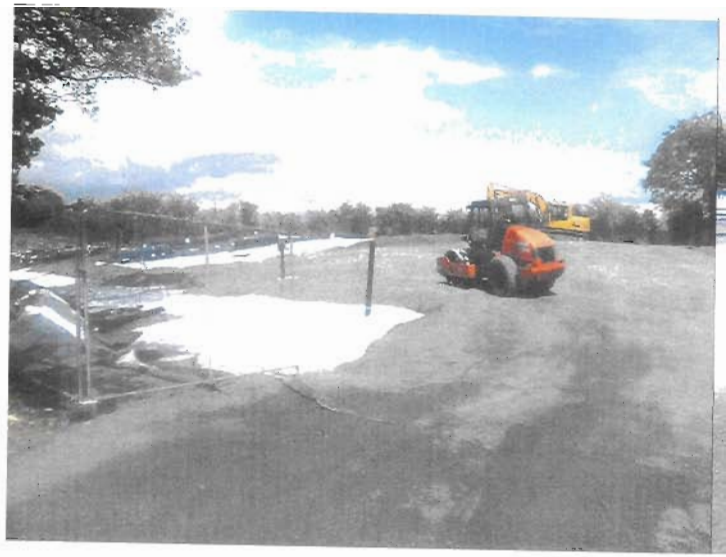
	Parameter	Ammonia	pH	Cond	BOD	COD	Total Suspended Solids	Cl	DO
	Units	mg/l N	pH Units	us/cm	mg/l	mg/l	mg/l	mg/l	mg/l
SW Killynaher	Qtr 4 2011	0.155	7.8	310	<1.0	21	<5.000	21	8.9
	Qtr 3 2011	0.025	8.3	310	<1.0	14	<5.000	21	9.7
	Qtr 2 2011	0.036	7.8	330	<1	15	5	18.7	9.8
	Qtr 1 2011	0.036	7.8	330	<1	15	5	18.7	9.8
S.I No. 294/1989		**0.2**	**≥5.5 and ≤8.5**	**1000**	**5**	**40**	**50**	**250**	

There were no exceedances in surface water monitoring during 2011

5.2 Groundwater

This landfill underwent the process of final capping during 2011. Monitoring boreholes were drilled as part of the capping works and are being monitored as per the waste licence. The following plates depict the capping process and final landfill which clearly shows the drilled monitoring boreholes.

Capping of Landfill



Completed Capping

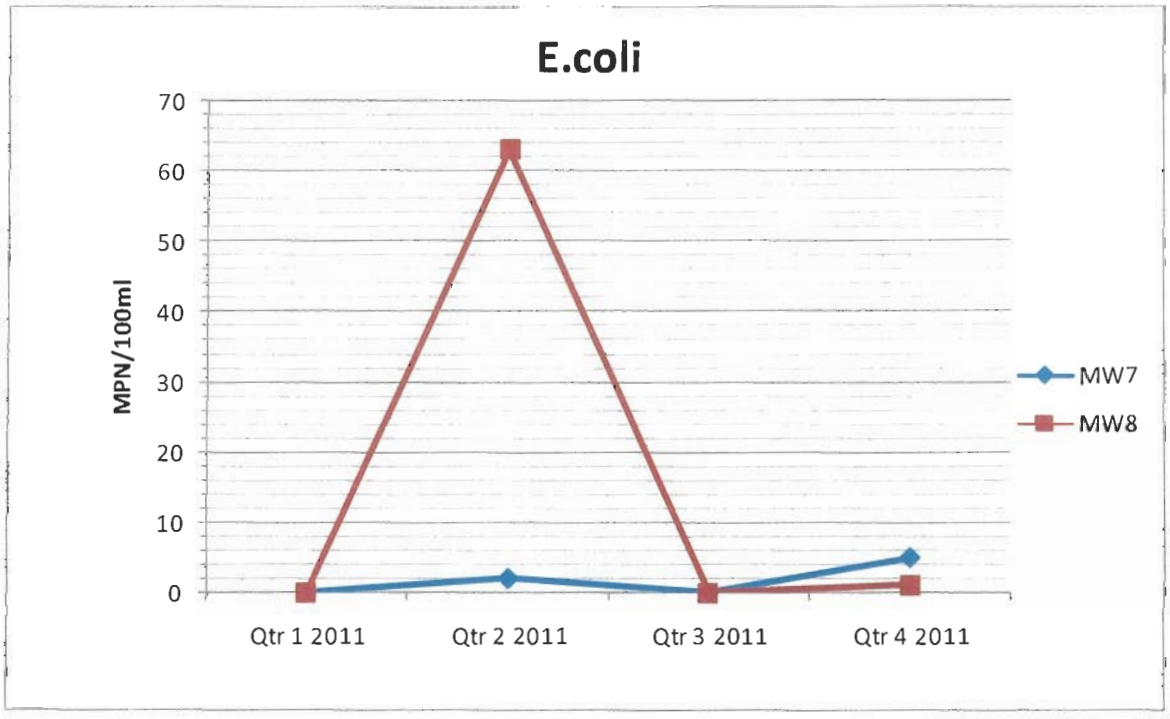


Table 5.2 Ground water summary results

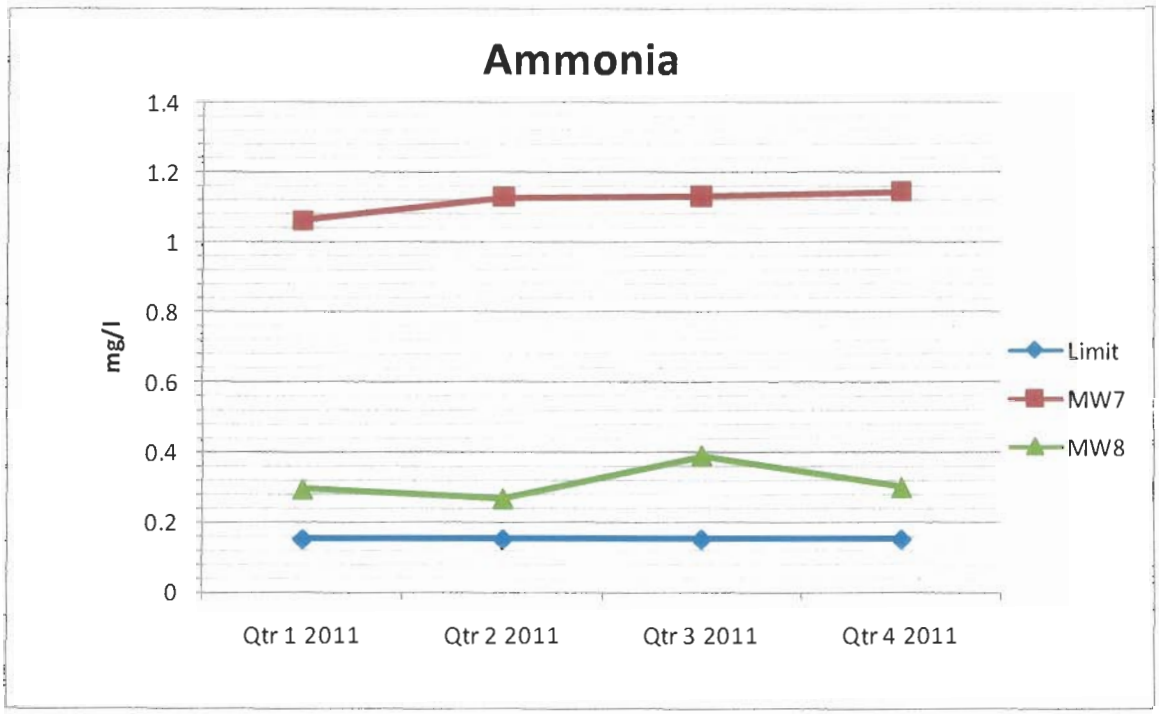
The following table and graphs show environmental monitoring results for the site.

	Parameter	E.Coli	Ammonia	Tot Coliforms	Cond	Cl	K
	Units	MPN/ 100ml	mg/l N	MPN/ 100ml	us/cm	mg/l	mg/l
MW 7	Qtr 4 2011	5	1.143	150	656	11	9.4
	Qtr 3 2011	0	1.131	19	641	11	2.1
	Qtr 2 2011	2	1.126	66	651	12	9.6
	Qtr 1 2011	0	1.060	4	607	10.7	8.5
MW 8	Qtr 4 2011	1	0.298	435	1113	162.5	6
	Qtr 3 2011	0	0.387	35	953	158.7	5.7
	Qtr 2 2011	63	0.266	161	1012	140.7	5.6
	Qtr 1 2011	0	0.293	0	1013	144.6	4.1
Interim Guide Value		**0**	**0.15**	**0**	**1000**	**30**	**5**

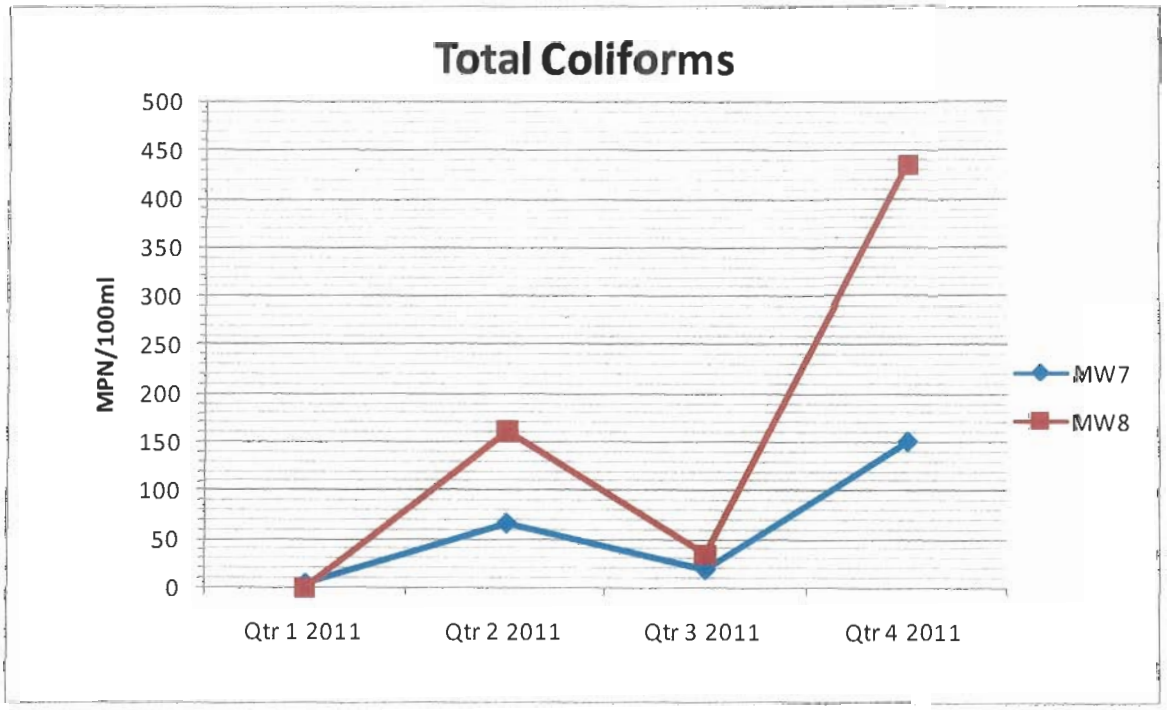
Graph 5.2



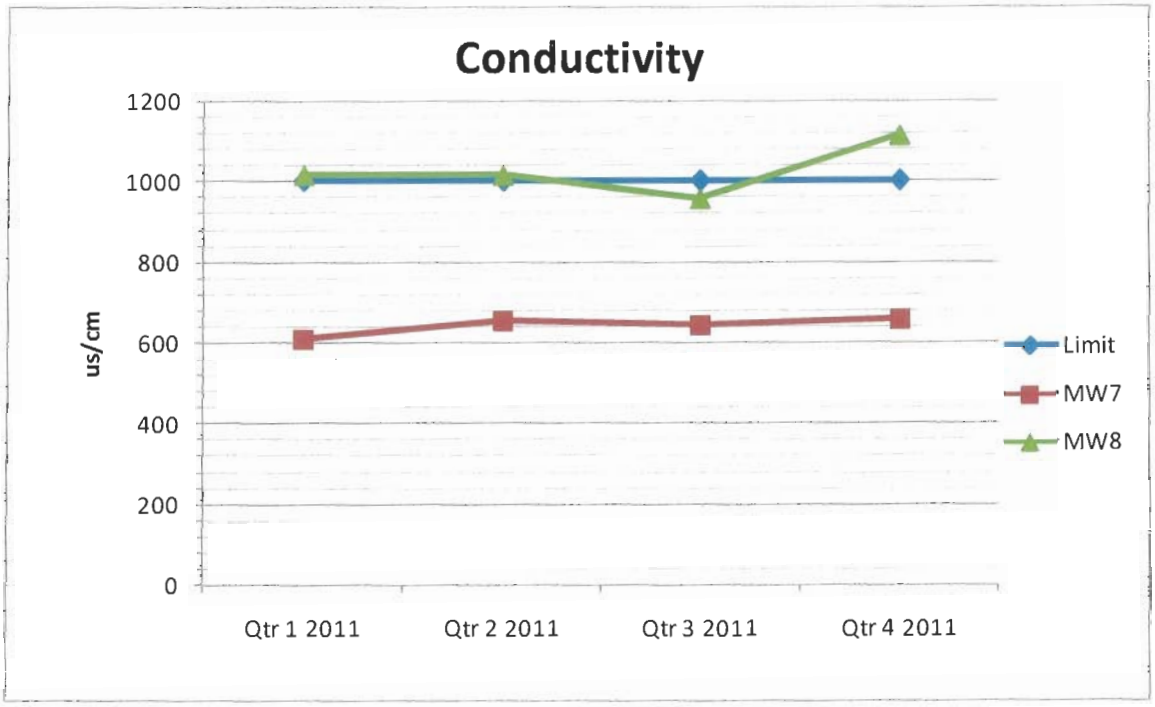
Graph 5.3



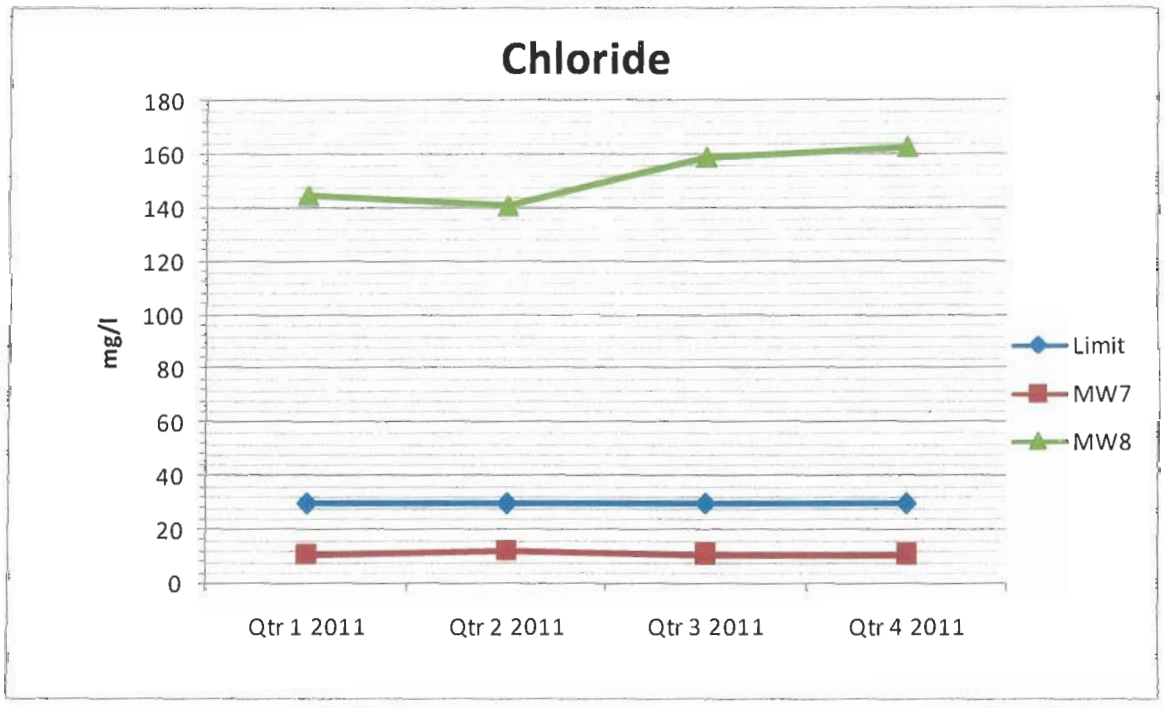
Graph 5.4



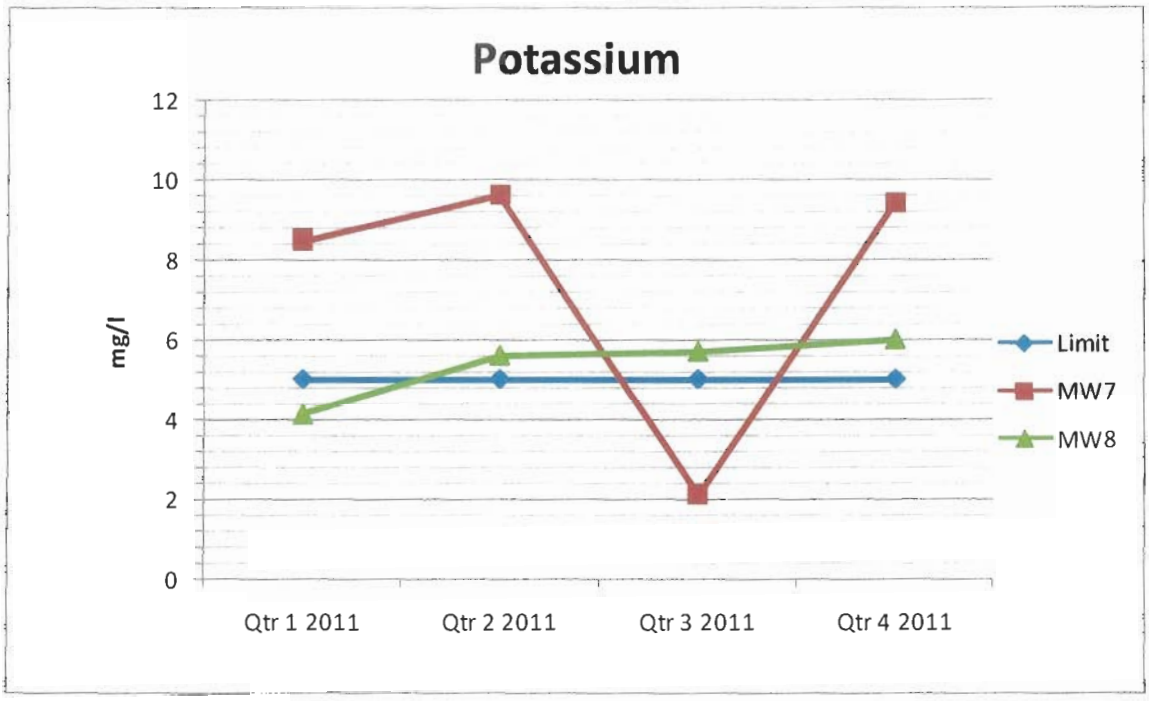
Graph 5.5



Graph 5.6



Graph 5.7



As detailed in the above graphs, there were numerous ground water exceedances at this landfill during 2011.

Exceedances occurred in the following parameters:

- Ammonia: Elevated levels of this parameter were prevalent during 2011. Levels such as those recorded are not unusual in a mature landfill such as this. Levels will gradually decrease as the landfill matures.
- Chloride: This parameter is a strong indication of contamination from a landfill source.
- Conductivity: Elevated levels of this parameter are commonly associated with pollution of an organic nature and therefore may be attributed tot he landfill.
- E.Coli: The exceedance in this parameter is attributed to the capping process at this landfill. During the process, numerous wells were left unsealed and contamination from external sources may have occurred.
- Total Coliforms: Exceedances in this parameter are attributed to the natural decomposition of the organic materials in this landfill.

- Potassium: Elevated levels of potassium can be associated with landfill contamination but it can also be associated with contamination from agricultural sources such as fertilizers. Therefore direct contamination from the landfill cannot be concluded.

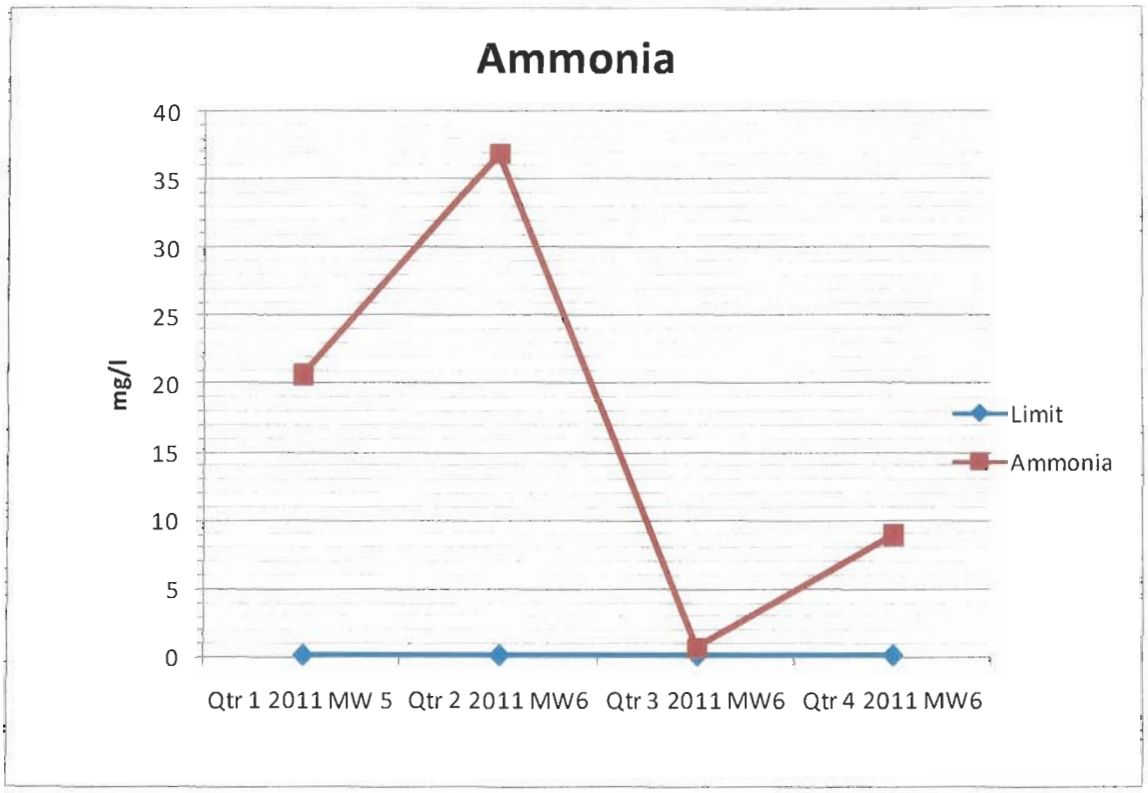
5.3 Leachate Monitoring

Monitoring Well MW5 is sampled for Leachate during quarter one of 2011. However after capping of the landfill the well was found to be dry and so a sample was obtained form Well MW6 for the remainder of the year.

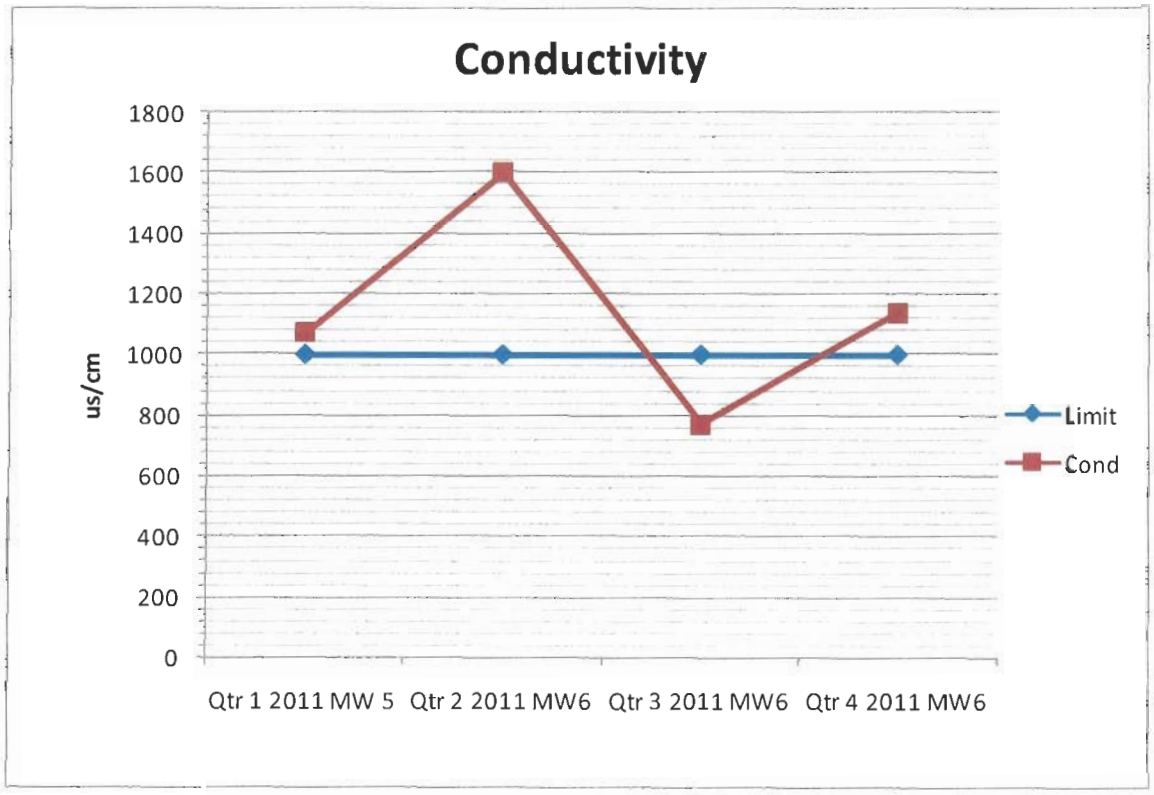
Table 5.3 Leachate summary results

	Parameter	Ammonia	Cond
	Units	mg/l N	us/cm
MW 5	Qtr 4 2011	-	-
	Qtr 3 2011	-	-
	Qtr 2 2011	-	-
	Qtr 1 2011	20.7	1073
MW 6	Qtr 4 2011	8.952	1141
	Qtr 3 2011	0.678	772
	Qtr 2 2011	36.9	1601
	Qtr 1 2011	-	-
Interim Guide Values		**0.15**	**1000**

Graph 5.8



Graph 5.9



5.4 Gas Emissions Monitoring

Table 5.4 Gas emissions summary results

Method		GA 2000	GA 2000	GA 2000	GA 2000	GA 2000
Parameter		CH_4	CO_2	O_2	H_2S	Barometric Pressure
Units		1% v/v	1.5 % v/v	%	PPM	mb
Client Ref	Qtr	-	-	-	-	-
MW 5	Qtr 4 201	0.3	9.7	1.1	0.0	996
	Qtr 3 201	0.0	0.8	19.81	0	1009
	Qtr 2 201	0.0	1.3	20.4	0	1004
	Qtr 1 201	0.0	0.8	19.81	0	1009
MW 6	Qtr 4 201	17.1	17.5	20.9	0.0	997
	Qtr 3 201	3.9	5.4	15.01	0	1009
	Qtr 2 201	5.1	4.2	15.9	0	1004
	Qtr 1 201	3.9	5.4	15.01	0	1009
	Limit	**1**	**1.5**			

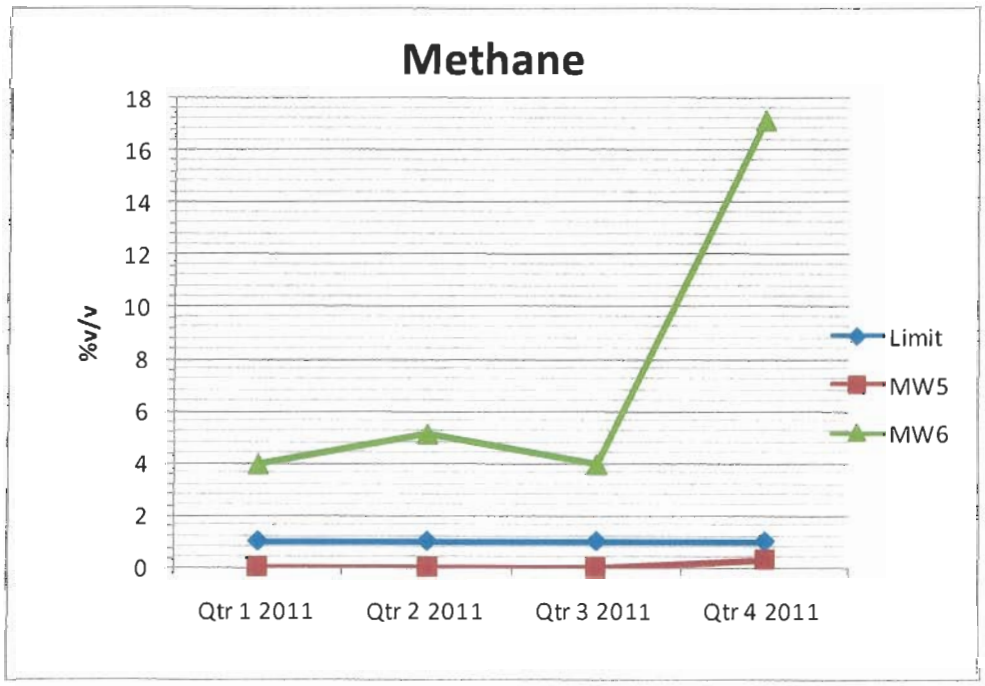
Exceedance

NOTES

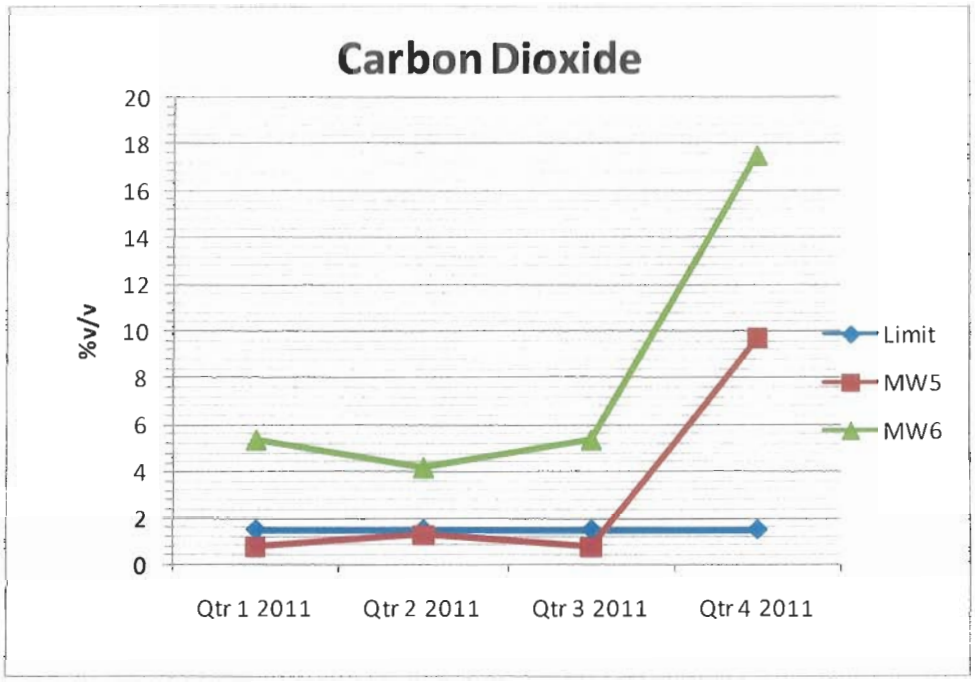
1 Instrument Serial No: GA 07721

2 Limit: Schedule C2, Licence

Graph 6.0



Graph 6.1



Exceedances in both Carbon Dioxide and Methane were recorded during 2011 at well MW6. These exceedances however are typical of a mature landfill.

6.0 SUMMARY OF RESULTS & INTERPRETATION OF ENVIRONMENTAL MONITORING

As presented in the information above and in Appendix 3, apart from slight elevations in certain parameters, there appears to be no environmental pollution associated with this landfill. We will continue to monitor this facility and monitoring will be increased following restoration works with the insertion of new boreholes on adjacent lands etc.

7.0 RESOURCE & ENERGY CONSUMPTION

There is no energy consumption or resource use on the site. There is no landfill gas of any value produced as can be seen from the PRTR Report

8.0 VOLUME OF LEACHATE PRODUCED

The volume of Leachate produced is unknown.

9.0 REPORT ON DEVELOPMENT WORKS UNDERTAKEN DURING THE REPORTING PERIOD AND A TIMESCALE FOR THOSE PROPOSED DURING THE COMING YEAR

Final capping of this landfill was completed during 2011.

10.0 REPORT ON THE RESTORATION OF COMPLETED CELLS/PHASES

Belturbet Landfill was capped in 2011 according to specifications submitted and approved by the EPA Castlebar office.

A fully engineered and lined system was installed and the site has been improved significantly. There is however some outstanding works unfinished. The cap surface water collection system and monitoring boreholes are due to be installed on Mr Reilly's lands as soon as agreement can be reached. Agreement was reached previously but other queries have arisen in the meantime. We hope to get a resolution to this issue by the end of 2012. Also the fencing of the site will be completed.

11.0 SITE SURVEY SHOWING THE EXISTING LEVELS OF THE FACILITY AT THE END OF THE REPORTING PERIOD

Site Survey is included in Appendix B.

12.0 ESTIMATED ANNUAL AND CUMULATIVE QUANTITIES OF LANDFILL GAS EMITTED FROM THE FACILITY

This information is reported in the PRTR Report attached in Appendix A. The estimated quantity of Methane released is 19800kgs/yr. Page one from the Annual Gas Survey is also presented in Appendix A.

13.0 FULL TITLE AND A WRITTEN SUMMARY OF ANY PROCEDURES DEVELOPED BY THE LICENCE IN THE YEAR WHICH RELATES TO THE FACILITY

There are no written procedures required for this site.

14.0 TANK & BUND TESTING INSPECTION

There are no tanks or bunds on site.

15.0 REPORTING INCIDENTS & COMPLAINTS SUMMARIES

There were no complaints reported or recorded for this site during the reporting period.

16.0 REPORTS ON FINANCIAL PROVISION MADE UNDER THIS LICENCE, MANAGEMENT AND STAFFING STRUCTURE OF THE FACILITY AND A PROGRAMME FOR PUBLIC INFORMATION.

Provision will be made in Cavan County Council Official Estimates for Charges as required under Condition 12 of Waste Licence Ref. 92-1.

Table 16.1 Management Structure 2011-2012

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 2011/ 2012:
John Brannigan
Senior Executive Officer
Waste Management Section
Cavan County Council
Farnham Street,
Cavan

Programme for Public Information:

Cavan County Council informs local residents of any works that are taking place at the landfill facility.

17.0 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, Control of Landfill Gas and carries a Safe Pass.

18.0 ANY OTHER ITEMS SPECIFIED BY THE AGENCY

No other items have been specified.

Appendix A

PRTR Emissions Report,

Landfill Gas Survey

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.13

REFERENCE YEAR	2011

1. FACILITY IDENTIFICATION

Parent Company Name	Cavan County Council
Facility Name	Belturbet Landfill
PRTR Identification Number	W0092
Licence Number	W0092-01

Waste or IPPC Classes of Activity

No.	class_name
3.1	Deposit on, in or under land (including landfill).
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).
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.

Address 1	Rahaghan
Address 2	Belturbet
Address 3	Co Cavan
Address 4	
	Cavan
Country	Ireland
Coordinates of Location	-7.51132 54.0873
River Basin District	GBNIIENW
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(c)	Installations for the disposal of non-hazardous waste
50.1	General

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

Is it applicable?	
Have you been granted an exemption ?	
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

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				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
03	Carbon dioxide (CO2)	C	MAB	GASSIM	0.0	55500.0	0.0	55500.0
01	Methane (CH4)	C	MAB	GASSIM	0.0	19800.0	0.0	19800.0

* 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				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

* 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				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

* 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: Belturbet 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)	19800.0				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)	19800.0				N/A	

Environmental Protection Agency

A survey of landfill sites to determine the quantity of methane flared and or recovered in utilisation plants for 2011

Please choose from the drop down menu the license number for your site	W0092
Please choose from the drop down menu the name of the landfill site	Belturbet Landfill
Please enter the number of flares operational at your site in 2011	Select
Please enter the number of engines operational at your site in 2011	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 31/03/2012

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

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 Map

New Groundwater Monitoring Well
Construct well with rotary drilling rig
In accordance with sketch skt-13

KILLYNAHER LAKE

MR. MICHAEL REILLYS LANDS

ADJACENT AGRICULTURAL LANDS

OVERHEAD ELECTRICAL POWERLINES

EPA REQUIRED LANDFILL RESTORATION WORKS

ADJACENT AGRICULTURAL LANDS

New Groundwater Monitoring Well
Construct well with rotary drilling rig
in accordance with sketch skt-13

Manhole
Watertight conc manhole with class D400 cover set 500mm below ground

Surface water outfall
Contractor to construct surface water outfall in 15m wide working space. Working space to be temporary established with post end wire fencing

Existing 150mm of topsoil to be removed and stored for reuse. Additional topsoil to be provided as required, harrowed, raked and sowed with approved grass seed.

CONTRACTORS ACCESS ALONG FIELD TRACK FROM PUBLIC ROAD

AREA OF LAND REQUIRED FOR TEMPROARY WORKING SPACE 1600 SQ.M

New Groundwater Monitoring Well
Construct well with rotary drilling rig
in accordance with sketch skt-13

Existing Open Drain
Drain to be cleaned up to culvert under field access

Existing Open Drain

ACCESS GATE TO PUBLIC ROAD

EXISTING DWELLING HOUSE

Appendix C

Quarter 4 Monitoring Report

Boylan engineering

ENVIRONMENTAL MONITORING REPORT FOR BELTURBET LANDFILL W0092-01

Client: **Cavan County Council**

Site Location: **Rahaghan, Belturbet**

Report No.: CCC-04-01-04-Rev-0

Produced by: Brona Keating, BSc Hons (Environmental Science & Tech.)

Approved by: _____ **Date:** 07th December. 2011

Cathal Boylan, BEng, CEng, MIEI
CHARTERED ENGINEER

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Fax: 046 – 928 6002
Email: info@boylanengineering.ie
Web: www.boylanengineering.ie

Rev.	Date	Description

I SUMMARY

Boylan Engineering (Eng. & Environmental Consultancy) was commissioned by Cavan County Council to carry out Environmental Monitoring at Belturbet Landfill (W0092-01), Rahaghan, Belturbet, Co Cavan for quarter four 2011.

Brona Keating, Environmental Consultant carried out all monitoring. This report shall document the findings.

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Appendix

1. INTRODUCTION

Belturbet landfill was operated as a disposal facility by Cavan County Council from 1979 until its closure in February 2002. The facility was operated as a traditional landfill and is located on the Belturbet Ballyconnell road (R200) approximately 4.5 kilometres West of Belturbet town. The site which was originally a limestone quarry comprises some 0.65 hectares. The bedrock surrounding the landfill is Darty Limestone Formation from the Lower Carboniferous period. A waste licence was issued by the EPA on the 13th of February 2002. Some remedial works were carried out after the closure of the site.

Condition 8.1 of the waste licence requires that monitoring be carried out in accordance with Schedule D of the licence. The following reports give details of groundwater, surface water and leachate sampling programme conducted on site and also summarises findings and analytical results for quarter four 2011.

The purpose of environmental and landfill gas monitoring at closed landfills is to:

- Ensure the facility is compliant with the waste license
- Ensure the facility is not causing environmental pollution
- Ensure the facility is not posing a risk to human health
- Ensure the facility is not creating an unacceptable risk to atmosphere, water, soil, plants or animals.
- Ensure that the facility is not causing a nuisance through noise or odors
- Ensure the facility is not adversely affecting the countryside or places of interest.
- Compare actual site behavior with expected/modeled behavior
- Assess the effectiveness of gas control measures installed at the site
- Establish a reliable database of information for the landfill throughout its life.

According to the Response matrix for landfills, Belturbet landfill is situated in the R4 Zone. This zone was categorized using a vulnerability rating combined with the aquifer category for the area. Landfills situated in R4 Zones are unacceptable in accordance with today's standards detailed in the EPA Landfill Design Manual or conditions of a waste licence - (EPA, groundwater protection Responses for Landfills).Unfortunately this landfill was constructed prior to this guidance and conditions were issued only after its closure.

Landfill gas is generated by decomposition of organic materials in waste deposited at landfills. Typically, the gas is a mixture of Methane (up to 65% by volume) Carbon Dioxide (up to 35% per volume). It can also contain minor constituents at low concentrations (typically less than 1% volume contains 120-150 trace constituents).
The landfill directive requires that appropriate measures are taken in order to control the accumulation and migration of landfill gas.

The generation of Leachate is one of the main hazards to groundwater from the disposal of waste by land filling. The conditions within a landfill vary over time from aerobic to anaerobic thus allowing for different chemical reactions to take place. Most landfill leachates have a high BOD, COD, Ammonia, Chloride, Sodium, Potassium, Hardness and Boron levels - (EPA, groundwater protection Responses for Landfills).

2. METHODOLOGY

2.1 Environmental Sampling

The following procedure was employed by Boylan Engineering to ensure accurate monitoring:

- ISO 5667: Guidance on sampling of groundwaters was adhered to.
- Prior to sampling, the depth of water in both groundwater and leachate wells was measured by dipping. Two individual dipping meters were used to avoid cross contamination. Dipping the wells before sampling allows for calculation of the volume of water in the well. This data was recorded on the field sheet for volume calculation which is presented in appendix 4.
- Once the volume was calculated the boreholes were purged three times their volume before sampling.
- Sampled was conducted using a Waterra inertial lift pump and associated tubing pumping water directly from the borehole to the appropriate sampling bottles.
- Designated tubing was used at each location.
- Surface water samples were taken by grab sample using a Telescoup and Pendulum beaker.
- Having obtained a representative sample the following parameters were measured on-site using a Hanna HI 98129 combination waterproof high accuracy analyser.
    - Conductivity
    - Temperature
    - pH
    - Dissolved Oxygen

- Boylan Engineering operate a Sample Submission/Chain of Custody form which accompanies the samples at all times.

2.2 Laboratory Analysis

- Samples were sent to Environmental Laboratory Service (ELS) (Ireland) for analysis of the required parameters in designated cool boxes with ice packs. These boxes insure that samples are maintained at a consistent temperature between 0 °C and 4°C on their journey to the laboratory.
- On arrival at the laboratory, samples were stored between 0 °C and 4 °C.
- All samples received are inspected by Laboratory Manager Mr. Brendan Murray.
- All samples are assigned a unique reference number and are recorded on the Laboratory Information Management System (LIMS)
- All staff involved in the analysis of samples hold a minimum honours science degree.
- In the event of a Quality Control Check failure for a given parameter, a note will be included on the analysis report detailing the QC failure.
- Analysis of samples is conducted under the INAB accreditation and associated quality control procedures are employed in every aspect of analysis.
- Analysis methods are listed in appendix 3.

2.3 Landfill Gas Analysis

The following procedure was employed by Brona Keating of Boylan Engineering to ensure accurate monitoring:

- EPA, Landfill Manual, landfill monitoring 2nd Edition was adhered to.
- Prior to sampling, a dip meter was used to measure water levels, if present, in the wells.
- GA 2000 landfill gas analyser was used to measure the gas levels.
- The analyser was purged and connected to the sealed well monitoring nozzle.
- The monitoring nozzle was turned to the open position and the analyser measured the gas levels at 60 second intervals for 10 minutes. The analyser was allowed to run for this period of time to allow for a representative average to be obtained.
- All data was recorded on the Gas Analysis field sheet.
- The instrument was removed after 10 minutes and the monitoring nozzle returned to the closed position.
- The GA2000 was switched off between each monitoring location so as to allow the instrument to purge.
- This process was repeated at each monitoring location.

Data for the GA 2000 was downloaded in the Boylan Engineering office.

2.4 Monitoring Locations

Monitoring Well	Sample Type	Cover Level (OD Malin) M	Depth (mTOC)	National Grid Co-ordinates
MW5	Gas & Leachate	TBC	TBC	TBC
MW6	Gas & Leachate	TBC	TBC	TBC
MW7	GW	TBC	TBC	TBC
MW8	GW	TBC	TBC	TBC
Killynaher Lake	SW	TBC	TBC	TBC

2.5 Weather Report

REPORTS FROM BALLYHAISE (A)							
Date	**Rainfall**	**Max**	**Min**	**Grass Min Temp**	**Mean Wind Speed**	**Gusts**	**Sunshine**
	(mm)	**Temp**	**Temp**	**(°C)**	**(knots)**	**(if >= 34 knots)**	**(hours)**
		(°C)	**(°C)**				
17/11/2011	10.9	13.3	5.2	3.5	12.5	38	
*Met Eireann, Climate Data & reports, Daily Data							

3.0 SUMMARY OF RESULTS

3.1 Ground Water

Table 1.0 4th Quarter Ground water monitoring 2011

Report Number 54826
Monitoring Date: 17/11/2011

Method		Site Tests	Site Tests	Site Tests	Site Tests	Site Tests	Analyser	Coliert	AQ2		Coliert	Titralab		AQ2-UP2	Inolab	Metals-Dissolved		
Method Number		Site Tests	Site Tests	Site Tests	Site Tests	Site Tests	EW123	MIC133	EW003	EW051	MIC133	EW138	EW139	EW015	EW043			
Parameter		Sample temperature (to be tested onsite)	Cond	pH	Water Level from TOC	Visual Inspection	TOC	E.Coli	Ammonia	TON	Tot Coliforms	pH	Cond	Cl	DO	Fe	K	Na
Units		Deg C	us/cm	pH units	Meter's		mg/l	MPN/ 100ml	mg/l N	mg/l N	MPN/ 100ml	pH Units	us/cm	mg/l	mg/l	mg/l	mg/l	mg/l
Limit of Detection		-	-	-	-	-	0.25	0	0.007	0.138	0	0.3	25	2.6	1.0	0.005	0.2	0.5
Date Testing Initiated		18.11.11					18.11.11	18.11.11	18.11.11		18.11.11	18.11.11		18.11.11	18.11.11	18.11.11		
ELS Ref	Client Ref																	
54826/001	MW7	10.7	668	7.8	6.08	Clear	2.65	5	1.143	<0.138	150	7.7	656	11	6.8	0.0263	9.4	57.3
54826/002	MW8	11.2	1138	7.1	7.05	Clear	2	1	0.298	<0.138	435	7.1	1113	162.5	7.6	0.1968	6	38.5
IGV			1000	≥6.5 and ≤9.5			NAC	0	0.15		0	≥6.5 and ≤9.5	1000	30	NAC	0.2	5	150

Exceedance

NOTES

1 Sub-contract analysis denoted by *
2 ND - Concentration was below the limit of detection
3 NAC- No Abnormal Change
4 IGV - Interim Guide Value

As there are no limits set in the waste licence for groundwater, results are compared to the Interim Guide Values for the protection of Groundwater in Ireland, where available.

3.2 Surface Water

Table 2.0 4th Quarter Surface water monitoring 2011

Report Number 20690 54827
Monitoring Date: 17/11/2011

Method	Site Tests	Site Tests	Site Tests	AQ2	Titralab		5-Day	HACH	Gravimetric	AQ2	Inolab
Method Number	Site Tests	Site Tests	Site Tests	EW003	EW138	EW139	EW001	EW094	EW013	EW015	EW043
Parameter	Sample temperature (to be tested onsite)	Cond	pH	Ammonia	pH	Cond	BOD	COD	Total Suspended Solids	Cl	DO
Units	Deg C	us/cm	pH units	mg/l N	pH Units	us/cm	mg/l	mg/l	mg/l	mg/l	mg/l
Limit of Detection	-	-	-	0.007	0.3	25	1	8	5	2.6	1.0
Date Testing Initiated	18.11.11			18.11.11	18.11.11		18.11.11	18.11.11	18.11.11	18.11.11	18.11.11
ELS Ref / Client Ref											
54827/001 SW1 Lake	9.9	327	7.92	0.155	7.8	310	<1.0	21	<5.000	21	8.9
S.I No. 294/1989				0.2	≥5.5 and ≤8.5	1000	5	40	50	250	

Exceedance

NOTES

1 Sub-contract analysis denoted by *
2 ND - Concentration was below the limit of detection
3 NAC- No Abnormal Change
4 IGV - Interim Guide Value

As there are no limits set in the waste licence for surface water, results are compared to S.I. No. 294/1989 — European Communities (Quality of Surface Water Intended For The Abstraction of Drinking Water) Regulations, 1989.

3.3 Leachate

Table 3.0 4th Quarter Leachate monitoring 2011

Report Number 54828
Monitoring Date 17/11/2011

Method		Site Tests	Site Tests	Site Tests	AQ2						
Method Number		Site Tests	Site Tests	Site Tests	EW003	EW051	EW138	EW139	EW001	EW094	EW015
Parameter		Sample temperature (to be tested onsite)	Water Level from TOC	Visual Inspection	Ammonia	TON	pH	Cond	BOD	COD	Cl
Units		Deg C	Meter's		mg/l N	mg/l N	pH Units	us/cm	mg/l	mg/l	mg/l
Limit of Detection		-	-	-	0.007	0.138	0.3	25	1	8	2.6
Date Testing Initiated		17.11.11	-	-	18.11.11						
ELS Ref	Client Ref										
54828/001	MW6	11.5	-	Straw	8.952	<0.69	7.1	1141	29	341	38.7
IGV					0.15	NAC	≥6.5&≤9.5	1000			200

Exceedance

NOTES

1 Sub-contract analysis denoted by *
2 ND - Concentration was below the limit of detection
3 NAC- No Abnormal Change
4 IGV - Interim Guide Value

As there are no limits set in the waste licence for leachate, results are compared to the Interim Guide Values for the protection of Groundwater in Ireland, where available.

3.4 Landfill Gas

Table 4.0 4th Quarter Landfill Gas monitoring 2011

Method		GA 2000	GA 2000	GA 2000	GA 2000	GA 2000
Parameter		CH_4	CO_2	O_2	H2S	Barometric Pressure
Units		% v/v	% v/v	%	PPM	mb
Date Testing		17/11	17/11	17/11	17/11	17/11
GA 2000 Ref	Client Ref					
1	MW 5	0.3	9.7	1.1	0.0	996
2	MW 6	17.1	17.5	20.9	0.0	997
	Limit	1	1.5			

Exceedance,outside waste mass

NOTES

1 Instrument Serial No: GA 07721

2 Limit: Schedule C2, Licence

4.0 DISCUSSION

4.1 Ground water

Monitoring of groundwater is a common and necessary event in landfill sites both during their active life and post closure. The significance of such monitoring is so the facilities can demonstrate that there is no potential for the migration of hazardous constituents from the unit into the groundwater systems.

Monitoring was conducted on 17th November 2011. Results in Hatched Red indicate where the interim guide value has been exceeded. Results from the fourth quarter 2011 show that there were exceedances at the ground water monitoring locations for parameters; Ammonia, Chloride, Potassium, Conductivity, E-Coli and Coliforms. Previous results detailed in the historical data show that exceedances for Ammonia, Chloride, Potassium and Coliforms are on par with previous monitoring events.

Historical results for comparison purposes are presented in tabular and graphic form in Appendix 1.

4.2 Surface Water

As there are no limits set in the waste licence for surface water, results are compared to limits detailed in S.I. No. 294/1989 — European Communities (Quality of Surface Water Intended or The Abstraction of Drinking Water) Regulations, 1989.
A surface water sample was taken at SW2 (Killynaher lake) which is in the vicinity of the landfill. Results show that all parameters were within levels stipulated by the afore mentioned document.

Historical results for comparison purposes are presented in tabular and graphic form in Appendix 1

4.3 Leachate

Leachate consists of water that has become contaminated as it passes through a waste disposal site. It contains insoluble waste constituents which have not degraded chemically or biochemically. This leachate can cause a treat to surrounding surface and ground waters. The composition of leachate will vary depending on the age of the landfill. As there are no limits set in the waste licence for leachate, results are compared to the Interim Guide Values for the protection of Groundwater in Ireland, where available. Results in Hatched Red indicate where the interim guide value has been exceeded. A leachate sample was abstracted from well MW6 during quarter four monitoring as well MW5 was empty. Results show that the Interim Guide Value was exceeded at well MW6 on this occasion for the parameter Ammonia. This level is consistent with those obtained in previous monitoring events at MW6.

Historical results for comparison purposes are presented in tabular and graphic form in Appendix 1.

4.4 Landfill Gas

The rate of gas generation at a landfill site varies through the life of a landfill and is dependent on several factors such as waste type, depths, moisture content, degree of compaction, landfill pH, temperature and the length of time since the waste was deposited. Landfill gas can move in any direction within the waste body and migrate from a site. The potential for gas migration will depend on the gas quality, volume, the site engineering works, geological characteristics of the surrounding strata and on man-made pathways such as sewers and drains.

Results obtained from monitoring on during quarter four, 2011 show an exceedance in Methane and Carbon Dioxide at well MW 6. This result is relatively consistent with previous readings. Although it is preferable that the results are within the limits stipulated within the licence, it is worth while noting that they have not increased dramatically since previous monitoring events.

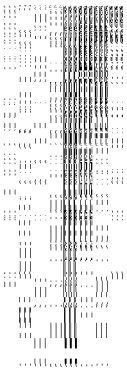
5.0 CONCLUSION

5.1 Environmental Monitoring

The results obtained are relatively consistent with previous monitoring events and do not show any signs of dramatic exceedences. Therefore there is no evidence of any major negative environmental impact associated with this landfill. The next environmental and landfill gas monitoring event will take place during quarter 4 2012.

5.2 Landfill Gas

The results obtained from landfill gas analysis are also relatively consistent with previous monitoring events and do not show any signs of dramatic exceedances; therefore there is no evidence of any major negative environmental impact associated with this landfill. However, it is important to monitor the trend in exceedance of Methane at this landfill and any dramatic increase in the parameter should be regarded as critical. The Methane content of landfill gas is flammable, forming potentially explosive mixtures in certain conditions, which raises concern about its uncontrolled migration and release. The next environmental and landfill gas monitoring will be conducted in the 4th Quarter of 2011.



Surface water

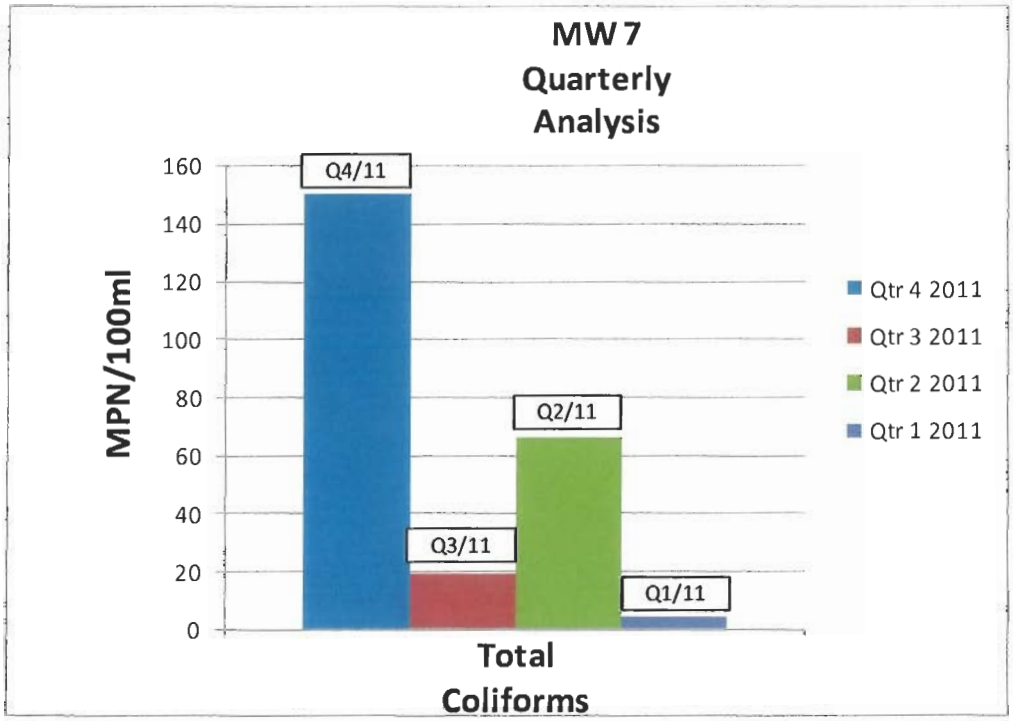
	Parameter	Ammonia	pH	Cond	BOD	COD	Total Suspended Solids	Cl	DO
	Units	mg/l N	pH Units	us/cm	mg/l	mg/l	mg/l	mg/l	mg/l
SW Killynaher Lake	Qtr 4 2011	0.155	7.8	310	<1.0	21	<5.000	21	8.9
	Qtr 3 2011	0.025	8.3	310	<1.0	14	<5.000	21	9.7
	Qtr 2 2011	0.036	7.8	330	<1	15	5	18.7	9.8
	Qtr 1 2011	0.036	7.8	330	<1	15	5	18.7	9.8
S.I No. 294/1989		**0.2**	**≥5.5 and ≤8.5**	**1000**	**5**	**40**	**50**	**250**	**>60%**

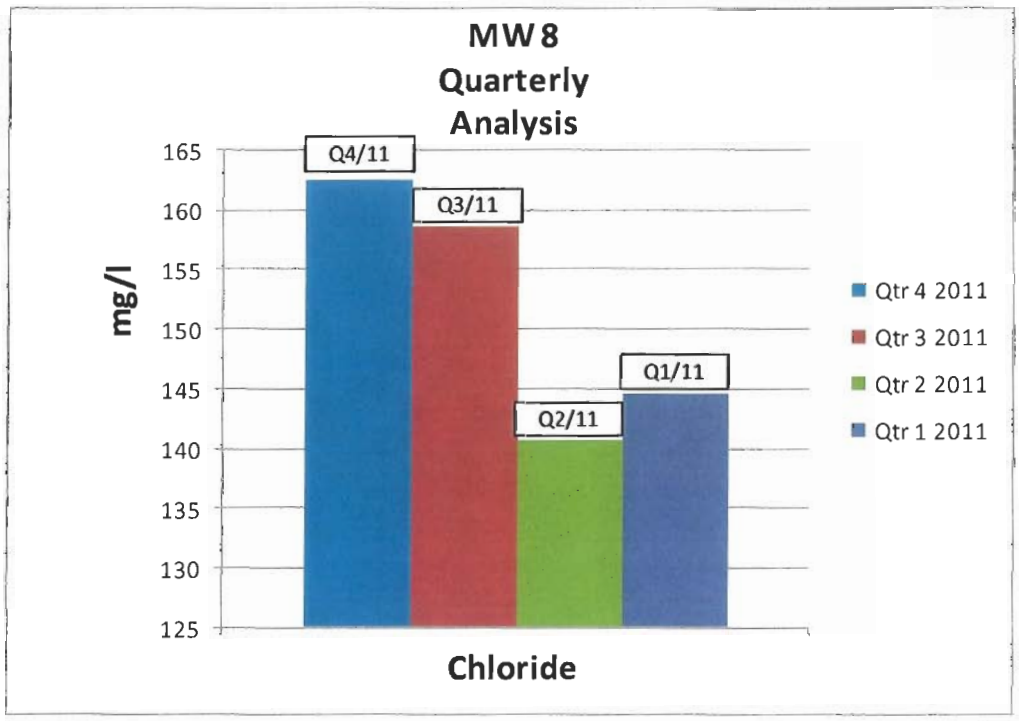
Wastewater

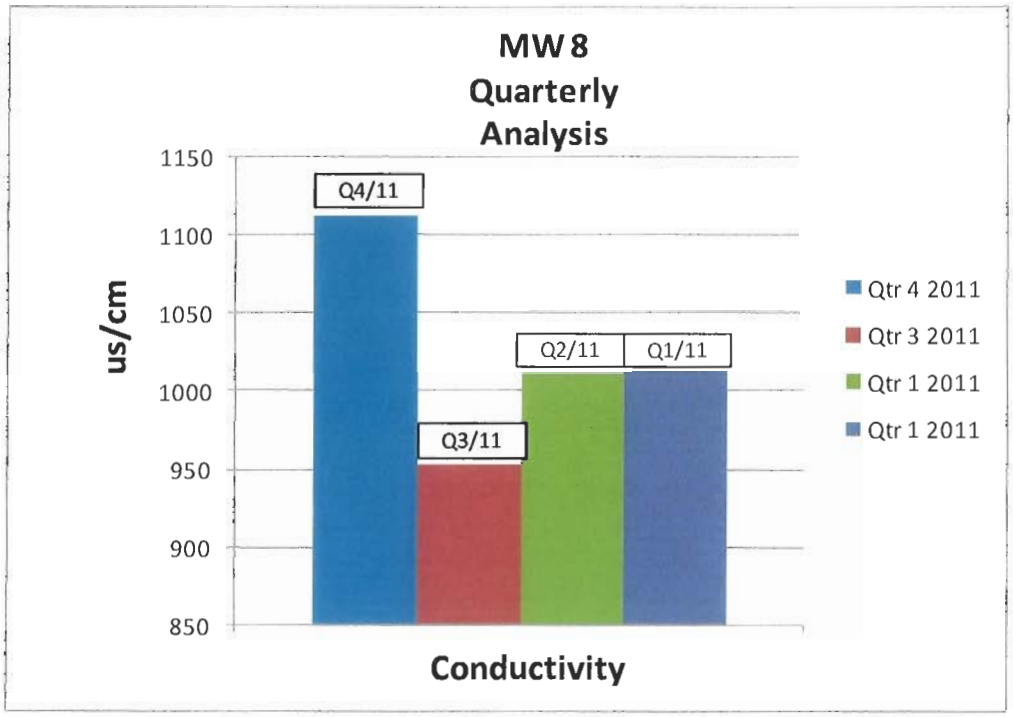
	Parameter	Ammonia	TON	pH	Cond	BOD	COD	Cl
	Units	mg/l N	mg/l N	pH Units	us/cm	mg/l	mg/l	mg/l
MW 5	Qtr 4 2011	-	-	-	-	-	-	-
	Qtr 3 2011	-	-	-	-	-	-	-
	Qtr 2 2011	-	-	-	-	-	-	-
	Qtr 1 2011	20.7	<0.138	6.8	1073	59	119	16.7
MW 6	Qtr 4 2011	8.952	<0.69	7.1	1141	29	341	38.7
	Qtr 3 2011	0.678	<0.69	7.3	772	<1.0	450	48.5
	Qtr 2 2011	36.9	<0.69	6.9	1601	40	725	49.4
	Qtr 1 2011	-	-	-	-	-	-	-
Interim Guide Values		**0.15**	**NAC**	**≥6.5&≤9.5**	**1000**			**200**

HISTORICAL RESULTS

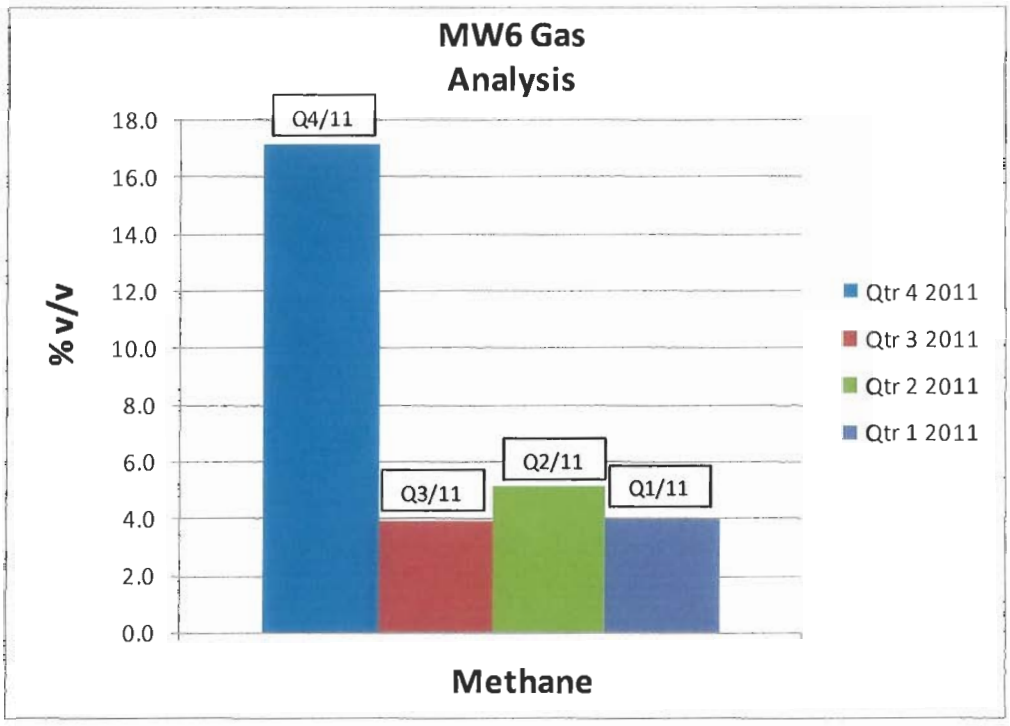
Groundwater

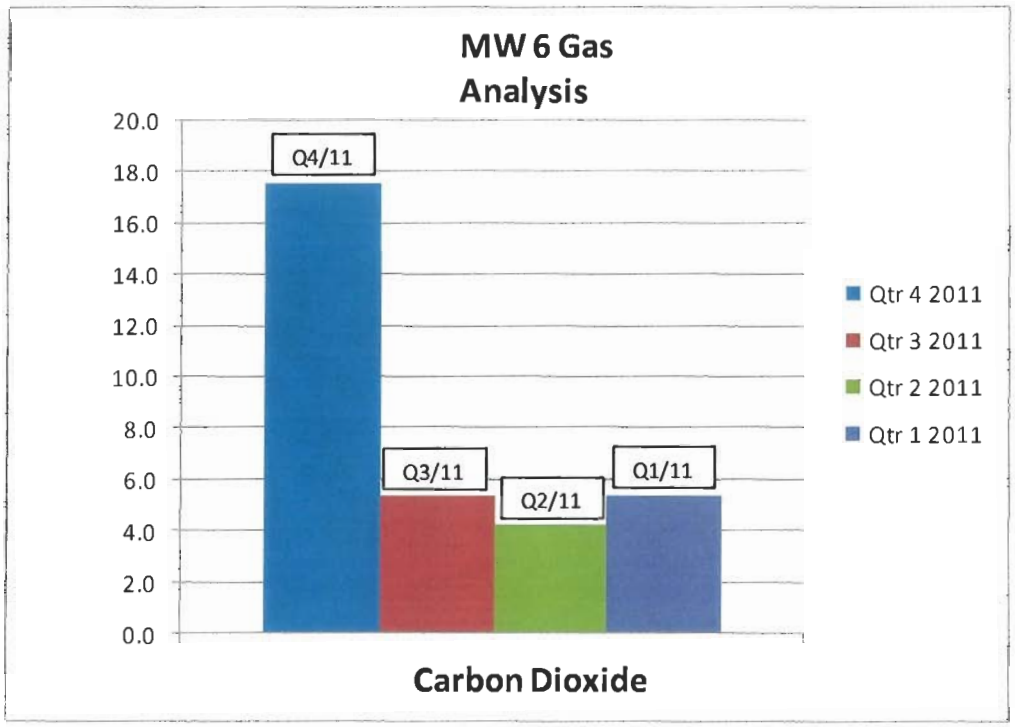





MW 8
Quarterly
Analysis
1150
1100
1050
1000
950
900
850
us/cm
Q4/11
Q3/11
Q2/11
Q1/11
Qtr 4 2011
Qtr 3 2011
Qtr 1 2011
Qtr 1 2011
Conductivity

Landfill Gas





APPENDIX 2- LANDFILL GAS BREAKDOWN

MW 5

Date/Time	CH4 (%)	CO2 (%)	O2 (%)	H2S PPM	Barometric Pressure (mb)
17/11/2011 10:32	17.0	17.3	20.4	0	997
17/11/2011 10:33	17.1	17.5	21.2	0	997
17/11/2011 10:34	17.1	17.4	21.2	0	997
17/11/2011 10:35	17.1	17.5	21.2	0	997
17/11/2011 10:36	17.2	17.6	21	0	997
17/11/2011 10:37	17.1	17.4	20.8	0	997
17/11/2011 10:38	17.2	17.5	20.9	0	997
17/11/2011 10:39	17.2	17.5	20.8	0	997
17/11/2011 10:40	17.1	17.4	20.9	0	997
17/11/2011 10:41	17.2	17.5	20.8	0	997
17/11/2011 10:42	17.2	17.5	20.8	0	997

MW 6

Date/Time	CH4 (%)	CO2 (%)	O2 (%)	H2S PPM	Barometric Pressure (mb)
17/11/2011 10:49	0.2	9.5	1.4	0.0	996
17/11/2011 10:50	0.3	9.7	1.2	0.0	996
17/11/2011 10:51	0.3	9.7	1.2	0.0	996
17/11/2011 10:52	0.3	9.6	1.2	0.0	996
17/11/2011 10:53	0.3	9.7	1.2	0.0	996
17/11/2011 10:54	0.3	9.6	1.1	0.0	996
17/11/2011 10:55	**0.3**	**9.7**	**1.1**	**0.0**	996
17/11/2011 10:56	0.3	9.7	1.1	0.0	996
17/11/2011 10:57	0.3	9.7	1.0	0.0	996
17/11/2011 10:58	0.3	9.7	0.9	0.0	996
17/11/2011 10:59	0.3	9.7	0.9	0.0	996

APPENDIX 3- ANALYSIS METHODS

ELS LTD INAB ACCREDITATION SCHEDULE SUMMARY SHEET

Miscellaneous (P,G,W,S)
Ammonia/Ammonium 0.007-1mg/l N EW003
Chloride 2.5-250 mg/l EW015
Flouride 0.1 - 2 mg/l EW137
COD 8-1500 mg/l EW094
Nitrate 0.12-50 mg/l N EW034
Nitrite 0.013-1 mg/l N EW035
pH 4 – 10 pH Units EW138
Phosphate 0.009-1 mg/l P EW007
TOC 0.25-100mg/l EW123
Total Phosphorous 0.03-1 mg/l P EW002
Miscellaneous (P,G,S)
Bromate 1 to 50ug/l BRO3 (EW137)
Colour 2.5-50mg/l PtCo (EW021)
Conductivity 132-6000 us/cm EW139
Dissolved Oxygen 1 to 10 mg/l (EW043)
Sulphate 1-250mg/l SO4(EW016)
Suspended Solids 5-1000mg/l (EW013)
Total Dissolved Solids 1-1000mg/l (EW046)
Total Hardness 3-330mg/l CaCO3 (EM099)
Total Oxidised Nitrogen 0.138-51mg/l N (EW051)
Metals EM130 (P,G,S)
Aluminium 5.0 – 500 µg/l
Antimony 0.1 – 10µg/l
Arsenic 0.2 - 20µg/l
Barium 1.0 - 100µg/l
Boron 0.02 – 2mg/l
Cadmium 0.1 – 10µg/l
Calcium 1.0 – 100mg/l
Chromium 1.0 - 100µg/l
Cobalt 1.0 - 100µg/l
Copper 2 - 4000µg/l
Iron 5.0 - 500µg/l
Lead 0.3 - 30µg/l
Magnesium 0.3 – 20mg/l
Manganese 1.0 - 100µg/l
Mercury 0.02 - 2µg/l
Molybdenum 1.0 - 100µg/l
Nickel 0.5 - 50µg/l
Potassium 0.2 – 20mg/l
Selenium 0.2 - 20µg/l
Sodium 0.5 – 50mg/l
Strontium 1.0 - 100µg/l
Tin 1.0 - 100µg/l
Vanadium 1.0 - 100µg/l
Zinc 1.0 - 100µg/l
SI439 Potable Water VOCs & THM
EO025 (P,G,S)
Benzene 0.1-35 µg/l
1,2-Dichloroethane 0.1-35 µg/l
Tetrachloroethene 0.1-35 µg/l
Trichloroethene 0.1-35 µg/l
Chloroform 1.0-150 µg/l
Bromoform 1.0-35 µg/l
Dibromochloromethane 1.0-35 µg/l
Bromodichloromethane 2.0-35 µg/l

Other VOC's EO025 (P,G,S)
Bromomethane 0.5 - 35 µg/l
Ethyl Ether/Diethyl Ether 0.5 - 35 µg/l
11 Dichloroethene 0.5 - 35 µg/l
Iodomethane/Methyl Iodide 0.5 - 35 µg/l
Carbon Disulphide 0.5 - 35 µg/l
Allyl Chloride 0.5 - 35 µg/l
Methylene Chloride/DCM 5.0 - 35 µg/l
2-Propenenitrile/Acrylonitrile 2.0 - 35 µg/l
Chloromethyl Cyanide 0.5 - 35 µg/l
Hexachlorobutadiene 0.5 - 35 µg/l
Trans-1,2 Dichloroethene 0.5 - 35 µg/l
MtBE 0.5 - 35 µg/l
11 Dichloroethane 0.5 - 35 µg/l
22 Dichloropropane 0.5 - 35 µg/l
Cis-12 Dichloroethene 0.5 - 35 µg/l
Methyl Acrylate 5.0 - 35 µg/l
Bromochloromethane 0.5 - 35 µg/l
Tetrahydrofuran 5.0 - 35 µg/l
111 Trichloroethane 0.5 - 35 µg/l
1-Chlorobutane 0.5 - 35 µg/l
Carbon Tetrachloride 0.5 - 35 µg/l
11 Dichloropropene 0.5 - 35 µg/l
12 Dichloropropane 0.5 - 35 µg/l
Dibromomethane 0.5 - 35 µg/l
Methyl Methacrylate 0.5 - 35 µg/l
13 Dichloropropene, cis 2.0 - 35 µg/l
MIBK/4 Methyl 2 Pentanone 2.0 - 35 µg/l
Toluene 0.5 - 35 µg/l
13 Dichloropropene, trans 2.0 - 35 µg/l
Ethyl Methacrylate 2.0 - 35 µg/l
112 Trichloroethane 0.5 - 35 µg/l
13 Dichloropropane 0.5 - 35 µg/l
2 Hexanone 1.0 - 35 µg/l
12 Dibromoethane 0.5 - 35 µg/l
Chlorobenzene 0.5 - 35 µg/l
1112 Tetrachloroethane 2.0 - 35 µg/l
Ethyl Benzene 0.5 - 35 µg/l
m & p Xylene 0.5 - 35 µg/l
O Xylene 0.5 - 35 µg/l
Styrene 2.0 - 35 µg/l
Isopropyl Benzene 0.5 - 35 µg/l
Bromobenzene 0.5 - 35 µg/l
1122 Tetrachloroethane 0.5 - 35 µg/l
123 Trichloropropane 2.0 - 35 µg/l
Propyl Benzene 0.5 - 35 µg/l
2-Chlorotoluene 0.5 - 35 µg/l
4 Chlorotoluene 0.5 - 35 µg/l
135 Trimethylbenzene 0.5 - 35 µg/l
Tert Butyl Benzene 0.5 - 35 µg/l
124 Trimethlbenzene 0.5 - 35 µg/l
Sec Butyl Benzene 0.5 - 35 µg/l
13 Dichlorobenzene 0.5 - 35 µg/l
P Isopropyltoluene 0.5 - 35 µg/l
14 Dichlorobenzene 0.5 - 35 µg/l
12 Dichlorobenzene 0.5 - 35 µg/l
N Butyl Benzene 0.5 - 35 µg/l
Hexachloroethane 5.0 - 35 µg/l
12 Dibromo 3Chloropropane 2.0 - 35 µg/l
124 Trichlorobenzene 0.5 - 35 µg/l
123 Trichlorobenzene 0.5 - 35 µg/l

PAH EO129 (P,G,S)
Range 0.01 - 0.2 ug/l
Acenaphthene
Benzo (a) Anthracene
Benzo (a) Pyrene
Benzo (b) Fluoranthene
Benzo (ghi) Perylene
Benzo (k) Fluoranthene
Chrysene
Dibenzo (ah) Anthracene
Fluoranthene
Fluorene
Indeno (123-cd) Pyrene
Phenanthrene
Pyrene
Acid Herbicides (P,G,S)
Range 0.01 - 0.2 ug/l
2,4,5-T H
2,4-D H
2,4-DB H
MCPA H
Picloram H
Organophosphorus Pesticides(P,G,S)
Range 0.01 - 0.2 ug/l
Fenuphos OP
Methyl Parathion OP
Parathion OP
Thionazin OP
Organochlorine Pesticides (P,G,S)
Range 0.01 - 0.2 ug/l
Aldrin
BHC Alpha isomer OC
BHC Beta isomer OC
BHC Delta isomer OC
Dieldrin OC
Endosulphan Alpha isomer OC
Endosulphan Beta isomer OC
Endosulphan Sulphate OC
Endrin OC
Heptachlor Epoxide OC
Heptachlor OC
Lindane OC
P,P DDE OC
P,P-DDD OC
P,P-DDT OC

Notes
1.Sample Matrix:P=Potable Water (Drinking) , G=Ground Water , S=Surface Water, W=Waste Water

APPENDIX 4 – FIELD SHEETS

Landfill Gas Monitoring Form

Facility Name: Belturbet **Waste Licence No:** W0062 **Licensee:** Cavan County Council	**Facility Address:** Rahaghan Belturbet
Date of Licensing: 2002	**Date of sampling:**
Instrument Used: GA2000	**Date next full calibration:** 2012 **Last field calibration: (inc date & gases)** 2011
Monitoring Personnel: Joan Keating	**Weather:** Heavy Rain

Results

Station Number	Time	GA2000 ID	CH_4	CO_2	O_2	CO	H_2S	Barometric Pressure (mbar)	Comments
mw 6	10.32		17.0	17.3	20.4	—	0	997	
mw7	10:49		0.2	9.5	1.4	—	0	996	

General Comments:

Cavan County Council Groundwater & Leachate Sampling Ref:

Site Reference: Belturbet **Permit No.** WD092 **Date:** 17/11/11 **Personnel:** B. Conlon Heaton

Sample Ref (Shallow /Deep)	Depth of Well (m) A	Depth of water below Ground Level (m) B	Depth of Water column (m) A-B= h	Diameter of Well (m) C	Radius of Well (m) (C/2)= r	Radius Squared (m^2) r^2	Volume of Water in Well (m^3) $\Pi r^2 h$	Volume of Water in well – Litres (m3 x 1000)	Volume of water to purge (Litres x 3)	Time to Purge (mins)
MW 7	31.2	6.08	25.12	0.05	0.025	0.000625	0.044298	44.298	147.89	25 mins Purge
MW 8	31.12	7.05	24.07	0.05	0.025	0.000625	0.047237	47.237	141.711	25 mins Purge

ON SITE SAMPLING FORM

Facility Name: Ballydubet	**Waste Licence No:** WC09
Report To: Cavan County Council	
Sampling Date: 17/11/11	**Sample Type (GW, SW ,Leachate)** All
Personnel: Brian Heaslip	**Weather:** Heavy Rain
Other Remarks)	**GPS:**

Sample Ref No	Sample Type	Time	DO Level PPM	Elec Cond us	pH pH units	Temp °C	Instrument
MW 7	GW	11:15	6.91	668	7.80	10.7	Hanna
MW 8	GW	12:00	7.64	1138	7.11	11.2	"
Lake SW1	SW	12:30	8.92	327	7.92	9.9	"

COMMENTS:

Boylan civil engineering

CAVAN COUNTY COUNCIL

CLOSED LANDFILL MONITORING INTEGRITY FORM

SITE Belturbet DATE 17/11/11 PERSONNEL Grace Keating

ITEM	CONDITION			COMMENTS
	GOOD	NEEDS MAINTENANCE	N/A	
GROUNDWATER MONITORING WELLS				
-Labeled	✓			Pt 5 works complete
-Well cap integrity	✓			
-Water drainage	✓			
-Locks	X			
LANDFILL GAS VENTS				
-Riser condition	✓			locks required for boreholes
-Concrete collar condition	✓			
-Screen condition	✓			
LANDFILL GAS MONITORING WELLS				
-Labeled				
-Well cap integrity	✓			
-Water drainage	✓			
-Traffic protection	✓			
-Concrete collar condition	✓			
-Screen Condition	✓			
-Locks				
SURFACE WATER MONITORING LOCATIONS				
-Access	✓			
-Disturbance				

APPENDIX 5 – CHAIN OF CUSTODY/SAMPLE SUBMISSION

els

2084

SAMPLE SUBMISSION FORM

DETAILS TO APPEAR ON ANALYSIS REPORT

Contact Name: Kevin Keating
Address: Boylan Eng, Main St, Mullagh, Cavan

Customer Name: Boylan Eng
PO Number:
NOTE: Use a separate sheet for different PO Numbers. For all customers a PO Number must be provided with the samples

CONTRACT DETAILS

ELS Quote No: QN 406
NOTE: To reduce potential for error this field must be completed. Use a separate sheet for different Quote Numbers.

NOTE: Standard lead time is 10 working days and 15 working days for test sub-contract. Destinations should be agreed in advance and may incur an extra charge.

SAMPLE DETAILS

Number	Sample Reference (NOTE: Whatever appears in this section is the ONLY detail that will appear on the analysis report)	Tests Requested (NOTE: To reduce potential for error please complete this field clearly indicating per sample)	Number of bottles submitted	Sample Type (Drinking Water (DW), Ground Water (GW), Surface Water (SW), Waste Water (WW), Sludge, Soil, Silt, Solvent, Air)
1	MW 7	See QN	Full V.T	GW
2	MW 8	"	"	"
3				
4				
5				

ONLY FIVE SAMPLES ALLOWED PER SUBMISSION SHEET

ADDITIONAL INFORMATION AND SIGNATURES

To be filled by the person submitting samples:
Signature: K Keating — Phone No: 0469286000
Date: 17/11/10
No. samples submitted: 4 — No. of pages: 1 of 3
Additional Info (if any):

To be filled by ELS Ltd:
Signature:
Date: 18/11 — Time:
Condition: ✓ Satisfactory
Additional Info: Testing

NOTES FOR CUSTOMER

1. Feel free to save this submission sheet to your desktop.
2. This form is designed to allow key details to be typed/saved and/or used as necessary.
3. Failure to submit the form with samples may lead to errors which may be outside the control of ELS Ltd.

NOTES FOR ELS LTD

1. If the customer details are not on the system or if the name and address differ greatly with that on the system consult the Customer Service Agent.
2. Always ensure the "Contact Name" above is used on the report. If that field is blank use the default name on the system.
3. Click "Po Req" where samples have been received from County Councils without PO Numbers.
4. Always log in samples with different PO Numbers on different reports.
5. Do not enter sample details in block capitals.

els 2085

Environmental Laboratory Services Ltd
[illegible] Campus
[illegible] Park
[illegible]
Cork
Tel: 021 [illegible]

SAMPLE SUBMISSION FORM

DETAILS TO APPEAR ON ANALYSIS REPORT

Contact Name: Brona Keating
Address: Boylan Eng, Main St, Mullagh, Co. Cavan

Customer Name: Boylan Eng
PO Number:
NOTE: Use a separate sheet for different PO Numbers
For all customers a PO Number must be provided with the samples

CONTRACT DETAILS

ELS Quote No.: QN 406
NOTE: To reduce potential for error this field must be completed
Use a separate sheet for different Quote Numbers

Results Due (tick): ✓

NOTE: Standard lead time is 10 working days and 15 working days for tests which contract. Deviations should be agreed in advance and may incur an extra charge.

SAMPLE DETAILS

Number	Sample Reference NOTE: Whatever appears in this section, is the ONLY detail that will appear on the analysis report (Do not write the required detail on the bottles as it is normally not clear)	Tests Requested NOTE: To reduce potential for error please complete this field clearly indicating per quote/per sheet attached or list the specific tests below	Number of bottles submitted	Sample Type Drinking Water (DW), Ground Water (GW), Surface Water (SW), Waste Water (WW), Sludge, Soil, Silt, Solvent, Air
1	SW1	see QN	full Kit	SW
2				
3				
4				
5				

ONLY FIVE SAMPLES ALLOWED PER SUBMISSION SHEET

ADDITIONAL INFORMATION AND SIGNATURES

To be filled by the person submitting samples	
Signature	B. Keating
Phone No.	046 92800[illegible]
Date	17/11/11
No. samples submitted	1
No. of pages	2 of 3
Additional Info (if any)	

To be filled by ELS Ltd	
Signature	[illegible]
Date	18.11
Time	
Condition	✓ Satisfactory
Unsatisfactory - See notes above	
Additional Info	Fastway

NOTES FOR CUSTOMER

1. Feel free to save this submission sheet to your desktop
2. This form is designed to allow key details to be typed, saved and re-used as necessary
3. Failure to submit the form with samples may lead to errors which may be outside the control of ELS Ltd
4.
5.

NOTES FOR ELS LTD

1. If the customer details are not on the system or if the name and address differ greatly with that on the system consult the Customer Service Agent
2. Always ensure the "Contact Name" above is used on the report, if that field is blank use the default name on the system
3. Click "Po Req" where samples have been received from County Councils without PO Numbers
4. Always log in samples with different PO Numbers on different reports.
5. Do not enter sample details in block capitals eg sample ref ACORN DRINKING WATER should read Acorn Drinking Water

els 2086

Environmental Laboratory Services Ltd.
Seven Huts Ind. Estate
Mallow Industrial Park
Mallow
Co. Cork
Tel: 022-47122

SAMPLE SUBMISSION FORM

DETAILS TO APPEAR ON ANALYSIS REPORT

Contact Name / Address: Brian Keating, Boylan Eng, Main St, Mullingar, Co. Westmeath

Customer Name: Boylan Eng

PO Number:

NOTE: Use a separate sheet for different PO Numbers. Else all customer's PO Number must be provided with the samples.

CONTRACT DETAILS

ELS Quote No: QN 606

NOTE: To reduce potential for error this field must be completed. Use a separate sheet for different Quote Numbers.

Results Due/Hold: [ ] 5 days [ ] 10 days [ ] 15 days [ ] Other

NOTE: Standard lead time is 10 working days and 15 working days for test sub-contract. Deviations should be agreed in advance and may result in extra charge.

SAMPLE DETAILS

Number	Sample Reference NOTE: Whatever appears in this section, is the ONLY detail that will appear on the analysis report. (Do not write the required detail on the bottles as it is normally not clear)	Tests Requested NOTE: To reduce potential for error please complete this field clearly indicating per quote, per sheet attached or list the specific tests below.	Number of bottles submitted	Sample Type Drinking Water (DW), Ground Water (GW), Surface Water (SW), Waste Water (WW), Sludge, Soil (SO), Solvent (SO)
1	MW 6	See QN	full kit	WW
2				
3				
4				
5				

ONLY FIVE SAMPLES ALLOWED PER SUBMISSION SHEET

ADDITIONAL INFORMATION AND SIGNATURES

To be filled by the person submitting samples

Signature: B Keating — Phone No: 046 9286000

Date: 17/10/11

No. samples submitted: 4 — No. of pages: 3 d 3

Additional Info if any:

To be filled by ELS Ltd

Signature:

Date: 18/10 — Time:

Condition: ✓ Satisfactory — [ ] Unsatisfactory - See notes above

Additional Info: Footway

NOTES FOR CUSTOMER

1. Feel free to save this submission sheet to your desktop
2. This form is designed to allow key details to be typed/saved and re-used as necessary
3. Failure to submit the form with samples may lead to errors which may be outside the control of ELS Ltd
4.
5.

NOTES FOR ELS LTD

1. If the customer details are not on the system or if the name and address differ greatly with that on the system consult the Customer Service Agent
2. Always ensure the "Contact Name" above is used as the report if that field is blank, use the default name on the system
3. Click "Po Req" where samples have been received from County Councils without PO Numbers
4. Always log in samples with different PO Numbers on different reports
5. Do not enter sample details in block capitals eg sample ref SOURCE DRINKING WATER should read Source Drinking Water

APPENDIX 6 – CALIBRATION CERTIFICATE-GA2000

Calibration Certificate

Issued by	Environmental monitoring	**Certificate number**	1048
Instrument	GA2000 for Boylan	**Calibrated by**	AI
Serial no	GA 02721 (asset 5051	**Ambient temp**	11
Service done	18/01/11	**Ambient pressure**	1007
Service interval	365 days	**Calibration due**	18th Jan 2012
Job number	NA	**Linearity check**	n/a
Logger	Pass	**Battery**	Pass
Filter	pass	**Overall result**	pass

Test Method
The instrument was calibrated by applying a know concentration of gas at a set flow rate and pressure
The results are recorded on this sheet **after** adjustment and a constant reading is obtained.
The results are compared to that of a reference certified set of gases

Test reference	Cert traceability	Instrument reading	pass/fail
CO2	5.0%	5.0%	pass
O2	17.8%	17.8%	pass
CH4	2.5%	2.5%	pass
CO	100ppm	102ppm	pass
H2S	20ppm	20ppm	pass

Address
environmental monitoring
Unit 9a
Lake District Business Park
Mint Bridge Road
Kendal
Cumbria
Tel 01782 435100
email : environmonitoring@btconnect.co.uk

Appendix D

Declaration of True Copy

Cavan County Council

Comhairle Chontae an Chabháin

Teach Na Cúirte
An Cabháin

Courthouse
Cavan

Declaration

Belturbet Landfill W0092-01

Cavan County Council hereby certifies that the content of the full pdf AER W0092-012011AER.pdf uploaded to the EPA website is a true copy of the original AER.

Signed Sinead Fox Dated 26/March 2012

Sinead Fox
Landfill Operations Manager
Cavan County Council

Tá fáilte romhat gnó a dhéanamh as Gaeilge
Tel/Guthán: 049 437 8300
Fax/Facs: 049 436 1565

Email/Ríomhphost: info@cavancoco.ie eolas@cavancoco.ie
Web/Láithreán Gréasáin: www.cavancoco.ie