

COMHAIRLE CHONDAE AN CABHÁIN

Cavan County Council



Annual Environmental Report

2014

Ballyjamesduff Landfill WL0093-1

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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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Appendix C	Quarter 4 Monitoring Report

1.0 INTRODUCTION

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 2014 to 31st December 2014.

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”.

2.0 REPORTING PERIOD

The reporting period for the purposes of this AER is 1st January 2014 to 31st December 2014.

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 the full scope of sampling as required by the Licence.

5.1 Surface Water

As detailed by table 5.1, there were slight exceedances in the surface water analysis for parameter COD. Sample SW1 is located upstream of the landfill while SW2 is located downstream. All monitoring locations are detailed in the site map which is presented in Appendix B.

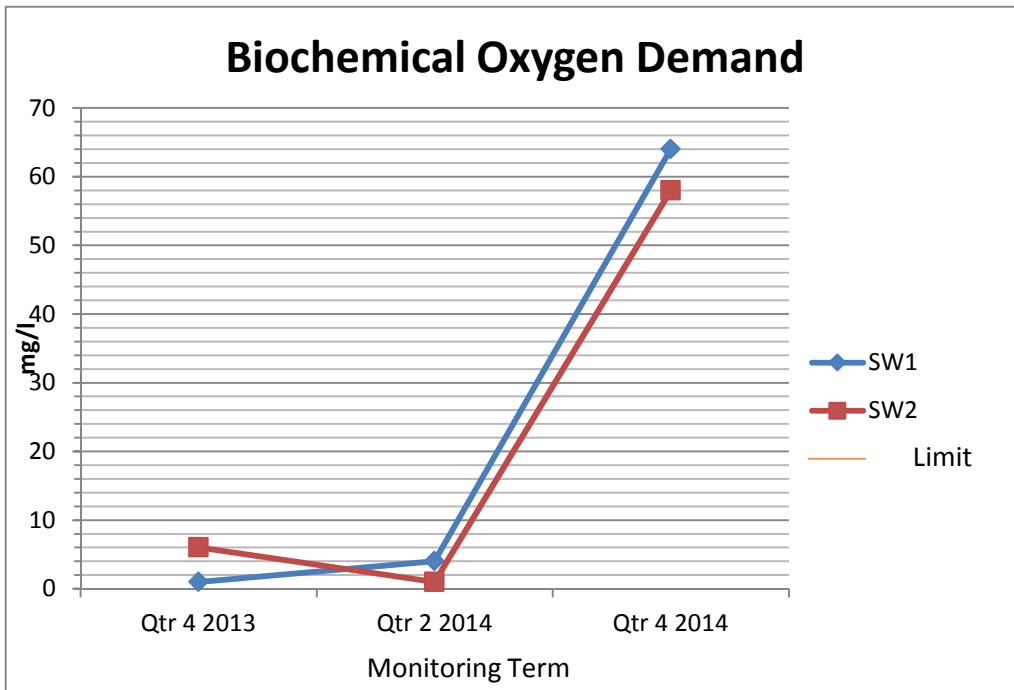
All parameters have been assessed against water limits as outlined in the European Communities (Drinking Water) (No.2) Regulations 2007. Results in Bold Italics indicate where the interim guide value has been exceeded.

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
SW1	Qtr 4 2014	0.032	7	201	64	2	30	<5	18.9
	Qtr 2 2014	0.668	7.2	270	4	52	24	13.7	9
	Qtr 4 2013	0.081	6.8	189	<1	43	10	14.9	10
SW2	Qtr 4 2014	0.1	6.9	182	58	<1	32	<5	14.6
	Qtr 2 2014	0.184	7.4	281	<1	27	<5	15.9	7
	Qtr 4 2013	0.031	7.2	273	6	41	17	27.3	11
Discharge Cap	Qtr 4 2014	0.072	6.8	200	48	<1	29	<5	14.3
	Qtr 2 2014	0.489	7.7	365	<1	33	<5	15.1	8
	Qtr 4 2013	-	-	-	-	-	-	-	-
S.I No. 294/1989 A1		0.2	≥5.5 and ≤8.5	1000	5		50	250	>60%

A comprehensive report of all results obtained in 2014 is presented in Appendix C.

Graph 5.1



All surface water locations were found to be within limits specified in the above regulations with the exception of BOD. Elevations from these parameters cannot be definitively associated to the landfill due to the presence of increased decaying organic matter in the form of decaying vegetation due to the winter season.

5.2 Groundwater

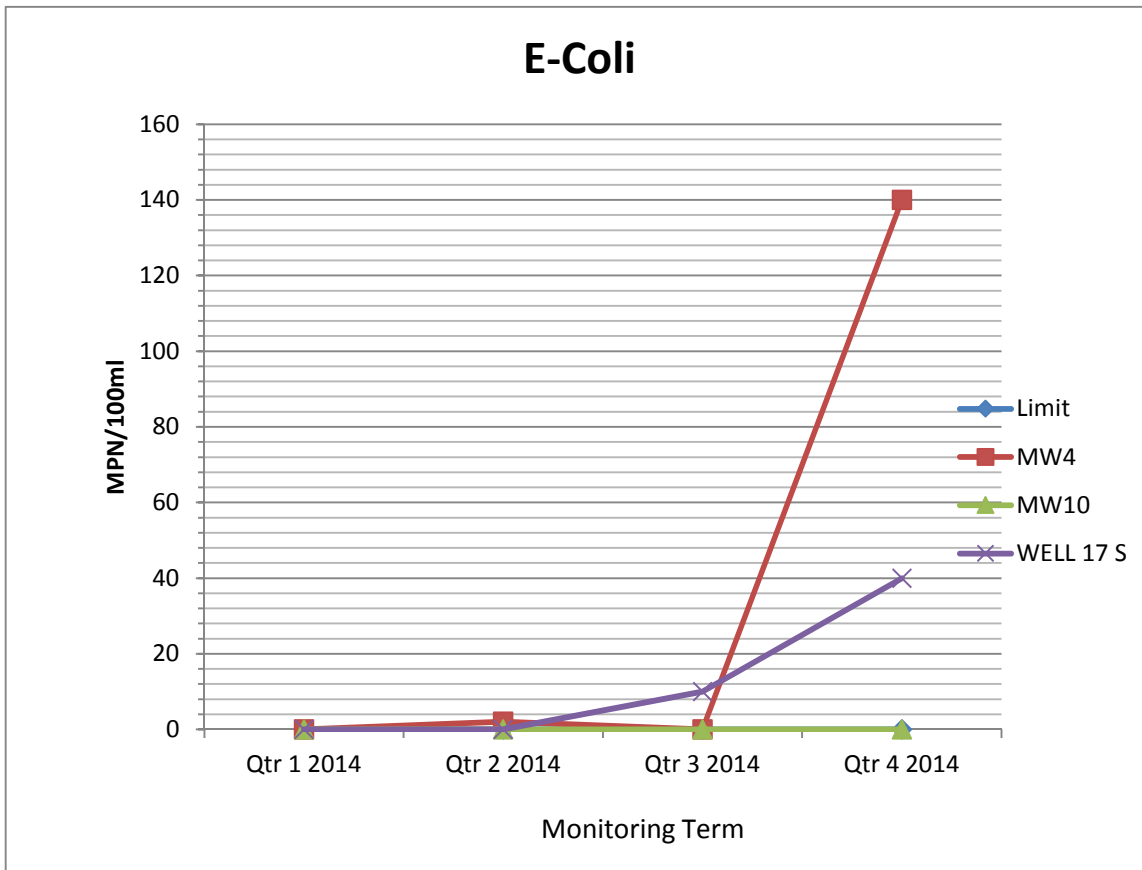
The following table details all reoccurring exceedances at all groundwater wells during 2014. Results in Hatched Red indicate where the interim guide value has been exceeded when compared to limits stipulated by the Environmental Protection Agency.

Table 5.2 Groundwater Summary Results

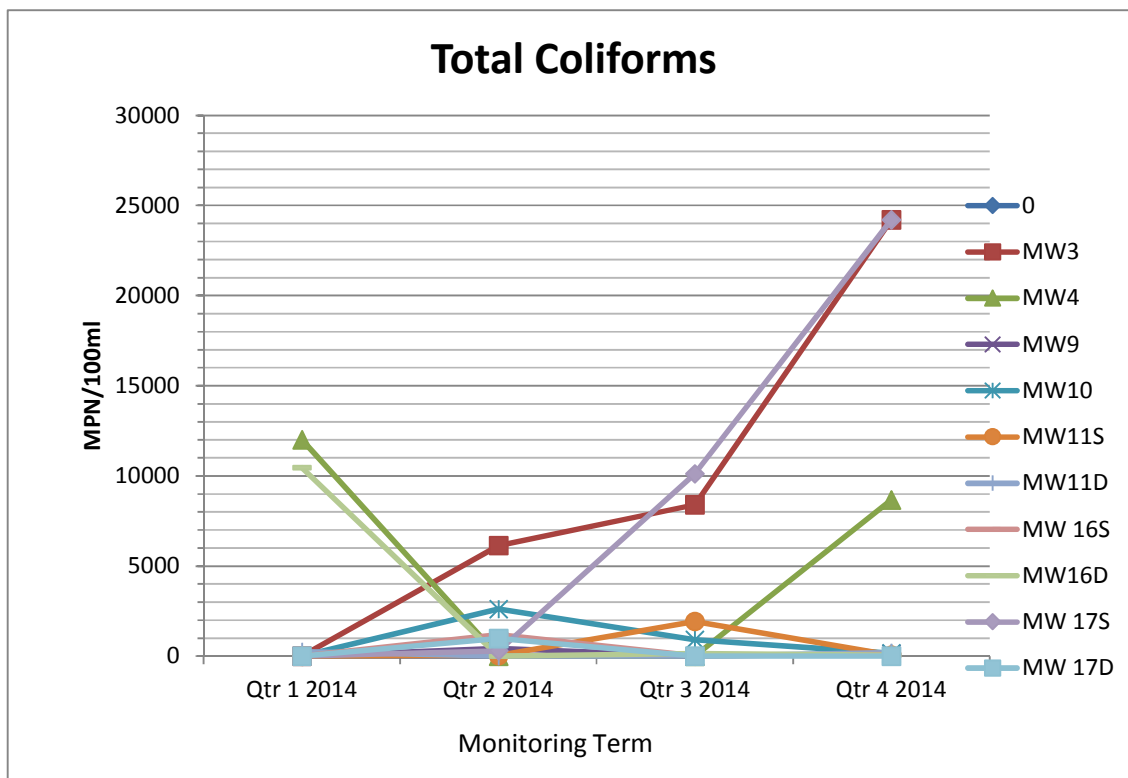
	Paramete	TOC	E.Coli	Ammonia	TON	Tot Coliforms	pH	Cond	Cl	DO	Total Phenols	Fe	K	Na
	Units	mg/l	MPN/100ml	mg/1N	mg/1N	MPN/100ml	pH Units	us/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
MW 3	Qtr 4 2014	18.41	0	57	0.151	24201	7.1	948	26.9	<1	3.97	18000	14.3	35.2
	Qtr 3 2014	95.7	0	49.354	<0.138	8400	7	964	22.5	<1	<0.15	159.7	15.8	29.7
	Qtr 2 2014	20.37	0	60.165	0.377	6130	7.2	1069	43.3	2	<0.15	8922.1	18.4	27.8
	Qtr 1 2014	35.66	0	45.476	<0.138	0	6.9	1002	28.3	2	<0.15	43978.4	17.1	25.8
MW 4	Qtr 4 2014	12.44	140	0.13	0.609	8660	7.6	220	14.9	8	0.58	260	4.3	10
	Qtr 3 2014	-	-	-	-	-	-	-	-	-	-	-	-	-
	Qtr 2 2014	17.91	2	9.377	<0.138	-	6.7	593	22.6	3	<0.15	2517.5	11	22.2
	Qtr 1 2014	10.52	0	0.376	0.338	12000	7.1	217	14.8	7	<0.15	1339.7	7.9	11.4
MW9	Qtr 4 2014	13.51	0	38	<0.138	120	6.9	958	14.8	<1	0.58	26	12.6	22
	Qtr 3 2014	-	-	-	-	-	-	-	-	-	-	-	-	-
	Qtr 2 2014	14.16	430	21.125	3.18	430	7	1029	71.3	8	<0.15	302.2	15.9	24.7
	Qtr 1 2014	10.62	0	17.802	<0.138	0	7	961	19.4	6	<0.15	28329.5	14.6	20.4
Well MW	Qtr 4 2014	22.01	0	120	0.154	160	6.9	1611	132.6	<1	0.53	1500	36.8	76.8
	Qtr 3 2014	23.74	0	57.398	0.276	900	6.8	1560	98.6	<1	<0.15	1106.4	33.6	72.9
	Qtr 2 2014	19.19	0	28.829	0.295	2610	7.1	1030	63	7	<0.15	229.8	21.7	32
	Qtr 1 2014	13.15	0	30.775	<0.138	0	6.9	1145	62.6	4	<0.15	17776	22.1	38.3
WELL 11 S	Qtr 4 2014	1.67	20	0.084	0.67	60	7	686	142.1	9	0.03	<20	1.6	31.2
	Qtr 3 2014	1.82	40	0.051	1.256	1920	7.1	1252	296.2	6	<0.15	24.3	3.2	46
	Qtr 2 2014	1.89	0	0.053	0.47	40	7.6	412	7.9	7	<0.15	29.5	4.1	21.8
	Qtr 1 2014	1.25	0	0.066	<0.138	0	7.5	487	13.3	5	<0.15	274.8	4.7	29.3
	Qtr 4 2013 R	1.47	200	0.041	<0.138	20300	7.1	1266	270	6	<0.15	38.9	4	44.9
WELL 11D	Qtr 4 2014	0.76	120	0.043	0.357	190	7.7	396	9.2	8	0.05	<20	1.3	22.9
	Qtr 3 2014	0.76	0	0.024	<0.138	10	7.5	397	6.7	4	<0.15	<20	2.4	22.5
	Qtr 2 2014	2.02	0	0.152	0.333	10	7.7	472	19.1	9	<0.15	<20	5.3	22.8
	Qtr 1 2014	1.53	10	0.025	0.217	260	7.6	485	18	11	<0.15	<20	4.3	23.7
	Qtr 4 2013 R	1.83	0	0.068	0.663	100	7.4	412	10.1	8	<0.15	85.1	3.8	21.2
WELL 16 S	Qtr 4 2014	1.61	10	0.042	0.273	90	7.7	477	21.3	9	0.03	<20	1.7	32.4
	Qtr 3 2014	1.21	0	0.196	<0.138	20	7.7	490	17.4	8	<0.15	<20	3.7	23
	Qtr 2 2014	1.36	0	0.107	0.194	1203	7.4	507	21.4	6	<0.15	<20	5	20.9
	Qtr 1 2014	0.69	0	0.037	<0.138	0	7.5	492	20.2	7	<0.15	79.6	3.7	21.5
WELL 16 D	Qtr 4 2014	0.27	10	0.089	2.111	50	7.5	485	22.9	8	0.02	<20	1.7	25.9
	Qtr 3 2014	0.56	0	0.106	<0.138	148	7.4	490	18.3	9	<0.15	80.3	3.3	21.9
	Qtr 2 2014	4.08	0	7.386	<0.138	-	7	497	21.4	6	<0.15	8672	5.9	25
	Qtr 1 2014	2.98	0	7.394	0.227	10460	6.9	476	13.9	8	<0.15	8557.8	4.5	27.7
WELL 17 S	Qtr 4 2014	4.62	40	7.5	0.541	24201	7	397	16.4	8	1.4	<20	4.7	26.6
	Qtr 3 2014	4.89	10	9.21	<0.138	10110	6.9	506	14.1	2	<0.15	13083	7.6	29.3
	Qtr 2 2014	1.56	0	0.381	4.502	291	7.6	482	16	6	<0.15	96.8	2.4	28.5
	Qtr 1 2014	1.04	0	0.283	<0.138	10	7.4	503	17.4	9	<0.15	296.6	4.4	28.3
WELL 17 D	Qtr 4 2014	0.57	0	0.32	0.25	0	7.4	492	17.4	7	0.05	<20	2.1	29.7
	Qtr 3 2014	0.62	0	0.28	<0.138	4	7.5	509	15.4	9	<0.15	305.4	3.6	30
	Qtr 2 2014	1.04	0	0.067	<0.138	980	7.6	492	14.4	8	<0.15	157.2	5	29.3
	Qtr 1 2014	1.49	0	0.045	0.161	0	7.1	674	84.5	8	<0.15	<20	2.7	32.7
WELL 18	Qtr 4 2014	0.48	0	0.046	0.139	0	7.4	474	16.4	8	0.02	<20	2.1	30
	Qtr 3 2014	0.91	0	0.048	<0.138	50	7.7	495	12.4	9	<0.15	72.1	3	30.4
	Qtr 2 2014	2.39	0	0.094	2.448	687	7.3	781	125.2	8	<0.15	<20	4.6	35.7
	Qtr 1 2014	0.91	0	0.038	<0.138	50	7.5	394	7.2	9	<0.15	<20	3.4	22.4
IGV		NAC	0	0.15	NAC	0		1000	30	NAC	0.0005	0.200	5	150
Exceedance														
NOTES														
1	Sub-contract analysis denoted by *													
2	ND - Concentration was below the limit of detection													
3	NAC- No Abnormal Change													

The following graphs detail all groundwater exceedances.

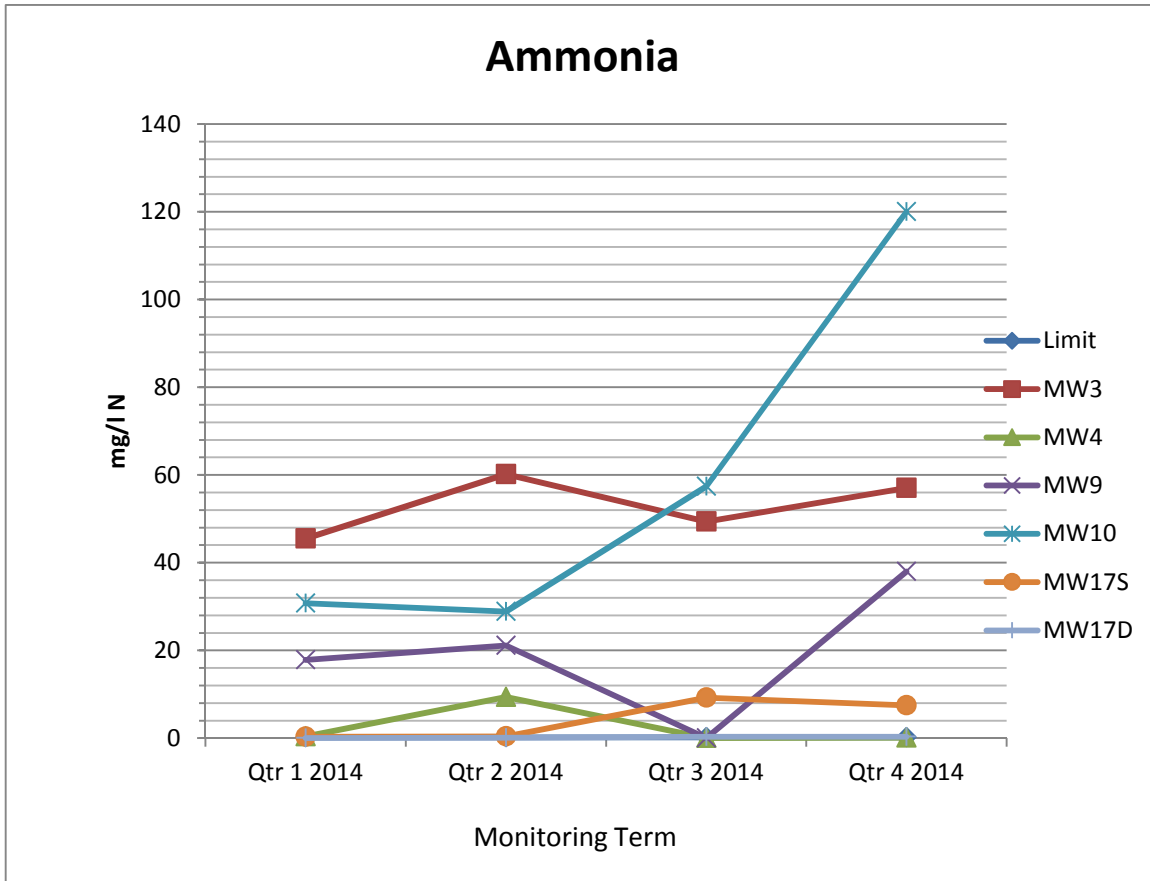
Graph 5.2



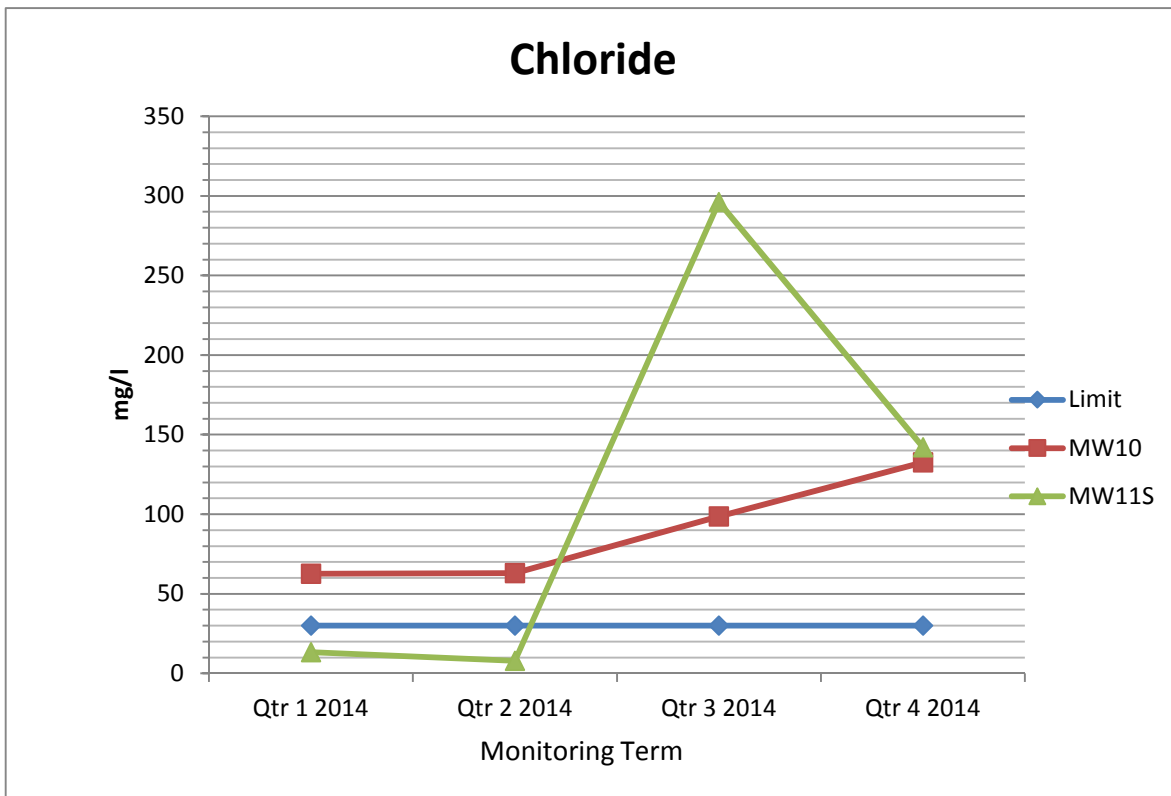
Graph 5.3



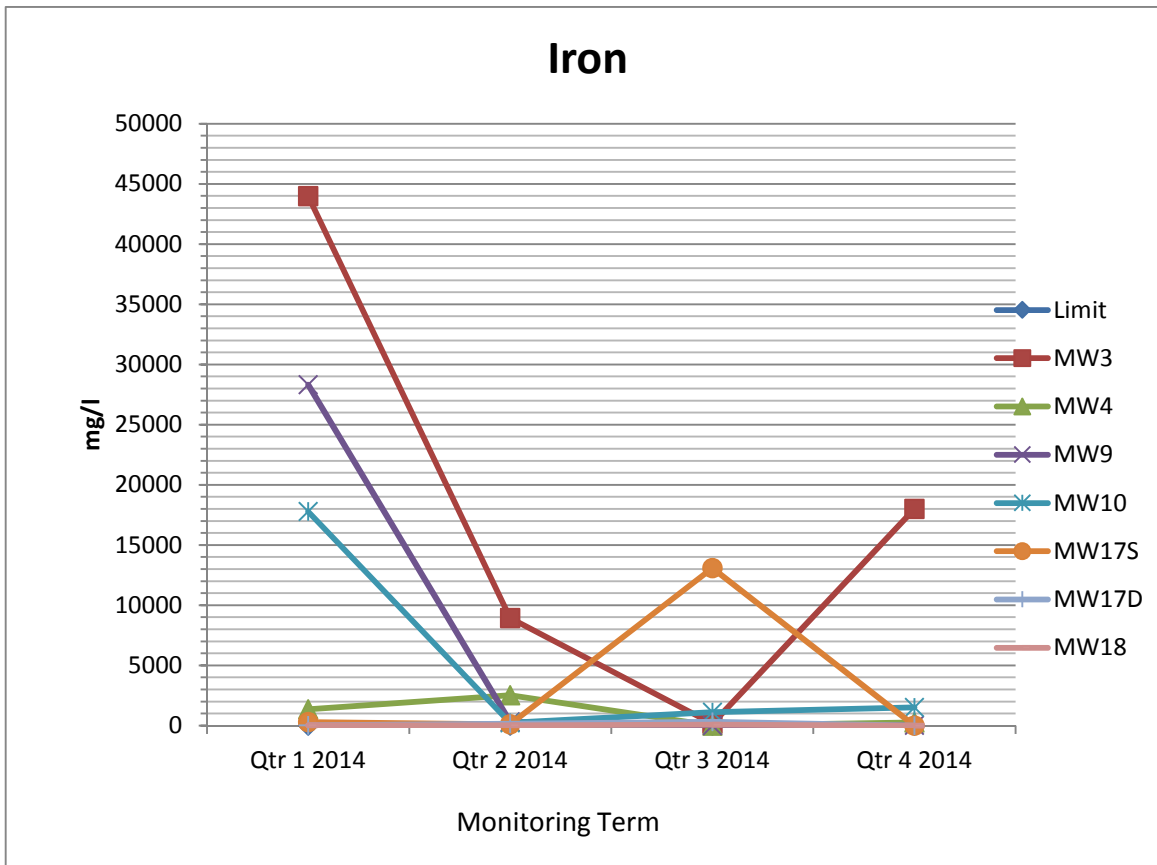
Graph 5.4



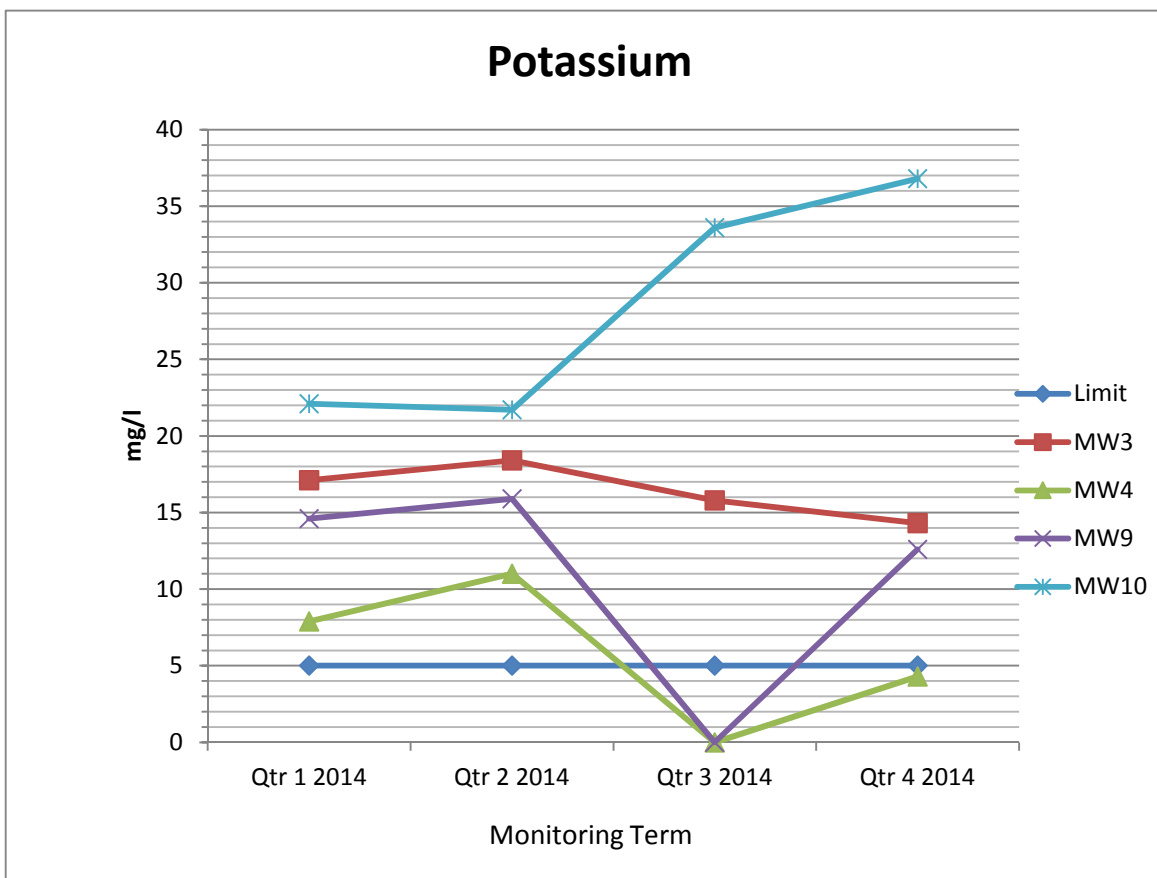
Graph 5.5



Graph 5.6



Graph 5.7



As detailed in the above graphs, there were numerous ground water exceedances at this landfill during 2014.

Exceedances occurred in the following parameters:

- **Escherichia coli:** Elevated levels of this parameter were found in samples MW3, MW4, MW11S, MW11D, MW16S, MW16D & MW17S. It is not uncommon for wells in the vicinity of a landfill to be contaminated with *E. coli*. It is also attributed to influx of contamination from other sources such as septic tanks, slurry spreading and animal faecal contaminations. It should be noted that there were numerous horses present on the landfill for the most part of 2014 and as such the E.Coli contamination cannot be solely attributed to the landfill itself.
- **Ammonia:** Elevated levels of this parameter were prevalent during 2014. Elevated levels of ammonia are strongly associated with pollution from waste water treatment systems and so contamination of these wells by the landfill cannot be definitively concluded.
- **Total Coliforms:** elevated levels of this parameter can be attributed to contamination from organic matter; therefore exceedances in this parameter may not be directly linked to the landfill.
- **Iron:** Although increased iron levels can be attributed to contamination from landfills, it is also strongly associated with the native soils of the Cavan area and therefore cannot be directly linked to the landfill.
- **Chloride:** Historical results obtained from this parameter show frequent exceedances. However, Contamination of well 11S from the landfill is impossible due to MW11S being located up gradient of the landfill. Therefore an alternative source of chloride contamination should be investigated in this instance.
- **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.
- **Cyanide:** An exceedance in this parameter was encountered in quarter 3 2014 at well MW11D, MW17S and MW17D. Again contamination of well MW11D from the landfill is not possible as this well is situated up gradient from the landfill and so cannot be attributed to the landfill. Repeat analysis of all landfill groundwater wells revealed that there were no exceedances.

5.3 Leachate Monitoring

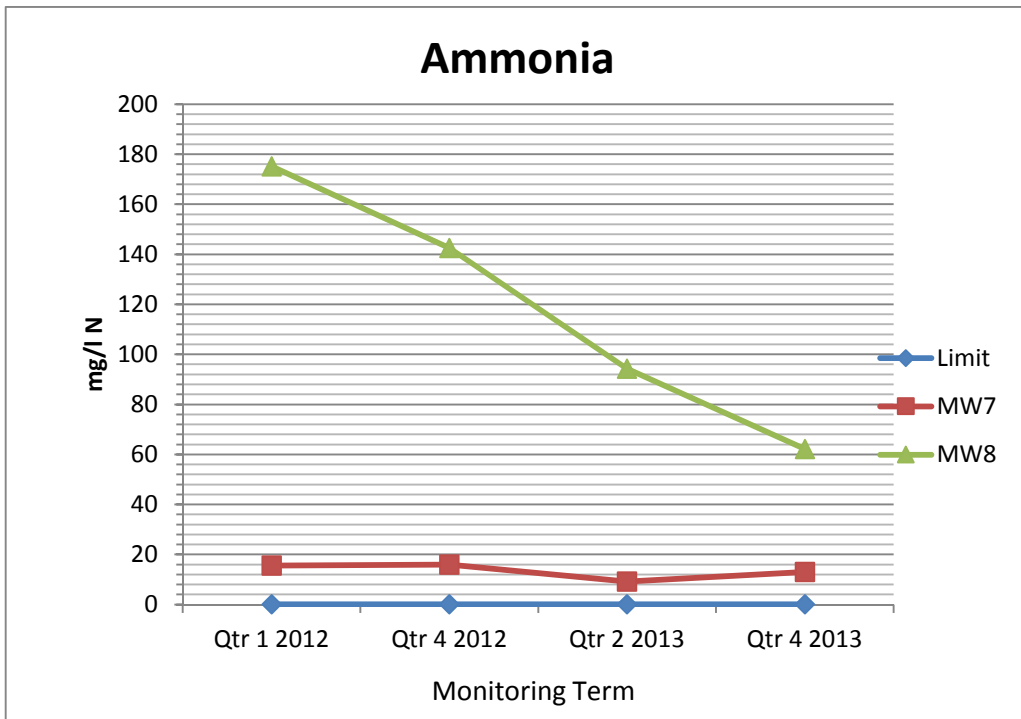
Leachate monitoring is carried out biannually in accordance with the licence.

Re-occurring exceedances are displayed below. Results in Hatched Red indicate where the interim guide value has been exceeded when compared to limits stipulated by the Environmental Protection Agency.

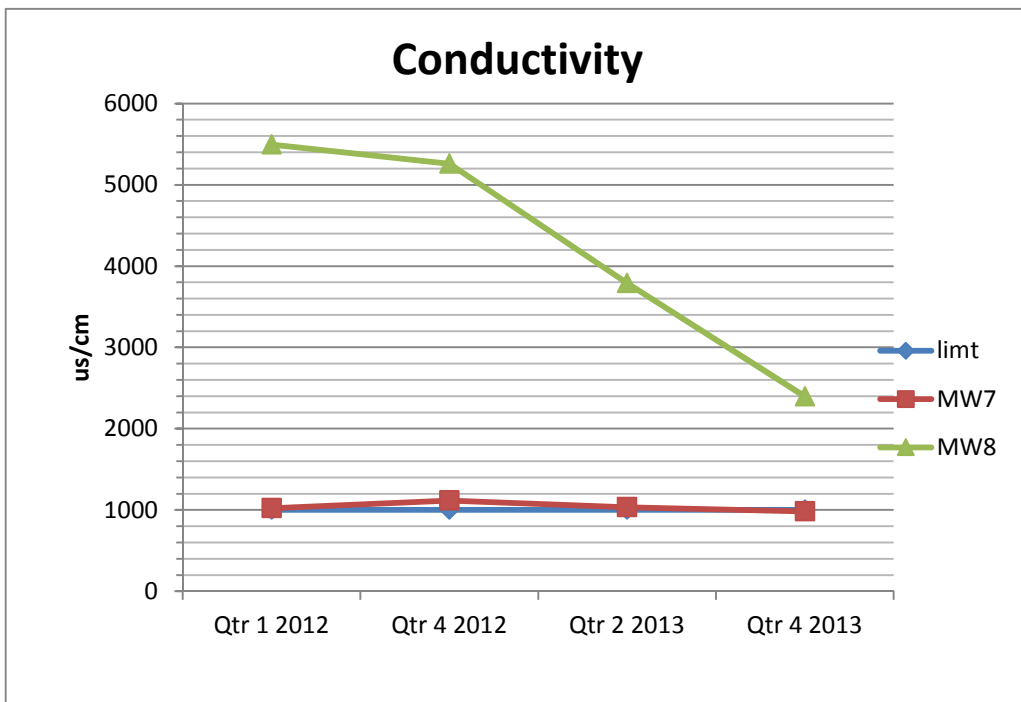
Table 5.3 Leachate Summary Results

	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
WELL MW 7	Qtr 4 2014	13	<0.69	6.9	980	7	136	19.9
	Qtr 2 2014	9.238	<0.690	7	1031	11	115	14.9
	Qtr 4 2013	15.956	0.717	6.7	1117	20	225	15.4
	Qtr 2 2013	15.597	<0.69	7	1022	7	225	<13
WELL MW 8	Qtr 4 2014	62	<0.69	7.2	1397	64	151	45
	Qtr 2 2014	32.119	<0.690	7.3	1393	36	203	29.4
	Qtr 4 2013	48.217	<0.69	7.3	1467	40	215	27
	Qtr 2 2014	32.78	<0.69	7.5	1237	27	342	24.7
Interim Guide Values		0.15	NAC		1000			200

Graph 5.8



Graph 5.9



As can be seen from the above figures the conductivity reading at this landfill remain steady and are typical of those associated with a mature landfill.

Results obtained for ammonia at these wells are elevated in comparison to Interim Guide Values for groundwater. Although ammonia is associated with leachate, it is also strongly associated with agricultural activities such as manure spreading, an activity which is prevalent in the surrounding area. As such the elevated levels cannot be solely attributed to the landfill at this time.

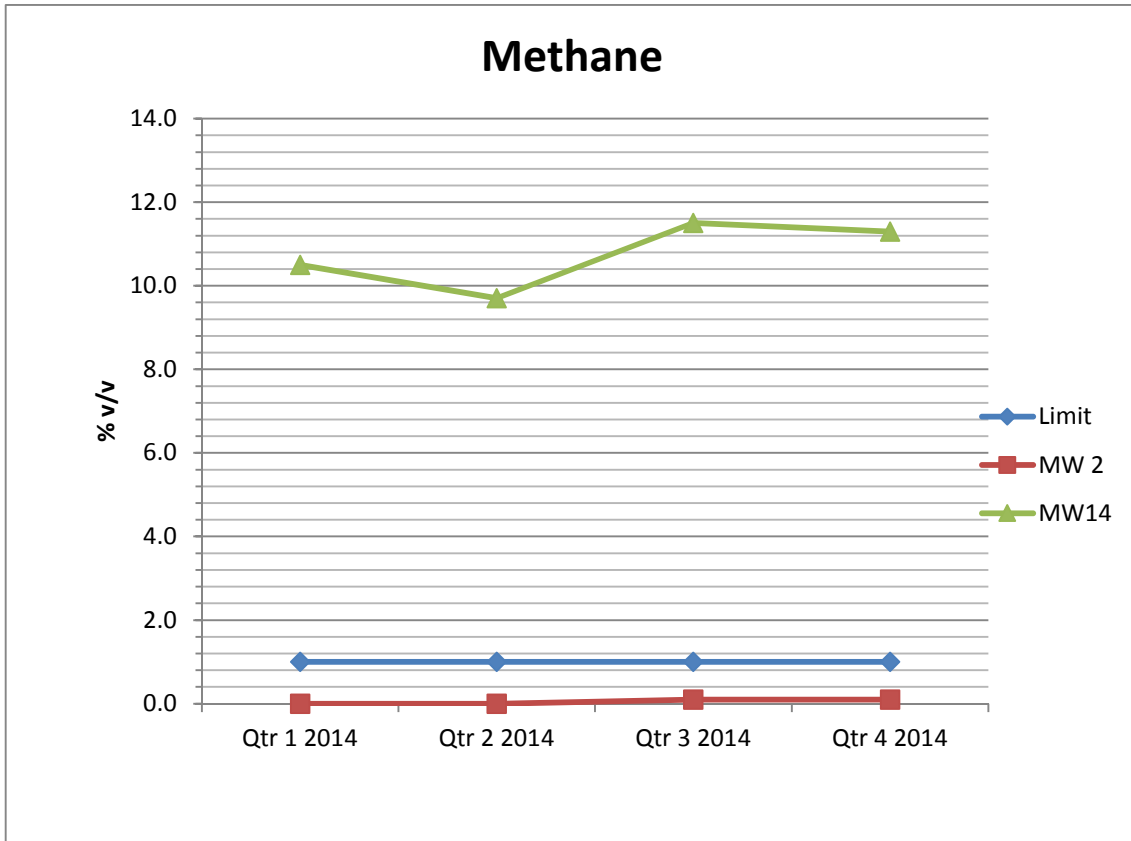
5.4 Gas Emissions

Landfill gas was monitored at five locations both within and outside the landfill mass. The following table details all results during 2014.

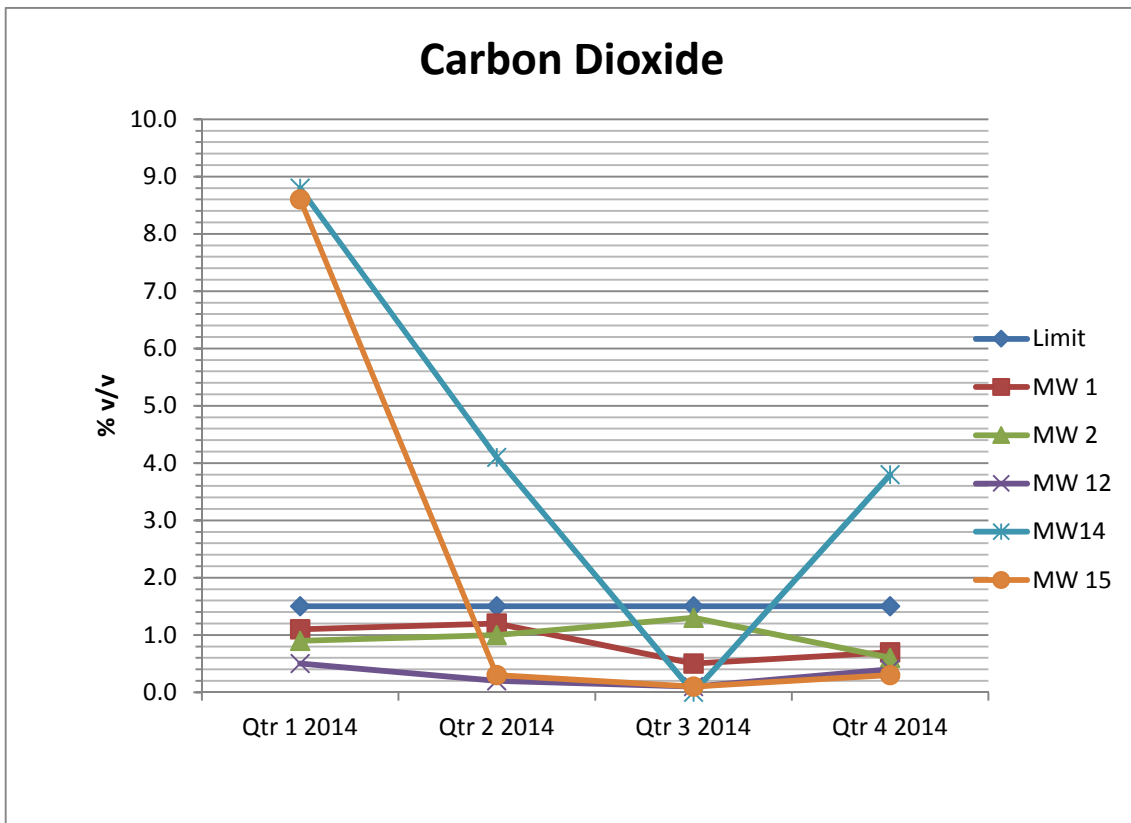
Table 5.4 Gas Emissions Summary Results

Method		GA 2000	GA 2000	GA 2000	GA 2000	GA 2000
Parameter		CH ₄	CO ₂	O ₂	H ₂ S	Barometric Pressure
Units		% v/v	% v/v	%	PPM	mb
Client Ref	Qtr	-	-	-	-	-
MW 1	Qtr 1 2014	0	1.1	20	0	995
	Qtr 2 2014	0	1.2	19.3	0	999
	Qtr 3 2014	0.1	0.5	20	996	0
	Qtr 4 2014	0.1	0.7	19.8	0	999
MW 2	Qtr 1 2014	0	0.9	20.1	0	995
	Qtr 2 2014	0	0.8	19.7	0	999
	Qtr 3 2014	0.1	0.4	20.6	996	0
	Qtr 4 2014	0.1	0.4	20.6	0	999
MW 12	Qtr 1 2014	0	0.5	20.5	0	995
	Qtr 2 2014	0	0.3	20.9	0	999
	Qtr 3 2014	1.1	1.2	20.3	994	0
	Qtr 4 2014	1.4	1.3	20.3	0	999
MW 14	Qtr 1 2014	10.5	8.8	15.3	0	995
	Qtr 2 2014	9.7	8.4	15.6	0	999
	Qtr 3 2014	11.5	9.9	13.3	995	0
	Qtr 4 2014	11.3	10	14.1	0	999
MW 15	Qtr 1 2014	9.2	8.6	16	0	995
	Qtr 2 2014	9.7	8.4	15.6	0	999
	Qtr 3 2014	12.6	14.5	9.6	994	0
	Qtr 4 2014	12.7	15.4	10.4	0	999

Graph 6.0



Graph 6.1



Gas Monitoring on the site reveals typical low levels of Methane & Carbon Dioxide and higher levels of Oxygen. There were no exceedances in licence limits for wells located outside the waste mass. The results are typical of a closed landfill.

6.0 SUMMARY OF RESULTS AND INTERPRETATION OF ENVIRONMENTAL MONITORING

As reported in section 4 there were a number of elevations recorded in 2014. Included in Appendix C is a copy of the quarter 4 monitoring results as reported by Monitoring Company Boylan Engineering. 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.

7.0 RESOURCE & 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.

8.0 REPORT ON RESTORATION OF FACILITY

The site is fully restored and the cap intact. There were horses grazing on the site during 2014.

9.0 ESTIMATED ANNUAL & 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 33,700kgs/yr. Page one from the Annual Gas Survey is also presented in Appendix A.

10.0 FULL TITLE & 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 2014.

11.0 REPORTED INCIDENTS AND COMPLAINTS SUMMARY

There were no incidences in the reporting period 2014. There were no complaints received by the EPA or the Local Authority regarding this facility in the reporting period 2014.

12.0 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.

13.0 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, carries a Safe Pass and has been trained in Landfill Gas Management.

Table 13.1 Management Structure 2014

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 2014/ 2015:

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

14.0 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.



[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.18

REFERENCE YEAR	2014
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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

Classes of Activity

No.	class_name
	- Refer to PRTR class activities below

Address 1	Derrylurgan
Address 2	Ballyjamesduff
Address 3	
Address 4	
	Cavan
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	
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	1
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?	No
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. WASTE IMPORTED/ACCEPTED ONTO SITE

[Guidance on waste imported/accepted onto site](#)

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities)?	No
-----------------------------------------------------------------------------------------------------------	----

This question is only applicable if you are an IPPC or Quarry site

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR# : W0093 | Facility Name : Ballyjamesduff Landfill | Filename : Copy of W0093_2014.xls | Return Year : 2014 |

09/04/2015 14:34

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASERS TO AIR		Please enter all quantities in this section in KGs						
POLLUTANT		METHOD		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	OTH	GASSIM	0.0	93600.0	0.0	93600.0
01	Methane (CH4)	C	OTH	GASSIM	0.0	33700.0	0.0	33700.0

* 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		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

* 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		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

* 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 Code	Designation or Description	Facility Total Capacity m3 per hour	
	Total estimated methane generation (as per site model)	33700.0	C	OTH	GASSIM	N/A
	Methane flared	0.0				0.0 (Total Flaring Capacity)
	Methane utilised in engines	0.0				0.0 (Total Utilising Capacity)
	Net methane emission (as reported in Section A above)	33700.0	C	OTH	GASSIM	N/A

A survey of landfill sites to determine the quantity of methane flared and or recovered in utilisation plants for 2014

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 2014	<input type="text" value="0"/>
Please enter the number of engines operational at your site in 2014	<input type="text" value="0"/>
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 31/03/2015

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

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_2014) to:

LFGProject@epa.ie



GROUND WATER MONITORING REPORT FOR BALLYJAMESDUFF LANDFILL W0093-01

Client: Cavan County Council

Site Location: Derrylurgan, Ballyjamesduff

Report No.: CCC-03-01-04-04-Rev 0

Produced by: Brona Keating, BSc, P.Grad.Dip. Environmental Eng.

Approved by:

A handwritten signature in blue ink, appearing to read 'Cathal Boylan', is written over a horizontal line.

Date: 24th January 2015

Cathal Boylan, BEng, CEng, MIEI
CHARTERED ENGINEER

Boylan Engineering

Company Reg. 430482

Address: Main St., Mullagh, Kells Co. Meath.

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Email: info@boylanengineering.ie

Web: www.boylanengineering.ie

Rev.	Date	Description

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I SUMMARY

Boylan Engineering (Eng. & Environmental Consultancy) was commissioned by Cavan County Council to carry out Environmental Monitoring at Ballyjamesduff Landfill (W0093-01), Derrylurgan, Ballyjamesduff, Co Cavan for quarter three and four 2014.

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

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- 1.0 Introduction
- 2.0 Methodology
 - 2.1 Environmental Sampling
 - 2.2 Laboratory Analysis
 - 2.3 Monitoring Locations
 - 2.4 Weather Report
- 3.0 Summary of Results
- 4.0 Discussion
- 5.0 Conclusion

List of Tables

- 1.0 Ground Water 03rd Quarter Monitoring
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Appendix

- 1.0 Historical Data
- 2.0 Analysis Methods
- 3.0 Field Sheets
- Lab Reports
- Landfill Map

1. 0 INTRODUCTION

Ballyjamesduff landfill is situated approximately 600m from Ballyjamesduff town centre in the town land of Derrylurgan. The site was in operation from the 1960's and comprises some 1.62 hectares. The site was originally peat land which was stripped for commercial purposes and was then operated as a traditional landfill until its closure in March 2002. A waste licence was issued by the Environmental Protection Agency after the closure of the site and remedial works were completed.

Condition 8.1 of the waste licence requires that monitoring be carried out in accordance with Schedule D of the licence. The following report give details of the groundwater, sampling programme conducted on site and also summarises findings and analytical results for quarter three and four 2014.

The purpose of environmental 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 the facility is not adversely affecting the countryside or places of interest
- Compare actual site behavior with expected/modeled behavior
- Establish a reliable database of information for the landfill throughout its life

According to the Response matrix for landfills, Bailieborough landfill is situated in the R2¹ Zone. This zone was categorized using a vulnerability rating combined with the aquifer category for the area. Landfills situated in R2¹ Zones are acceptable subject to guidance 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.

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. 0 METHODOLOGY

2.1 Environmental Sampling

The following procedure is conducted by Boylan Engineering to ensure accurate groundwater monitoring:

- ISO 5667: Guidance on sampling of groundwaters is adhered to.
- Prior to sampling, the depth of water in groundwater wells is measured by dipping. Dipping the wells before sampling allows for calculation of the volume of water in the well. This data is recorded on the field sheet for volume calculation which is presented in appendix 3.
- Once the volume was calculated the boreholes are purged three times their volume before sampling.
- Sampling is conducted using a Waterra inertial lift pump and associated tubing, pumping water directly from the borehole to the appropriate sampling bottles.
- Designated tubing is used at each location.
- Having obtained a representative sample the following parameters are measured on-site using a Hanna HI 98129 combination waterproof high accuracy.
 - Conductivity
 - Temperature
 - pH
- Boylan Engineering operate a Sample Submission/Chain of Custody form, which accompanies the samples at all times. These forms are located in the appendix 4.

2.2 Laboratory Analysis

- Samples are 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 are 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 fail.
- 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 Monitoring Locations

Quarter 3 2014					
Monitoring Well	Sample Type	Cover Level M (OD Malin Head)	Water Level M (OD Malin Head)	Water Depth M (Top of Casing)	National Grid Co-Ordinates
MW1	Gas	94.92	91.72	3.2	N291352.31 E252020.68
MW2	Gas	92.92	90.82	2.1	N291377.38 E252082.84
MW3	GW	94.39	92.99	1.4	N291369.28 E252109.44
MW4	GW	93.65	#VALUE!	-	N291309.78 E252129.14
MW5	Gas	92.84	-	n/a	TBC
MW6	Leachate	100.71	-	-	TBC
MW 7	Leachate	97.54	-	-	TBC
MW8	Leachate	96.56	-	-	N291346.99 E252041.22
MW9	GW	95.69	#VALUE!	-	N291369.67 E252103.93
MW10	GW	93.95	91.99	2.0	N291314.86 E252138.12
MW11S	GW	TBC	-	3.7	TBC
MW11D	GW	TBC	-	12.6	TBC
MW12	Gas	94.38	-	n/a	N291236.30 E252110.10
MW13	Gas	94.69	-	n/a	TBC
MW14	Gas	98.77	-	n/a	N291263.92 E252131.54
MW15	Gas	93.11	-	n/a	TBC
MW16S	GW	94.02	93.02	1.0	N252076.89 E291174.65
MW16D	GW	94.16	93.86	0.3	N252077.36 E291173.27
MW17S	GW	93.59	92.34	1.3	N251997.04 E291377.19
MW17D	GW	93.63	93.27	0.4	N251997.80 E291376.00
MW18	GW	93.5	93.5	0.0	N251986.57 E291425.39
SW1	SW	n/a	-	n/a	TBC
SW2	SW	n/a	-	n/a	TBC
Cap	SW	n/a	-	n/a	TBC

Quarter 4 2014

Monitoring Well	Sample Type	Cover Level M (OD Malin Head)	Water Level M (OD Malin Head)	Water Depth M (Top of Casing)	National Grid Co-Ordinates
MW1	Gas	94.92	91.72	3.2	N291352.31 E252020.68
MW2	Gas	92.92	90.82	2.1	N291377.38 E252082.84
MW3	GW	94.39	92.91	1.5	N291369.28 E252109.44
MW4	GW	93.65	92.45	1.2	N291309.78 E252129.14
MW5	Gas	92.84	-	n/a	TBC
MW6	Leachate	100.71	-	-	TBC
MW 7	Leachate	97.54	-	-	TBC
MW8	Leachate	96.56	-	-	N291346.99 E252041.22
MW9	GW	95.69	92.37	3.3	N291369.67 E252103.93
MW10	GW	93.95	91.92	2.0	N291314.86 E252138.12
MW11S	GW	TBC	-	3.3	TBC
MW11D	GW	TBC	-	10.8	TBC
MW12	Gas	94.38	-	n/a	N291236.30 E252110.10
MW13	Gas	94.69	-	n/a	TBC
MW14	Gas	98.77	-	n/a	N291263.92 E252131.54
MW15	Gas	93.11	-	n/a	TBC
MW16S	GW	94.02	93.12	0.9	N252076.89 E291174.65
MW16D	GW	94.16	93.86	0.3	N252077.36 E291173.27
MW17S	GW	93.59	92.78	0.8	N251997.04 E291377.19
MW17D	GW	93.63	93.43	0.2	N251997.80 E291376.00
MW18	GW	93.5	93.5	0.0	N251986.57 E291425.39
SW1	SW	n/a	-	n/a	TBC
SW2	SW	n/a	-	n/a	TBC
Cap	SW	n/a	-	n/a	TBC

2.4 Weather Report

REPORTS FROM BALLYHAISE (A)							
Date	Rainfall	Max	Min	Grass Min	Mean Wind Speed (knots)	Maximum	Sunshine
	(mm)	Temp	Temp	(°C)		Gust	
		(°C)	(°C)			(if >= 34 knots)	
23/09/2014	4.8	14.5	11.2	8.1	5		

REPORTS FROM BALLYHAISE (A)							
Date	Rainfall	Max	Min	Grass Min	Mean Wind Speed (knots)	Maximum	Sunshine
	(mm)	Temp	Temp	(°C)		Gust	
		(°C)	(°C)			(if >= 34 knots)	
18/11/2014	0.1	12.2	5.2	0.1	3.6		

3.0 SUMMARY OF RESULTS

Table 1.0 03rd Quarter Ground water monitoring 2014

Report Number:	79056																	
Monitoring Date:	23.09.14																	
Method	Site Tests					TOC	Ammonia	AQ2-UP1	Titralab		Titralab	AQ2-UP2		DO	Total Cyanide High	Total Phosphorus-TP	PhenolsTotal	
Method Number	Site Tests					DEFAULT	EW003	EW154M	EW153		EW154M	EW154M		EW043	DEFAULT	EW146	DEFAULT	
Parameter	Sample temperature (to be done onsite)	Cond	pH	Water Level from TOC	Visual Inspection	TOC	Ammonia	TON (as N)(calc)	pH	Cond	Alkalinity Total (R2 pH4.5)	Chloride	Sulphate	Dissolved Oxygen	Total Cyanide High	Total Phosphorus-TP	Phenols-Total	
Units	Deg C	us/cm	pH units	Meter's	-	mg/l	mg/l N	mg/l N	pH Units	us/cm	mg/L CaCO3	mg/l	mg/l	mg/l	ug/L	mg/l P	mg/L	
Limit of Detection	-	-	-	-	-	0.25	0.007	0.138	0.3	25	10	2.6	1.0	1.0	10	0.01	0.15	
Date Testing Initiated	23.9.14					24.9.14												
ELS Ref	Client Ref																	
79056/001	GW 3	-	968	7.1	1.4	Heavy Silt	95.7	49.354	<0.138	7	964	439	22.5	18.3	<1	<10	3.37	<0.15
79056/002	GW 10	-	1575	6.89	1.96	Heavy Silt	23.74	57.398	0.276	6.8	1560	616	98.6	32.8	<1	<10	2.66	<0.15
79056/003	GW 11S	12.7	1263	7.15	3.7	Straw	1.82	0.051	1.256	7.1	1252	256	296.2	39.3	6	<10	0.6	<0.15
79056/004	GW 11D	11.9	406	7.6	12.6	Clear	0.76	0.024	<0.138	7.5	397	202	6.7	15.5	4	19	0.04	<0.15
79056/006	GW 16 S	13	502	7.82	1	Straw	1.21	0.196	<0.138	7.7	490	192	17.4	57	8	<10	1	<0.15
79056/007	GW 16D	10.5	507	7.49	0.3	Clear	0.56	0.106	<0.138	7.4	490	193	18.3	67.3	9	<10	0.03	<0.15
79056/008	GW 17S	13.2	523	7.26	1.25	Straw	4.89	9.21	<0.138	6.9	506	235	14.1	21.6	2	15	2.39	<0.15
79056/009	GW 17D	10.9	528	7.66	0.36	Clear	0.62	0.28	<0.138	7.5	509	241	15.4	27.1	9	30	0.05	<0.15
79056/005	GW 18	11	509	7.81	0	Clear	0.91	0.048	<0.138	7.7	495	237	12.4	30	9	<10	0.05	<0.15
IGV		1000	≥6.5 and ≤9.5				NAC	0.15	NAC	≥6.5 and ≤9.5	1000	NAC	30	200	NAC	10	-	-
Method	Coliforms	Coliforms	Ion Chromatography	Residue on Evaporation	Metals-Total	Metals-Dissolved												
Method Number	MIC133		EW137	EW060	EM130													
Parameter	Total Coliforms	E. Coli	Fluoride	Residue on Evaporation	Chromium-Total	Iron Dissolved	Manganese Dissolved	Potassium Dissolved	Sodium Dissolved	Cadmium-Dissolved	Calcium-Dissolved	Copper-Dissolved	Lead-Dissolved	Magnesium-Dissolved	Mercury-Dissolved	Zinc-Dissolved	Boron-Dissolved	
Units	MPN/100ml	MPN/100ml	mg/L	mg/L	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/L	mg/L	ug/L	mg/L	ug/L	ug/L	mg/L	
Limit of Detection	0		0.1	10.0	1.0	20.0	0.001	0.2	0.5	0.1	1.0	0.00	0.3		0.02	1.0	0.02	
Date Testing Initiated	24.09.14																	
ELS Ref	Client Ref																	
79056/001	GW 3	8400	0	0.11	4432	94.5	159.7	414.5	15.8	29.7	0.1	113.3	<0.003	<0.3	18.3	<0.02	4.9	0.63
79056/002	GW 10	900	0	<0.1	2596	109.1	1106.4	1332	33.6	72.9	0.1	174.8	<0.003	<0.3	32.6	<0.02	4.3	0.42
79056/003	GW 11S	1920	40	<0.1	2734	100.2	24.3	70.3	3.2	46	0.2	155.4	<0.003	<0.3	45.4	<0.02	10.9	<0.02
79056/004	GW 11D	10	0	0.21	268	<3	<20	149.6	2.4	22.5	0.1	54.3	<0.003	<0.3	12.2	<0.02	14.1	<0.02
79056/006	GW 16 S	20	0	0.19	2500	235.5	<20	1033.1	3.7	23	0.1	67.9	<0.003	<0.3	12.1	<0.02	7.6	<0.02
79056/007	GW 16D	148	0	0.19	368	<3	80.3	955.9	3.3	21.9	0.1	69	<0.003	<0.3	12.4	<0.02	10.3	<0.02
79056/008	GW 17S	10110	10	<0.1	4174	785.8	13083	784.1	7.6	29.3	0.1	59.7	<0.003	0.4	11.6	<0.02	13.3	0.02
79056/009	GW 17D	4	0	0.11	372	<3	305.4	1193	3.6	30	0.1	66.3	<0.003	<0.3	15.5	<0.02	19.9	0.02
79056/005	GW 18	50	0	<0.1	374	6.3	72.1	600.6	3	30.4	0.1	57.7	<0.003	<0.3	13.6	<0.02	17.1	0.02
IGV	0	0	1	-	30	200	50	5	150	0.005	200	0.03	10	50	1	100	1	
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																	

Table 1.0 04th Quarter Ground water monitoring 2014

Report Number:	76483																	
Monitoring Date:	18.11.14																	
Method	Site Tests					TOC	Coliforms	Ammonia	AQ2-UP1	Coliforms	Titralab		AQ2-UP2	DO	Total Phosphorus-TP	AQ2-UP2	Titralab	
Method Number	Site Tests					DEFAULT	MIC133	EW003	EW154M	MIC133	EW153		EW154M	EW043	EW146	EW154M	EW153	
Parameter	Sample temperature (to be done onsite)	Cond	pH	Water Level from TOC	Visual Inspection	TOC	E. Coli	Ammonia	TON (as N)(calc)	Total Coliforms	pH	Cond	Chloride	Dissolved Oxygen	Total Phosphorus-TP	Sulphate	Alkalinity Total (R2 pH4.5)	
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 P	mg/l	mg/L CaCO3	
Limit of Detection	-	-	-	-	-	0.25		0.007	0.138	0	0.3	25	2.6	1.0	0.01	1.0	10	
Date Testing Initiated	18.11.14					19.11.14												
ELS Ref	Client Ref																	
76483/001	MW 3	11.4	965	7.15	1.48	Heavy Silt	18.41	0	57	0.151	24201	7.1	948	26.9	<1	3.97	35.1	509
76483/002	MW 4	11.6	529	7.68	1.2	Heavy Silt	12.44	140	0.13	0.609	8660	7.6	220	14.9	8	0.58	25.3	94
76483/003	MW 9	11.2	962	7.05	3.32	Heavy Silt	13.51	0	38	<0.138	120	6.9	958	14.8	<1	0.58	12.9	547
76483/004	MW 10	11	1623	5.06	2.03	Heavy Silt	22.01	0	120	0.154	160	6.9	1611	132.6	<1	0.53	47.4	787
76483/005	MW 11S	11.4	690	7.16	3.3	Straw	1.67	20	0.084	0.67	60	7	686	142.1	9	0.03	28.2	210
76483/006	MW 11D	10.8	405	7.81	10.8	Clear	0.76	120	0.043	0.357	190	7.7	396	9.2	8	0.05	16.4	202
76483/007	MW 16S	11.2	489	7.83	0.9	Straw	1.61	10	0.042	0.273	90	7.7	477	21.3	9	0.03	57.5	194
76483/008	MW 16D	10.1	494	7.55	0.3	Clear	0.27	10	0.089	2.111	50	7.5	485	22.9	8	0.02	72.3	178
76483/009	MW 17S	10.8	404	7.16	0.81	Straw	4.62	40	7.5	0.541	24201	7	397	16.4	8	1.4	27.8	177
76483/010	MW 17D	10.5	501	7.49	0.2	Clear	0.57	0	0.32	0.25	0	7.4	492	17.4	7	0.05	31.6	233
76483/011	MW 18	10.3	478	7.51	0	Clear	0.48	0	0.046	0.139	0	7.4	474	16.4	8	0.02	32.5	223
IGV		1000		≥6.5 and ≤9.5			NAC	0	0.15	NAC	0	≥6.5 and ≤9.5	1000	30	NAC	-	200	NAC
Method	Ion Chromatography	Residue on Evaporation	Metals-Total	Metals-Dissolved												Phenols-Total	Total Cyanide High	
Method Number	EW137	EW060	EM130	EM130												Default	Default	
Parameter	Fluoride	Residue on Evaporation	Chromium-Total	Iron Dissolved	Manganese Dissolved	Potassium Dissolved	Sodium Dissolved	Cadmium-Dissolved	Calcium-Dissolved	Copper-Dissolved	Lead-Dissolved	Magnesium-Dissolved	Mercury-Dissolved	Zinc-Dissolved	Boron-Dissolved	Phenols-Total	Total Cyanide High	
Units	mg/L	mg/L	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/L	mg/L	ug/L	mg/L	ug/L	ug/L	mg/L	mg/l	ug/L	
Limit of Detection	0.1	10.0	1.0	20.0	0.001	0.2	0.5	0.1	1.0	0.00	0.3	0.3	0.02	1.0	0.02	0.15	10	
Date Testing Initiated																		
ELS Ref	Client Ref																	
76483/001	MW 3	<0.1	1135	8.5	18000	690	14.3	35.2	<0.1	105.9	<0.003	0.4	17.8	<0.02	4.5	0.62	<0.15	22
76483/002	MW 4	<0.1	790	36.1	260	4.6	4.3	10	<0.1	29.5	0.003	0.8	3.7	<0.02	9.9	0.02	<0.15	<10
76483/003	MW 9	<0.1	895	11.5	26	1700	12.6	22	<0.1	126.8	<0.003	0.3	36.8	<0.02	8.5	0.08	<0.15	<10
76483/004	MW 10	<0.1	1035	5.9	1500	2400	36.8	76.8	<0.1	181.3	<0.003	0.3	32.1	<0.02	4	0.38	<0.15	<10
76483/005	MW 11S	0.17	13540	<3.0	<20	46	1.6	31.2	<0.1	76.1	<0.003	0.3	26.6	<0.02	8.2	0.02	<0.15	<10
76483/006	MW 11D	0.19	185	<3.0	<20	150	1.3	22.9	<0.1	51.6	<0.003	0.3	12.9	<0.02	6.7	<0.02	<0.15	<10
76483/007	MW 16S	0.17	270	35.2	<20	<1	1.7	32.4	<0.1	65.5	<0.003	0.3	13.1	<0.02	5.3	<0.02	<0.15	<10
76483/008	MW 16D	0.18	140	<3.0	<20	790	1.7	25.9	<0.1	68.2	<0.003	0.3	13.8	<0.02	9.6	<0.02	<0.15	<10
76483/009	MW 17S	<0.1	435	19.9	<20	410	4.7	26.6	<0.1	47.7	<0.003	0.3	8.3	<0.02	6.8	0.02	<0.15	<10
76483/010	MW 17D	0.1	265	<3.0	<20	1000	2.1	29.7	<0.1	61.5	<0.003	<0.3	15.3	<0.02	5	0.03	<0.15	<10
76483/011	MW 18	<0.1	265	<3.0	<20	640	2.1	30	<0.1	56.9	<0.003	<0.3	14.9	<0.02	6.5	0.02	<0.15	<10
IGV	1	-	30	200	50	5	150	0.005	200	0.03	10	50	1	100	1		10	
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.

4.0 DISCUSSION

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 the 23rd September and 18th November 2014. Results in Hatched Red indicate where the interim guide value has been exceeded. Results from the third and fourth quarters 2014 show that there were exceedances at various ground water monitoring locations for parameters; Iron, Ammonia, Total Coliforms, E-coli, Potassium, Chloride, Manganese, Conductivity and Cyanide. Cyanide is a parameter that is measured on an annual basis but due to the occurrence of exceedance at three locations in quarter 3 it was analysed again at all locations in quarter 4. Results from quarter 4 reveal elevated levels similar to that of quarter 3 and historical readings. Cyanide was found to be present again at one location during this monitoring event. This location was MW 3 and is located on the peripheries of the waste mass. Cyanide analysis will continue into quarter 1 2015. If further elevations are found outside the landfill boundaries in quarter 1, further remedial actions will be taken.

Elevated Iron levels can be an indication of contamination. The hypothesis that is proposed is that the source of this Iron is not the landfill leachate, but the native soils beneath the landfill. Iron can become mobilised due to changing pH and/or redox conditions in the environment underneath the landfill. Alternatively, the leachate from the non-hazardous waste may produce reducing conditions beneath the landfill, allowing the solution of Iron from the underlying deposits. Elevated Iron may also be attributed to the natural composition of this area.

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

5.0 CONCLUSION

The groundwater results obtained are relatively consistent with previous monitoring events and do not show any signs of dramatic exceedances. The presence of cyanide in the last two quarters warrants careful monitoring and so will again be analysed in quarter 1 2015. Information relating to previous results can be seen in the historical data tables in Appendix 1.



SURFACE WATER MONITORING REPORT FOR BALLYJAMESDUFF LANDFILL W0093-01

Client: Cavan County Council

Site Location: Derrylurgan, Ballyjamesduff

Report No.: CCC-03-01-04-04-Rev 0

Produced by: Brona Keating, BSc, P.Grad.Dip. Environmental Eng.

Approved by:

A handwritten signature in blue ink, appearing to read 'Cathal Boylan', is written over a horizontal line.

Date: 24th January 2015

Cathal Boylan, BEng, CEng, MIEI
CHARTERED ENGINEER

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Rev.	Date	Description

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I SUMMARY

Boylan Engineering (Eng. & Environmental Consultancy) was commissioned by Cavan County Council to carry out Environmental Monitoring at Ballyjamesduff Landfill (W0093-01), Derrylurgan, Ballyjamesduff, Co Cavan for quarter three and four 2014.

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

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1. 0 INTRODUCTION

Ballyjamesduff landfill is situated approximately 600m from Ballyjamesduff town centre in the town land of Derrylurgan. The site was in operation from the 1960's and comprises some 1.62 hectares. The site was originally peat land which was stripped for commercial purposes and was then operated as a traditional landfill until its closure in March 2002. A waste licence was issued by the Environmental Protection Agency after the closure of the site and remedial works were completed.

Condition 8.1 of the waste licence requires that monitoring be carried out in accordance with Schedule D of the licence. The following report give details of the surface water sampling programme conducted on site and also summarises findings and analytical results for quarter four 2014.

The purpose of environmental 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 the facility is not adversely affecting the countryside or places of interest
- Compare actual site behavior with expected/modeled behavior
- Establish a reliable database of information for the landfill throughout its life

According to the Response matrix for landfills, Ballyjamesduff landfill is situated in the R2¹ Zone. This zone was categorized using a vulnerability rating combined with the aquifer category for the area. Landfills situated in R2¹ Zones are acceptable subject to guidance 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.

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. 0 METHODOLOGY

2.1 Environmental Sampling

The following procedure is conducted by Boylan Engineering to ensure accurate surface water monitoring:

- Surface water samples are taken by grab sample using a Telescoup and Pendulum beaker.
- Having obtained a representative sample the following parameters are measured on-site using a Hanna HI 98129 combination waterproof high accuracy.
 - Conductivity
 - Temperature
 - pH
- Boylan Engineering operate a Sample Submission/Chain of Custody form, which accompanies the samples at all times.

2.2 Laboratory Analysis

- Samples are 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 are 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 fail.
- 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 2.

2.3 Monitoring Locations

Quarter 4 2014					
Monitoring Well	Sample Type	Cover Level M (OD Malin Head)	Water Level M (OD Malin Head)	Water Depth M (Top of Casing)	National Grid Co-Ordinates
MW1	Gas	94.92	91.72	3.2	N291352.31 E252020.68
MW2	Gas	92.92	90.82	2.1	N291377.38 E252082.84
MW3	GW	94.39	92.91	1.5	N291369.28 E252109.44
MW4	GW	93.65	92.45	1.2	N291309.78 E252129.14
MW5	Gas	92.84	-	n/a	TBC
MW6	Leachate	100.71	-	-	TBC
MW 7	Leachate	97.54	-	-	TBC
MW8	Leachate	96.56	-	-	N291346.99 E252041.22
MW9	GW	95.69	92.37	3.3	N291369.67 E252103.93
MW10	GW	93.95	91.92	2.0	N291314.86 E252138.12
MW11S	GW	TBC	-	3.3	TBC
MW11D	GW	TBC	-	10.8	TBC
MW12	Gas	94.38	-	n/a	N291236.30 E252110.10
MW13	Gas	94.69	-	n/a	TBC
MW14	Gas	98.77	-	n/a	N291263.92 E252131.54
MW15	Gas	93.11	-	n/a	TBC
MW16S	GW	94.02	93.12	0.9	N252076.89 E291174.65
MW16D	GW	94.16	93.86	0.3	N252077.36 E291173.27
MW17S	GW	93.59	92.78	0.8	N251997.04 E291377.19
MW17D	GW	93.63	93.43	0.2	N251997.80 E291376.00
MW18	GW	93.5	93.5	0.0	N251986.57 E291425.39
SW1	SW	n/a	-	n/a	TBC
SW2	SW	n/a	-	n/a	TBC
Cap	SW	n/a	-	n/a	TBC

2.4 Weather Report

REPORTS FROM BALLYHAISE (A)							
Date	Rainfall	Max	Min	Grass Min Temp	Mean Wind Speed (knots)	Maximum Gust	Sunshine
	(mm)	Temp	Temp	(°C)		(if >= 34 knots)	(hours)
		(°C)	(°C)				
18/11/2014	0.1	12.2	5.2	0.1	3.6		

3.0 SUMMARY OF RESULTS

Table 1.0 04th Quarter Surface water monitoring 2014

Report Number	80724												
Monitoring Date	18/11/2014												
Method	Site Tests	Site Tests	Site Tests	Site Tests	Ammonia	Titralab	Titralab	BOD	COD	Suspended Solids	AQ2-UP2	Dissolved Oxygen	
Method Number	Site Tests	Site Tests	Site Tests	Site Tests	EW003	EW138	EW139	EW001	EW094	EW013	EW015	EW043	
Parameter	Sample temperature (to be done onsite)	Cond	pH	Visual Inspection	Ammonia	pH	Cond	BOD	COD	Suspended Solids	Cl	DO	
Units	Deg C	us/cm	pH units	-	mg/l N	pH Units	uscm-1@20	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	18.11.14						19.11.14						
ELS Ref	Client Ref												
80723/001	SW 1	8.7	227	7.05	Clear	0.032	7	201	2	30	<5	18.9	9
80723/002	SW 2	8.5	189	9.02	Clear	0.1	6.9	182	<1	32	<5	14.6	9
80723/003	Discharge Cap	9.5	208	7.01	Clear	0.072	6.8	200	<1	29	<5	14.3	9
S.I No. 294/1989					0.2	≥5.5 and ≤8.5	1000	5	40	-	250	-	
Exceedance													
NOTES													
1	Sub-contract analysis denoted by *												
2	ND - Concentration was below the limit of detection												
3	NAC- No Abnormal Change												

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.

4.0 DISCUSSION

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

Surface water samples were taken at SW1 and at SW2 and at the discharge cap.

With regard to all surface water samples, there were some minor exceedances for parameters COD and ammonia which are attributed to stagnation as a result of the prolonged dry weather at the time of monitoring. All remaining results were within specified limits.

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

5.0 CONCLUSION

The surface results obtained are relatively consistent with previous monitoring events and do not show any signs of concerning exceedances. Therefore there is no evidence of any major negative environmental impact associated with this landfill. Information relating to previous results can be seen in the historical data tables in Appendix 1.



LEACHATE MONITORING REPORT FOR BALLYJAMESDUFF LANDFILL W0093-01

Client: Cavan County Council

Site Location: Derrylurgan, Ballyjamesduff

Report No.: CCC-03-01-04-04-Rev 0

Produced by: Brona Keating, BSc, P.Grad.Dip. Environmental Eng.

Approved by:

A handwritten signature in blue ink, appearing to read 'Cathal Boylan', is written over a horizontal line.

Date: 24th January 2015

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I SUMMARY

Boylan Engineering (Eng. & Environmental Consultancy) was commissioned by Cavan County Council to carry out Environmental Monitoring at Ballyjamesduff Landfill (W0093-01), Derrylurgan, Ballyjamesduff, Co Cavan for quarter four 2014.

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

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1. 0 INTRODUCTION

Ballyjamesduff landfill is situated approximately 600m from Ballyjamesduff town centre in the town land of Derrylurgan. The site was in operation from the 1960's and comprises some 1.62 hectares. The site was originally peat land which was stripped for commercial purposes and was then operated as a traditional landfill until its closure in March 2002. A waste licence was issued by the Environmental Protection Agency after the closure of the site and remedial works were completed.

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 leachate sampling programme conducted on site and also summarises findings and analytical results for quarter four 2014.

The purpose of environmental 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 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, Ballyjamesduff landfill is situated in the R2¹ Zone. This zone was categorized using a vulnerability rating combined with the aquifer category for the area. Landfills situated in R2¹ Zones are acceptable subject to guidance 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.

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. 0 METHODOLOGY

2.1 Environmental Sampling

The following procedure is conducted by Boylan Engineering to ensure accurate leachate monitoring:

- ISO 5667: Guidance on sampling of groundwaters is adhered to.
- Prior to sampling, the depth of water in wells is measured by dipping.
- Sampling is conducted using a Waterra inertial lift pump and associated tubing, pumping water directly from the borehole to the appropriate sampling bottles.
- Designated tubing is used at each location.
- Having obtained a representative sample the following parameters are measured on-site using a Hanna HI 98129 combination waterproof high accuracy analyser and a Hanna 9164 meter, respectively.
 - Conductivity
 - Temperature
 - pH
- Boylan Engineering operate a Sample Submission/Chain of Custody form, which accompanies the samples at all times.

2.2 Laboratory Analysis

- Samples are 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 are 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 fail.
- 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 2.

2.3 Monitoring Locations

Quarter 4 2014					
Monitoring Well	Sample Type	Cover Level M (OD Malin Head)	Water Level M (OD Malin Head)	Water Depth M (Top of Casing)	National Grid Co-Ordinates
MW1	Gas	94.92	91.72	3.2	N291352.31 E252020.68
MW2	Gas	92.92	90.82	2.1	N291377.38 E252082.84
MW3	GW	94.39	92.91	1.5	N291369.28 E252109.44
MW4	GW	93.65	92.45	1.2	N291309.78 E252129.14
MW5	Gas	92.84	-	n/a	TBC
MW6	Leachate	100.71	-	-	TBC
MW 7	Leachate	97.54	-	-	TBC
MW8	Leachate	96.56	-	-	N291346.99 E252041.22
MW9	GW	95.69	92.37	3.3	N291369.67 E252103.93
MW10	GW	93.95	91.92	2.0	N291314.86 E252138.12
MW11S	GW	TBC	-	3.3	TBC
MW11D	GW	TBC	-	10.8	TBC
MW12	Gas	94.38	-	n/a	N291236.30 E252110.10
MW13	Gas	94.69	-	n/a	TBC
MW14	Gas	98.77	-	n/a	N291263.92 E252131.54
MW15	Gas	93.11	-	n/a	TBC
MW16S	GW	94.02	93.12	0.9	N252076.89 E291174.65
MW16D	GW	94.16	93.86	0.3	N252077.36 E291173.27
MW17S	GW	93.59	92.78	0.8	N251997.04 E291377.19
MW17D	GW	93.63	93.43	0.2	N251997.80 E291376.00
MW18	GW	93.5	93.5	0.0	N251986.57 E291425.39
SW1	SW	n/a	-	n/a	TBC
SW2	SW	n/a	-	n/a	TBC
Cap	SW	n/a	-	n/a	TBC

2.4 Weather Report

REPORTS FROM BALLYHAISE (A)							
Date	Rainfall	Max	Min	Grass Min	Mean Wind Speed (knots)	Maximum	Sunshine
	(mm)	Temp	Temp	Temp		Gust	
		(°C)	(°C)	(°C)		(if >= 34 knots)	
18/11/2014	0.1	12.2	5.2	0.1	3.6		

2.0 SUMMARY OF RESULTS

Table 1.0 04th Quarter Leachate monitoring 2014

Report Number	80725								
Monitoring Date:	18/11/2014								
Method Number	Site Tests	EW154M	EW154M	EW153	EW153	EW001	EW096	EW154M-1	
Parameter	Visual Inspection	Ammonia (as N)	TON (as N)(Calc)	pH	Conductivity @20 DegC	BOD	COD	Chloride	
Units		mg/l N	mg/l N	pH Units	uscm-1@20	mg/L	mg/L	mg/L	
Limit of Detection	-	0.007	0.138	0.3	25	1	8	2.6	
Date Testing Initiated	18.6.14	19.11.14							
ELS Ref	Client Ref								
80725/001	MW7	Heavy Silt	13	<0.69	6.9	980	7	136	19.9
80725/002	MW8	Heavy Silt	62	<0.69	7.2	1397	64	151	45
Inerim Guide Value		0.15	-	≥6.5&≤9.5	1000	-	-	30	
Exceedance									
NOTES									
1	Sub-contract analysis denoted by *								
2	ND = Concentration was below the limit of detection								

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.

4.0 DISCUSSION

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 bold italics indicate where the interim guide value has been exceeded. A leachate sample was abstracted from wells MW7 and MW8 during quarter three monitoring. Results show that the Interim Guide Value was exceeded at on this occasion for the parameters Ammonia, conductivity & chloride. These results are consistent with those obtained in previous monitoring events.

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

5.0 CONCLUSION

5.1 Environmental Monitoring

The leachate results obtained are 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. Information relating to previous results can be seen in the historical data tables in Appendix 1.



GAS MONITORING REPORT FOR BALLYJAMESDUFF LANDFILL W0093-01

Client: Cavan County Council

Site Location: Derrylurgan, Ballyjamesduff

Report No.: CCC-03-01-04-03&04-Rev 0

Produced by: Bróna Keating, B.Sc., Dip. Environmental Eng., M.Sc., MCIWM

Approved by:

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Date: 07th April 2015

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I SUMMARY

Boylan Engineering (Eng. & Environmental Consultancy) was commissioned by Cavan County Council to carry out Environmental Monitoring at Ballyjamesduff Landfill (W0093-01), Derrylurgan, Ballyjamesduff, Co Cavan for quarter three and four 2014.

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

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1. 0 INTRODUCTION

Ballyjamesduff landfill is situated approximately 600m from Ballyjamesduff town centre in the town land of Derrylurgan. The site was in operation from the 1960's and comprises some 1.62 hectares. The site was originally peat land which was stripped for commercial purposes and was then operated as a traditional landfill until its closure in March 2002. A waste licence was issued by the Environmental Protection Agency after the closure of the site and remedial works were completed.

Condition 8.1 of the waste licence requires that monitoring be carried out in accordance with Schedule D of the licence. The following report give details of the landfill gas sampling programme conducted on site and also summarises findings and analytical results for quarter three and four 2014.

The purpose of 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

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.

2. 0 METHODOLOGY

2.1 Landfill Gas Analysis

The following procedure is employed by Bróna Keating of Boylan Engineering to ensure accurate monitoring:

- EPA, Landfill Manual, landfill monitoring 2nd Edition is adhered to.
- Prior to sampling, a dip meter is used to measure water levels, if present, in the wells.
- GA 2000 landfill gas analyser is used to measure the gas levels.
- The analyser is purged and connected to the sealed well monitoring nozzle.
- The monitoring nozzle is turned to the open position and the analyser measured the gas levels at 60 second intervals for no less than 10 minutes. The analyser is allowed to run for this period of time to allow for a representative average to be obtained.
- All data is recorded on the Gas Analysis field sheet.
- The instrument is removed after 10 minutes and the monitoring nozzle returned to the closed position.
- The GA2000 is switched off between each monitoring location so as to allow the instrument to purge.
- This process is repeated at each monitoring location.
- Data for the GA 2000 was downloaded in the Boylan Engineering office.

2.2 Monitoring Locations

Quarter 3 2014					
Monitoring Well	Sample Type	Cover Level M (OD Malin Head)	Water Level M (OD Malin Head)	Water Depth M (Top of Casing)	National Grid Co-Ordinates
MW1	Gas	94.92	91.72	3.2	N291352.31 E252020.68
MW2	Gas	92.92	90.82	2.1	N291377.38 E252082.84
MW3	GW	94.39	92.99	1.4	N291369.28 E252109.44
MW4	GW	93.65	#VALUE!	-	N291309.78 E252129.14
MW5	Gas	92.84	-	n/a	TBC
MW6	Leachate	100.71	-	-	TBC
MW 7	Leachate	97.54	-	-	TBC
MW8	Leachate	96.56	-	-	N291346.99 E252041.22
MW9	GW	95.69	#VALUE!	-	N291369.67 E252103.93
MW10	GW	93.95	91.99	2.0	N291314.86 E252138.12
MW11S	GW	TBC	-	3.7	TBC
MW11D	GW	TBC	-	12.6	TBC
MW12	Gas	94.38	-	n/a	N291236.30 E252110.10
MW13	Gas	94.69	-	n/a	TBC
MW14	Gas	98.77	-	n/a	N291263.92 E252131.54
MW15	Gas	93.11	-	n/a	TBC
MW16S	GW	94.02	93.02	1.0	N252076.89 E291174.65
MW16D	GW	94.16	93.86	0.3	N252077.36 E291173.27
MW17S	GW	93.59	92.34	1.3	N251997.04 E291377.19
MW17D	GW	93.63	93.27	0.4	N251997.80 E291376.00
MW18	GW	93.5	93.5	0.0	N251986.57 E291425.39
SW1	SW	n/a	-	n/a	TBC
SW2	SW	n/a	-	n/a	TBC
Cap	SW	n/a	-	n/a	TBC

Quarter 4 2014					
Monitoring Well	Sample Type	Cover Level M (OD Malin Head)	Water Level M (OD Malin Head)	Water Depth M (Top of Casing)	National Grid Co-Ordinates
MW1	Gas	94.92	91.72	3.2	N291352.31 E252020.68
MW2	Gas	92.92	90.82	2.1	N291377.38 E252082.84
MW3	GW	94.39	92.94	1.5	N291369.28 E252109.44
MW4	GW	93.65	92.85	0.8	N291309.78 E252129.14
MW5	Gas	92.84	-	n/a	TBC
MW6	Leachate	100.71	-	-	TBC
MW 7	Leachate	97.54	-	-	TBC
MW8	Leachate	96.56	-	-	N291346.99 E252041.22
MW9	GW	95.69	92.43	3.3	N291369.67 E252103.93
MW10	GW	93.95	91.94	2.0	N291314.86 E252138.12
MW11S	GW	TBC	-	2.9	TBC
MW11D	GW	TBC	-	12.7	TBC
MW12	Gas	94.38	-	n/a	N291236.30 E252110.10
MW13	Gas	94.69	-	n/a	TBC
MW14	Gas	98.77	-	n/a	N291263.92 E252131.54
MW15	Gas	93.11	-	n/a	TBC
MW16S	GW	94.02	93.15	0.9	N252076.89 E291174.65
MW16D	GW	94.16	93.66	0.5	N252077.36 E291173.27
MW17S	GW	93.59	92.78	0.8	N251997.04 E291377.19
MW17D	GW	93.63	93.43	0.2	N251997.80 E291376.00
MW18	GW	93.5	93.5	0.0	N251986.57 E291425.39
SW1	SW	n/a	-	n/a	TBC
SW2	SW	n/a	-	n/a	TBC

2.3 Weather Report

REPORTS FROM BALLYHAISE (A)							
Date	Rainfall	Max	Min	Grass Min Temp	Mean Wind Speed (knots)	Maximum Gust	Sunshine (hours)
	(mm)	Temp	Temp	(°C)		(if >= 34 knots)	
		(°C)	(°C)				
30/09/2014	2	19.3	12	10.9	7.5		

REPORTS FROM BALLYHAISE (A)							
Date	Rainfall	Max	Min	Grass Min Temp	Mean Wind Speed (knots)	Maximum Gust	Sunshine (hours)
	(mm)	Temp	Temp	(°C)		(if >= 34 knots)	
		(°C)	(°C)				
25/11/2014	0.4	8.5	4.1	3.2	2.8		

3.0 SUMMARY OF RESULTS

Table 1.0 03rd Quarter Landfill Gas monitoring 2014

Method	GA 2000	GA 2000	GA 2000	GA 2000	GA 2000		
Parameter	CH ₄	CO ₂	O ₂	H ₂ S	Barometric Pressure	Position to waste mass	
Units	% v/v	% v/v	%	PPM	mb		
Date Testing	30/09/2014						
GA 2000 Ref	Client Ref						
1	MW 1	0.1	0.5	20	996	0	Outside
3	MW 2	0.1	0.4	20.6	996	0	Outside
7	MW5	0	0.1	21	0	999	Outside
6	MW 12	1.1	1.2	20.3	994	0	Inside
2	MW 13	0.1	0.1	20.7	996	0	Outside
4	MW 14	11.5	9.9	13.3	995	0	Inside
5	MW 15	12.6	14.5	9.6	994	0	Outside
	Limit	1	1.5				

Table 1.0 04th Quarter Landfill Gas monitoring 2014

Method	GA 2000	GA 2000	GA 2000	GA 2000	GA 2000		
Parameter	CH ₄	CO ₂	O ₂	H ₂ S	Barometric Pressure	Position to waste mass	
Units	% v/v	% v/v	%	PPM	mb		
Date Testing	25/11/2014						
GA 2000 Ref	Client Ref						
1	MW 1	0.1	0.7	19.8	0	999	Outside
3	MW 2	0.1	0.4	20.6	0	999	Outside
7	MW5	0.2	0.1	21	0	999	Outside
6	MW 12	1.4	1.3	20.3	0	999	Inside
2	MW 13	0.1	0.2	20.6	0	999	Outside
4	MW 14	11.3	10	14.1	0	999	Inside
5	MW 15	12.7	15.4	10.4	0	999	Outside
	Limit	1	1.5				

4.0 DISCUSSION

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 during quarter three and four are relatively consistent with previous results and as the well is within the waste mass it is not observed as being an exceedance. It is preferable that the results are within the limits stipulated within the licence.

5.0 CONCLUSION

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 first quarter of 2015.

APPENDIX 1- HISTORICAL DATA

APPENDIX 2- LANDFILL GAS BREAKDOWN

Quarter 3

MW1

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
30/09/2014 13:16	0.1	0.8	19.6	996	0
30/09/2014 13:17	0.1	0.5	20.1	996	0
30/09/2014 13:18	0.1	0.5	20.1	996	0
30/09/2014 13:19	0.1	0.4	20.2	996	0
30/09/2014 13:20	0.1	0.4	20.2	996	0

MW 2

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
30/09/2014 13:31	0.1	0.4	20.6	996	0
30/09/2014 13:32	0.1	0.4	20.6	996	0
30/09/2014 13:33	0.1	0.4	20.6	996	0
30/09/2014 13:34	0.1	0.4	20.6	996	0
30/09/2014 13:35	0.1	0.4	20.6	996	0

MW 5

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
30/09/2014 14:06	0	0.1	21	0	999
30/09/2014 14:07	0	0.1	21	0	999
30/09/2014 14:08	0	0.1	21	0	999
30/09/2014 14:09	0	0.1	21	0	999
30/09/2014 14:10	0	0.1	21	0	999

MW 12

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
30/09/2014 13:58	0.9	0.9	20.4	994	0
30/09/2014 13:59	1.4	1.4	20.4	994	0
30/09/2014 14:00	0.8	0.7	20.6	994	0
30/09/2014 14:01	1.2	1.3	20.3	994	0
30/09/2014 14:02	1.3	1.5	20.1	994	0

MW 13

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
30/09/2014 13:23	0.1	0.1	20.7	996	0
30/09/2014 13:24	0.1	0.1	20.8	996	0
30/09/2014 13:25	0.1	0.1	20.8	996	0
30/09/2014 13:26	0.1	0.1	20.7	996	0
30/09/2014 13:27	0.1	0.1	20.7	996	0

MW 14

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
30/09/2014 13:38	11.6	9.1	14	995	0
30/09/2014 13:39	11.6	10.1	13.1	995	0
30/09/2014 13:40	11.5	10.1	13.1	995	0
30/09/2014 13:41	11.5	10.1	13.1	995	0
30/09/2014 13:42	11.5	10.1	13.1	995	0

MW 15

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
30/09/2014 13:49	12.4	14.4	9.7	994	0
30/09/2014 13:50	12.7	14.5	9.6	994	0
30/09/2014 13:51	12.6	14.5	9.6	994	0
30/09/2014 13:52	12.6	14.5	9.6	994	0
30/09/2014 13:53	12.6	14.5	9.6	994	0

Quarter 4

MW1

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
25/11/2014 10:18	0.1	0.8	19.6	0	999
25/11/2014 10:19	0.1	0.7	19.7	0	999
25/11/2014 10:20	0.1	0.7	19.8	0	999
25/11/2014 10:21	0.1	0.6	19.9	0	999
25/11/2014 10:22	0.1	0.5	20.1	0	999

MW 2

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
25/11/2014 10:39	0.1	0.4	20.6	0	999
25/11/2014 10:40	0.1	0.4	20.6	0	999
25/11/2014 10:41	0.1	0.4	20.5	0	999
25/11/2014 10:42	0.1	0.4	20.6	0	999
25/11/2014 10:43	0.1	0.4	20.6	0	999

MW 5

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
25/11/2014 11:42	0.2	0.1	21	0	999
25/11/2014 11:43	0.2	0.1	21	0	999
25/11/2014 11:44	0.3	0.1	21	0	999
25/11/2014 11:45	0.2	0.1	21	0	999
25/11/2014 11:46	0.3	0.1	21	0	999

MW 12

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
25/11/2014 11:35	1.3	1.3	20.3	0	999
25/11/2014 11:36	1.3	0.8	20.5	0	999
25/11/2014 11:37	1.4	1.3	20.3	0	999
25/11/2014 11:38	1.4	1.2	20.4	0	999
25/11/2014 11:39	1.3	1.4	20.2	0	999

MW 13

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
25/11/2014 10:27	0.1	0.2	20.4	0	999
25/11/2014 10:28	0.1	0.2	20.5	0	999
25/11/2014 10:29	0.1	0.2	20.6	0	999
25/11/2014 10:30	0.1	0.1	20.7	0	999
25/11/2014 10:31	0.1	0.1	20.8	0	999

MW 14

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
25/11/2014 11:18	11.2	9.1	14	0	999
25/11/2014 11:19	11.2	10.2	14	0	999
25/11/2014 11:20	11.3	10.2	14.1	0	999
25/11/2014 11:21	11.4	10.1	14.2	0	999
25/11/2014 11:22	11.5	10.2	14.3	0	999

MW 15

DATE	CH4	CO2	O2	H2S	Barometric Pressure (mb)
25/11/2014 11:29	12.8	15.6	10.2	0	999
25/11/2014 11:30	12.8	15.5	10.3	0	999
25/11/2014 11:31	12.7	15.5	10.5	0	999
25/11/2014 11:32	12.7	15.3	10.5	0	999
25/11/2014 11:33	12.6	15.3	10.6	0	999

