



Annual Environmental Report 2013 for Carrowbrowne Landfill facility.

Waste License Reference no. W013-01

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Introduction

The landfill facility at Carrowbrowne was granted an EPA waste license on the 28th August 2003. The facility currently incorporates an invessel composting facility and a closed landfill facility. Waste has not been accepted at the landfill facility since approximately 1999.

This annual environmental report is drafted in line with the content requirements as set out under schedule G of the waste license

Policy

Galway City Council is committed to meeting all conditions as set out in waste license W013-01.

1. Reporting Period

January 2013 - December 2013

2. Waste Activities Carried out at the facility

During the reporting period the facility accepted organic household waste at the in vessel composting facility only. This waste is processed at this facility with a final compost product produced. Contaminants extracted from the composting process are dispatched off site for disposal at a licensed facility for same. No waste was accepted at the landfill facility during the reporting period.

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

Waste accepted at the composting facility during the reporting period was that collected by the Galway City Council refuse collection service. This consisted of household domestic organic food and garden waste (ie brown bin waste). No other waste was accepted during the reporting period.

Waste emanating from the composting process was issued to Barna waste during the reporting period. This waste consists of items that are contained in the organic waste accepted but that are not compostible and are therefore removed manually and mechanically as part of the composting process.

Reporting period

Waste In: 2429tonnes
Waste out: 743tonnes
Recovered: 1686tonnes

2012

Waste In: 3839tonnes
Waste out: 1100tonnes (approx)
Recovered: 2739tonnes (approx)

4. Summary report on emissions

Condition 6 of the license details the requirements for the facility with regard to emissions with the emission limit values outlined in Schedule C of the license.

Noise

emission limits

Day dB(A) _{L_{AEQ}} (30 minutes)	Night dB(A) _{L_{AEQ}} (30 minutes)
55	45

Summary of survey

Location	Mean L(A) ₁₀
N1	44
N2	50
N3	51
N4	47
N5	66
N6	57

An annual noise survey at the facility was carried out. This survey included daytime noise sampling at 5no. Locations around the facility. 3 no. of the locations were found to be in excess of the ELV as set out. N3 was 1dB greater than the ELV. N5 and N6 are located in close proximity to the heavily trafficked N84 and this is likely the reason for the exceedances All other locations were within the ELV. As the facility was not operational during the night time during the reporting period no noise recordings were taken at night time.

Dust Deposition

limits

Level (mg/m ² /day)
350

Summary of surveys

	January- April(mg/m ² /day)	May-August(mg/m ² /day)	September-December(mg/m ² /day)
D1	45.4	110	194.9
D2	55.9	415.1	160.8
D3	329.5	75.5	130.1
D4	98.3	178.6	196

The dust deposition at the facility is assessed at 4 no. locations on three occasions throughout the year. The results for same detail that at all locations on site the dust deposition is below the threshold as set in the license with one exception as shown in the summary above. This exceedance is as a result of algae in the dust collection jar and therefore should not be considered as an accurate result. The results show that the requirement for this sampling is questionable. GCC will continue in 2014 to monitor the dust deposition with a view to, subject to good results, making an application to the agency to remove this sampling requirement post 2014.

Surface Water

Surface Water discharge at civic amenity facility is not relevant as there is no civic amenity facility within the licensed site.

Landfill gas

The gas system at the landfill facility is split in 3 areas of monitoring. 1. Gas Flare unit; 2. Gas collection system; 3. Gas boreholes. Emissions are required to be monitored at the composting building at the facility and at the flare unit.

Landfill gas concentration limits (measured in buildings at the facility)

Methane	Carbon Dioxide
20% LEL v/v	1.5% v/v

This refers to any buildings at the facility. An alarm with the limits as outlined is in place in the composting facility office. There were no exceedances during the reporting period.

Emission limit values for enclosed landfill gas flare unitOutlet

Nitrogen oxides	150mg/m ³
CO	50mg/m ³
Particulates	130mg/m ³
Hydrogen Chlorides	50mg/m ³
Hydrogen Flouride	5mg/m ³

The analysis of the emissions from the Flare stack outlet was not conducted during the reporting period. This analysis will be conducted in 2014.

Composting Process

Ammonia	50mg/m ³
Hydrogen Sulphide	5mg/m ³
Mercaptans	5mg/m ³

The composting facility comprises of 2 no. Biofilters which are monitored quarterly as per the license requirements (table D.2.3). The bed media and odour are visually inspected daily by facility staff as required. Both filters are monitored quarterly as per the license requirements. A summary of the findings are detailed below:

Bed Media	Q1		Q2		Q3		Q4	
	Reception filter	ASP filter	Reception filter	ASP filter	Reception filter	ASP filter	Reception filter	ASP filter
pH	7.5		7.3	7.6	7.0	6.2	5.8	6.4
Ammonia	25.8mg/m ³		5.56mg/m ³	11.72mg/m ³	1.6mg/m ³	277mg/m ³	1.6mg/m ³	2.6mg/m ³
Total viable counts	124000cfu/g		1900000cfu/g	78000cfu/g	530000cfu/g	149000cfu/g	1300000cfu/g	490000cfu/g

The results indicate one exceedance of the ELV's in Q3 on the ASP biofilter bed media. This figure is hugely distorted from the other readings over the reporting period and as such is unreliable.

Inlet and outlet gas	Q1 (mg/m ³ unless stated)				Q2(mg/m ³ unless stated)				Q3(mg/m ³ unless stated)				Q4(mg/m ³ unless stated)			
	Recep in	Recep out	Asp in	Asp out	Recep in	Recep out	Asp in	Asp out	Recep in	Recep out	Asp in	Asp out	Recep in	Recep out	Asp in	Asp out
Ammonia	21	<3.5	3.95	<3.5	158	<3.5	55	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
Hydrogen Sulphide	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27	<.27
Mercaptans	<.5ppm	<.05ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm	<.5ppm

The results indicate two exceedances of the ELV's in Q2 on the inlet gases on both biofilters in Q2. The exceedances are hugely distorted from the other readings over the reporting period and as such are unreliable.

5. Summary of results and interpretation of environmental monitoring

The license requires that GCC carry out monitoring of surface water, ground water and leachate at the landfill facility in line with table D.4.4. in the license.

Surface Water Monitoring

The sampling locations were G12s,G21s,G22s,G23s,G24s,G37s,G38s,

Monthly monitoring requirement:

GCC are required to monitor the above locations for visual inspection and odour. There is no record of this monitoring being carried out during the reporting period.

Quarterly monitoring requirement:

GCC are required to monitor the above locations for the following parameters:

- Ammoniacal Nitrogen (mg/l N)
- BOD (mg/l O₂)
- COD (mg/l O₂)
- Chloride (mg/l Cl)
- Dissolved Oxygen (% Saturation)
- Electrical Conductivity (µS/cm)
- pH
- Suspended Solids (mg/l)
- Temperature (°C)

Quarterly monitoring was carried out on four occasions during the reporting period; these were 13th March, 24th May, 15th August and 30th October.

Summary

The table below summarises the test results for surface water at all locations over the four quarters of the reporting period. Reference document used 'Parameters of Water Quality – Interpretation and Standards'; EPA publication.

The results show the following:

- Ammonia levels at G12s in Q2 was outside the levels as outlined in the EPA parameters of water quality document for A3 waters. Overall the ammonia levels are low at the sample points with 39% of samples below the A1 waters limit; 68% below the A2 waters limit and 98% below the A3 waters limit.
- BOD levels in general are low. There are 2 no. exceedences in Q3 at G12s and G38s. The other 26 results are within the A1 waters limits.
- Chloride levels are all within the A1 waters limits.
- COD levels were exceeded in 9 samples during the reporting period with all other test results within the limits as outlined in the reference document. Most exceedences are very slightly above the limits set.
- Conductivity levels in all samples is within the limits for A1 waters as outlined in the reference document.
- Dissolved oxygen levels in 10 no of the 28 samples during the reporting period were below the 30% threshold level for A3 waters. This would be affected given the nature of the streams sampled.
- The pH levels are all within the parameters for A1 waters (5.5-8.5)
- Suspended solids levels were exceeded at G12s in Q 3 and 4 and at G21s in Q3. All other levels were below the 50mg/l limit for A1 waters. The result for Q4 at G12s appears to be inaccurate given that the sample is from a stream of water and this result should be disregarded as being spurious.
- The temperature of samples were all below the 25 °C limit set for A3 waters.

parameter	Qtr	locations						
		G12s	G21s	G22s	G23s	G24s	G37s	G38s
Ammoniacal Nitrogen (mg/l N)	1	2.86	.277	.803	.058	1.82	1.65	.094
	2	6.54	.096	.749	.054	1.66	.193	<.01
	3	.27	.171	.226	.04	3.05	.164	.129
	4	3.83	.509	.465	<.01	1.74	.382	.082
BOD (mg/l O ₂)	1	<2	<2	<2	<2	<2	<2	<2
	2	<2	<2	<2	3	<2	<2	<2
	3	58	<2	<2	<2	2	<2	13
	4	<2	<2	<2	<2	<2	<2	8
Chloride (mg/l Cl)	1	24.31	24.1	26.13	28.44	27.13	27.98	20.99
	2	43.89	24.66	31.12	24.16	26.91	25.84	25.56
	3	23.19	24.49	24.43	23.85	30.38	24.01	23.41
	4	36.83	28.49	25.02	22.62	29.48	20.37	24.79
COD (mg/l O ₂)	1	44	24	51	46	36	54	26
	2	16	46	41	46	48	37	32
	3	66	23	37	45	37	37	27
	4	36	43	50	71	59	60	29
Electrical Conductivity (µS/cm)	1	683	580	419	129.4	587	247	533
	2	692	503	318	152	510	508	533
	3	409	507	500	163	560	487	514
	4	723	477	422	108	449	131	481
Dissolved Oxygen (% Saturation)	1	14.5	38.8	26.9	35.8	26.4	17.1	21.4
	2	102.1	21.7	90.6	95.7	26.1	90.7	96.8
	3	48.6	68.9	43.7	54.8	27.8	50.6	6.3
	4	12.9	23.8	24.9	37.2	23.3	39.2	24.5
pH	1	7.2	7.4	7.2	6.5	7.5	6.9	7.2
	2	7.6	7.2	7.5	7.2	7.2	7.6	7.7
	3	7	7	7.5	7.1	7.3	7.5	7
	4	7	7.2	7.3	6.3	7.2	7	7.1
Suspended Solids (mg/l)	1	10	5	4	2	9	3	<2
	2	7	21	6	24	6	9	5
	3	405	189	8	5	7	6	10
	4	1440	2	4	5	12	2	4
Temperature (°C)	1	7.8	3.7	7.4	6.6	6.0	6.9	7.7
	2	15	15.9	12	14.1	16.8	11.3	13
	3	20.4	20.1	17.8	18.1	20.1	17.7	15.3
	4	12.2	10.8	10.2	9.8	9.7	9.4	11

Annual Monitoring Requirement:

GCC are required to monitor at the listed locations for the following parameters:

- Sulphate (mg/l SO₄)
- Total Alkalinity (mg/l CaCO₃)
- Total Phosphorous/orthophosphate (mg/l P)
- Total Oxidised Nitrogen (mg/l N)
- Metals and non-metals
- Mercury (µg/l)
- Biological Assessment

Parameter (mg/L unless stated)	Units	location					
		G12s	G21s	G22s	G23s	G24s	G37s
Boron	µ g/L	202.3	185.8	74.53	38.72	141.9	120.1
Cadmium	µ g/L	.021	.04	.03	<.01	.015	.011
Calcium	mg/L	55.96	93.4	79.4	17.16	80.53	78.46
Chromium	µ g/L	<.58	<.58	<.58	<.58	<.58	<.58
Copper	µ g/L	13.22	16.27	15.91	10.53	12.94	12.55
Iron	µ g/L	367.5	479.8	217.1	177.4	567.8	260
Lead	µ g/L	.795	.821	.605	.449	.71	.891
Magnesium	mg/L	3.504	4.026	3.543	2.02	3.933	3.47
Manganese	µ g/L	37.21	78.13	17.82	1.998	46.35	16.33
Mercury	µ g/L	<.03	<.03	<.03	<.03	<.03	<.03
Nickel	µ g/L	2.119	3.501	1.273	.796	1.976	2.732
Total oxidised Nitrogen	mg/L as N	.07	.09	.57	<.07	.14	.86
pesticides(orga nochloride)	µ g/L	<.1	<.1	<.1	<.1	<.1	<.1
Peesticides (Organophosp horous)	µ g/L	<.1	<.1	<.1	<.1	<.1	<.1
Phosphate (ortho)	mg/L as P	.009	.01	.009	<.006	.012	.007
Phosphate (total)	mg/L as P	2.431	2.633	.048		.069	.028
Potassium	mg/L	3.618	3.77	2.153		4.32	2.046
Semi volotile organic compounds	µ g/L	<.5	<.5	<.5	<.5	<.5	<.5
Sodium	µ g/L	9.972	11.25	9.368		11.82	9.136
Sulphate	mg/L	47.79	33.05	24.23		22.56	23.04
VOCs	µ g/L	<1	<1	<1	<1	<1	<1
Zinc	µ g/L	<.63	7.81	1.622		13.73	16.09

The levels of copper at all locations exceeded that outlined in the european communities environmental objectives(surface waters) regulations 2009. All other parameters were within the guidance levels.

Ground Water Monitoring

The sampling locations were G1AP, G4AP, G9AP, G10AP, G108AP, G1A, G2A, G4A, G10A, 105A, 106A, 108A, 116A.

Quarterly monitoring requirement:

GCC are required to monitor the above locations for the following parameters:

- Visual inspection/odour
- groundwater level
- Ammoniacal Nitrogen (mg/l N)
- Chloride (mg/l Cl)
- Electrical Conductivity ($\mu\text{S}/\text{cm}$)
- pH
- Total Organic Carbon

Quarterly monitoring was carried out on four occasions during the reporting period; these were 18th February, 24th May, 10th September and the 30th October

Summary

The table below summarises the test results for ground water at all locations over the four quarters of the reporting period. Reference document used EPA Interim report 'towards setting guideline values for the protection of groundwater in ireland'

The results show the following:

- Ammonia levels are above the limit as outlined in the reference document for the reporting period
- Chloride levels were all found to be within the limits as outlined within the reference document
- Electrical conductivity for 93% of samples was below the limits outlined in the reference document
- pH levels of all samples was within the range detailed in the reference document.
- Total Organic Carbon was tested for however there is no guideline limit for this item in the reference document. In the main there is no obvious abnormal change in the results obtained during the reporting period.

parameter	QTR	locations						
		G1AP	G4AP	G9AP	108A	G108AP	G1A	G4A
Visual inspection/odour	1	ok	ok	ok	ok	ok	ok	ok
	2	ok	ok	ok	ok	ok	ok	ok
	3	ok	ok	ok	ok	ok	ok	ok
	4	ok	ok	ok	ok	ok	ok	ok
Gw level	1	1.8	.7	.8	2.2	1.8	.3	1.8
	2	1.4	3.2	4.1	5.3	2.3	5.6	6.3
	3	2.8	1.1	1.55	2.0	2.4	6.7	1.45
	4	4.2	3.3	4.3	2.3	3.1	3.2	2.4
Electrical Conductivity ($\mu\text{S}/\text{cm}$)	1	861	772	920	681	574	595	1388
	2	796	750	521	705	578	579	1301
	3	833	750	588	511	492	545	777
	4	29.52	695	659	708	492	545	758
pH	1	6.7	7.1	7.2	8.3	7.4	7.2	6.8
	2	6.6	7.2	7.3	7.2	7.1	7.3	7.2
	3	6.6	7	7.1	7	7	7.3	7
	4	6.7	7	7	7	7	7.2	7
Ammoniacal Nitrogen (mg/l N)	1	7.95	.311	26.35	1.11	2.55	3.54	49.82
	2	7.52	.593	3.96	2.61	2.12	3.76	1.24
	3	8.83	1.26	9.7	1.06	.963	3.28	22.62
	4	7.66	.736	14.7	2.93	.979	3.48	19.98
Chloride (mg/l Cl)	1	26.72	21.02	65.24	26.57	25.22	21.5	92.94
	2	31.75	22.68	36.62	27.77	16.38	22.8	91.72
	3	30.34	20.19	42.39	16.75	16.75	23.49	52.05
	4	29.52	26.92	41.86	29.7	19.07	22.09	51.06
Total organic carbon (mg/l)	1	82	12.3	65.24	26.57	25.22	21.5	92.94
	2	93.5	11.60	9.14	8.06	12.8	8.34	15.8
	3	85.6	13	10.6	13.5	17.4	41.1	8.95
	4	81.7	14.1	13.4	14.5	14.4	8.66	9.79

Annual monitoring requirement

GCC are required to monitor the locations annually for the following parameters

- Cyanide (mg/l CN)
- Fluoride (mg/l F)
- Sulphate (mg/l SO_4)
- Total Alkalinity (mg/l CaCO_3)
- Ortho-Phosphate (mg/l P)
- Total Oxidised Nitrogen (mg/l N)
- Faecal Coliforms (No. /100ml)
- Total Coliforms (No./100ml)
- Metals and non metals
- Mercury ($\mu\text{g}/\text{l}$ Hg)
- List I and List II organic substances

Parameter	Units	location						
		108A	G108AP	G4A	G4AP	G9AP	G1A	G1AP
Boron	µ g/L	7.725	11.65	95.74	7.807	94.91	11.38	11.74
Cadmium	µ g/L	<.09	<.09	<.09	.269	<.09	<.09	.148
Calcium	Mg/L	107.2	101.8	111.3	250.6	82.9	125.6	103.9
Chromium	µ g/L	<2.14	<2.14	<2.14	<2.14	<2.14	<2.14	2.959
Faecal coliforms	Cfu/100 ml	17	19	0	0	2	0	0
Total Coliforms	Cfu/100 ml	41	21	2	0	92	0	0
Copper	µ g/L	1.28	2.758	.133	3.932	.558	.167	1.99
Cyanide	µ g/L	<5	<5	<5	<5	<5	<5	<5
Dissolved oxygen (%)	%	23.5	28.7	22	38.3	20	14.1	14.9
Dissolved oxygen (mg/l)	Mg/L	2.12	2.65	2.04	3.5	1.91	1.85	1.38
Flouride	Mg/L	.55	.49	.71	.2	.32	.59	.45
Iron	µ g/L	3175	2568	16.25	28660	327	430.1	12780
Lead	µ g/L	.322	1.123	<.02	1.932	<.02	<.02	1.2
Magnesium	Mg/L	3.964	3.733	9.381	4.951	7.457	1.131	5.635
Manganese	µ g/L	112.4	114.4	115.4	799.3	63.28	116	1627
Mercury	µ g/L	<.04	<.04	<.04	<.04	<.04	<.04<.04	<.04
Nickel	µ g/L	.268	.488	1.206	3.709	.921	1.631	5.358
Total oxidised Nitrogen	Mg/L as N	.67	1.34	<.28	.29	1.46	.7	<.28
pesticides(or organochloride)	µ g/L	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Peesticides (Organophosphorous)	µ g/L	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Phosphate (ortho)	Mg/L as P	.035	.023	<.005	<.005	.007	.02	.178
Phosphate (total)	Mg/L as P	.045	.044	<.024	<.024	.027	.025	.223
Potassium	Mg/L	1.829	2.017	11.45	4.689	15.07	.953	6.666
Semi volatile organic compounds	µ g/L	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Sodium	Mg/L	8.089	8.089	34.68	15.6	39.58	11.26	62.59
Sulphate	Mg/L	1.03	1.03	<.75	<.75	1.12	<.75	<.75
Temperature on site	Degree C	18.8	18.8	17.9	19.3	19.2	12.6	13.4
VOCs	µ g/L	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Water level	m	2.8	2.8	1.45	1.1	1.55	6.7	2.8
Zinc	µ g/L	<.41	<.41	<.41	7.19	<.41	.778	14.86

All parameters were analysed and compared against the threshold values as set out in the European Communities Environmental Objectives (Groundwaters) Regulations 2009. All parameters were found to be within these limits.

Leachate Monitoring

It was agreed with the agency in 2007/2008 that the monitoring of the leachate at locations L1, L3 and L4 entering the leachate treatment system and location L2 exiting the leachate treatment system would be sufficient for the purposes of leachate monitoring and management in accordance with licence no. 13-1. Signs have been installed to clearly identify each inlet pipe and the outlet pipe in this regard.

Weekly monitoring requirement

The level of leachate in the leachate treatment system is required to be monitored weekly. There is no record of this being recorded during the reporting period.

Quarterly monitoring requirement

GCC are required to monitor the locations for the following parameters:

- Visual Inspection and odour
- Ammonia
- BOD
- COD
- Chloride
- Electrical Conductivity
- pH

Quarterly monitoring was only carried out in quarter 1 (25th March 2013) during the reporting period. A summary of the results are detailed below.

parameter	Qtr	location			
		L1 (north landfill)	L2 (outlet)	L3 (south landfill)	L4 (composting)
Ammonia mg/L as N	1	79.08	98.55	61.23	57.22
BOD	1	<2	330	<2	270
Chloride	1	98.18	-	114.30	185.47
COD	1	63	2990	67	1405
Conductivity	1	2030	-	1892	1474
pH	1	7	7.4	7	8

There are no emission limits stipulated in the waste license for the facility, therefore the analysis results have been compared to the IGVs as listed in the EPA document "EPA landfill Manual".

The ammonia levels at the 4 locations exceed the levels outlined. This is in line with previous test results.

The COD levels at the outlet point and at the composting facility exceed the levels outlined. This is in line with previous test results.

An additional input into the leachate system is the leachate from the Barna Waste facility adjacent to the landfill site. Leachate from this facility is accepted into the GCC treatment system. No samples were tested in the reporting period from this source. It is the opinion of GCC that this leachate may be causing the significant rise in ammonia and COD levels. This will be further examined in the next reporting period.

Annual Monitoring Requirement

GCC re required to monitor the locations for the following parameters:

- Cyanide (mg/l CN)
- Fluoride (mg/l F)
- Sulphate (mg/l SO₄)
- Ortho-Phosphate (mg/l P)
- Total Oxidised Nitrogen (mg/l N)
- Faecal Coliforms (No. /100ml)
- Total Coliforms (No./100ml)
- Metals and non metals (2 locations only)
- Mercury (µg/l Hg)

Parameter (mg/L unless stated)	location			
	L1 (north landfill)	L2 (outlet)	L3 (south landfill)	L4 (composting)
Boron	457.1	560.8	426.1	55.34
Cadmium	<.09	.264	<.09	.373
Calcium	251.8	134.5	225.4	61.35
Chromium	2.423	13.48	13.481.314	8.981
Faecal Coliforms	0	>1000	0	0
Total Coliforms	>100	>1000	56	>100
Copper	5.44	53.67	1.963	97.48
Cyanide	<5	<5	<5	<5
Flouride	.35	.45	.66	.39
Iron	9058	14010	736.9	3148
Lead	.644	14.3	<.38	24.91
Magnesium	28.73	42.08	22.93	10.6
Manganese	566.7	549.6	678.1	196.4
Mercury	.131	.3	.122	.495
Nickel	5.479	46.69	2.816	20.28
Total oxidised Nitrogen	<.03	.07	.58	<.03
pesticides(organochloride)	<.1	<.1	<.1	<.1
Peesticides (Organophosphorous)	<.1	<.1	<.1	<.1
Phosphate (ortho)	.063	<.005	<.005	1.116
Phosphate (total)	.861	9.568	.483	4.027
Potassium	39.79	347.9	47.4	114.3
Semi volatile organic compounds	<.5	<.5	<.5	<.5
Sodium	57.84	182.8	66.42	65.82
Sulphate	<1.56	218.38	<1.56	63.74
VOCs	<1	<1	<1	<1
Zinc	7.035	168	<4.6	192

Results of the annual leachate analysis indicate that at L2 the potassium, sodium and sulphate concentrations were above the guideline levels. Potassium levels at L4 also exceeded the guideline levels. All other parameters were within the guideline levels as per appendix D of EPA landfill manual, landfill site design.

6 Resource and energy consumption summary

The composting facility operates the following equipment:

- 2 no. Loading shovels
- 1 no. Site van
- 1 no. Site road sweeper
- 1 no. Mixer
- 1 no. Trommelling screen + conveyors
- 5 no air blowers for invessel composting
- 2 no. Heavy duty leachate pumps

The landfill facility operates the following equipment:

- 3 no. Heavy duty leachate pumps
- 2no. Lagoon aerators
- 1 no. Gas flare

Energy consumption during the reporting period was:

1. electricity	287,331kWhr
2. Fuel	223,542kWhr
Total	510873kWhr

7 Volume of leachate produced and volume of leachate transported/discharged off site

The recording of this information was not carried out during the reporting period due to the flowmeter on site not being operational.

Leachate at the facility is collected and delivered to the onsite leachate lagoon where following aeration the material is pumped via a rising main to the waste water treatment plant at Mutton island for final treatment.

The volume discharged of site in 2011 was reported as being 88500m³ and this figure should be used as an estimation for the facility for 2013 as there was little or no change to operations between the two periods.

8 Report on development works undertaken during the reporting period, and a timescale for those proposed during the coming year

General maintenance works were under taken in the reporting period

An on site scada system for management of the leachate lagoon system was installed by EPS ltd during the reporting period. This facilitates better monitoring of the system in place.

In the forthcoming year GCC hope to progress the gas network rehabilitation works that are required on site. This project will take place through the dry period of the year (may-sept) to facilitate the works.

9. Report on restoration

The restoration and capping of the landfill was completed in 2009.
No works were done during the reporting period.

10. Site survey showing existing levels of the facility at the end of the reporting period

A topographical survey of the facility was not carried out during the reporting period.

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

The information available for gas flow rates and flare operational timings is approximated for the purposes of this item

Estimated figures are:

- Flare operated on a timer system of 8 hours per day 7 days per week.
- Average total flow rate to the flare from the gas field was 200 cubic meters/hour
- Total gas flow to flare for the reporting period was 582,400 cubic meters
- Average quantity of methane for the reporting period was 34.6%
 - total methane for the reporting period was 201,510 cubic meters
- Average quantity of carbon dioxide for the reporting period was 23.4%
 - total carbon dioxide for the reporting period was 136,281 cubic meters
- Average quantity of carbon monoxide for the reporting period was .00017%
 - total carbon monoxide for the reporting period was 0.99 cubic meters
- Average quantity of hydrogen sulphide for the reporting period was .00022%
 - total hydrogen sulphide for the reporting period was 1.28 cubic meters
- Average quantity of oxygen for the reporting period was 3.3%
 - total oxygen for the reporting period was 19,219 cubic meters

(note the above calculations are approximated figures for the reporting period and should be used as a guide only)

12. Estimated annual and cumulative quantity of indirect emissions to groundwater

Potential sources of indirect emissions to groundwater are:

Leachate

A leachate containment system is in place at the facility which consists of the following:

- HDPE Cut-off Wall/Liner has been installed around the perimeter of the landfill, adjacent to the site perimeter road. The liner has been bedded into the marl layer underneath the site
- 200mm slotted HDPE Pipe has been installed inside the cut-off liner to collect leachate from the waste mound. The slotted pipe has been placed at an approximate depth of 2.5m (on top of the marl layer). The collected leachate is then conveyed to the on leachate treatment system. (aeration lagoon)
- The excavated trench has been backfilled with Free Draining Material to allow for the ease of collection of runoff water.

The collected leachate is treated in the onsite Leachate Treatment Compound, which consists of surface aeration via 2 No. surface aerators in a large leachate lagoon, aeration basin, followed by settlement in settlement lagoon and final pumping to Mutton Island Wastewater Treatment Facility via wastewater pumping stations. There is also sludge draw-off to a sludge lagoon and sludge recirculation to augment the treatment process.

Capping layer

The capping layer in place at Carrowbrowne is of the following make up:

- 100mm topsoil layer
- 300-400mm subsoil layer
- Surface water drainage layer entailing mole drains with a hydraulic conductivity, $k > 1 \times 10^{-4}$ m/s;
- Barrier layer consisting of at least 700mm of compacted clay with a hydraulic conductivity, $k < 1 \times 10^{-9}$ m/s; and,

As the landfill is contained by the provisions as outlined the risk of indirect emissions to ground water is greatly minimised.

13. Annual water balance calculation and interpretation

The landfill facility has not accepted waste since 1998 and final restoration was completed in 2007 and therefore an annual water balance calculation and interpretation is not necessary for the purposes of this report.

14. Report on the progress towards achievement of the Environmental Objectives and Targets contained in the previous year's report

There were no environmental objectives and targets outlined in the previous years report. Those as set out in the 2011 for 2012 AER are used for consideration for the purposes of this report

OBJECTIVE 2011	TARGET 2012	RESULT
1. Records Management.	On-going in 2012	This is an ongoing target
2 Training: Provide training for site operatives in 2012 in the following: Animal By-Product Training Composting Operator Training	End 2012 One additional Operate trained in CRE Composting Course during 2012	complete
3 Complete Phase 2 of remediation works to Landfill gas collection system. AFS Ltd	End 2012, subject to financial constraint and additional budget approval.	Was not complete in 2012
4. Install Alarm system to Flare	Mid 2012, ordered	Completed in 2012
5. Review all manhole and pumping station covers around the site and replace where required.	End 2012	Completed in 2012
6. Develop and complete a phased remediation Plan for Leachate Collection system as recommended by Tobins Consulting.	End 2012, subject to Senior management approval of additional budgetary allocation.	ongoing
7. Restore freeboard of 750mm at Leachate Lagoon.	End June 2012,	ongoing

8. Develop a phased remediation Plan for Leachate TREATMENT system as recommended by Tobins Consulting. Including SCADA and ALARMS for Leachate collection and treatment system	End 2012, subject to Senior management approval of additional budgetary allocation.	ongoing
9. Repair/replace damaged or inaccessible monitoring Locations e.g. B/H 116A	During 2012, subject to Senior management approval of additional budgetary allocation.	ongoing

15. Schedule of environmental Objectives and Targets for the forthcoming year

Objective	Target 2014
Remediation works to gas network	Year end
Improve leachate management records	Year end
Improve routine daily/weekly/monthly monitoring	Year end
Maintenance of topsoil and grass layer to landfill	Year end
Improve access to monitoring locations	Year end
Review monitoring requirements	Year end
Develop leachate management plan	Year end

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

No new procedures were developed by the licensee during the reporting period.

17. Tank, pipeline and bund testing inspection report.

Visual inspections of the lagoon and fuel bunds on site took place during the reporting period. No expert reports were generated for same.

18. Reported incidents and complaints summaries

There were no reported incidents or complaints during the reporting period.

19. Review of nuisance controls

The composting facility is the only area where there is constant operational activity. In order to ensure best practice in this area there is a strict cleaning regime in place and this is recorded daily as per the Standard operating procedures for the facility.

The landfill area of the site is assessed weekly and any additional cleaning that is required is carried out.

There is a road sweeper assigned to the facility on a permanent basis and this ensures that all roadways, yards and buildings are maintained clean at all times.

Rentokil are contracted to carry out vermin control at the facility.

There was no issue with litter, birds, flies, vermin or odour at the facility during the reporting period.

20. Reports on financial provision made under the license, management and staffing structure for the facility, and a programme for public information

The budgetary allocation for the reporting period was as follows:

Landfill operation, aftercare and maintenance: €146,674

Composting facility: €597,797

Management and staffing during the reporting period:

Landfill

Name	Position	Responsibility
Senior management team	Senior management	Ensuring that budget and staffing needs are in place
Kevin Swift/Joe O Neill	Directive of service	Overall management
Theo Mc Loughlin	A/Senior exec eng	Management of the facility
Jim O Connor	Waste ops supervisor	Landfill management, daily monitoring

Composting

Name	Position	Responsibility
Senior management team	Senior management	Ensuring that budget and staffing needs are in place
Kevin Swift/Joe O Neill	Directive of service	Overall management
Theo Mc Loughlin	A/Senior exec eng	Management of the facility
Jim O Connor	Waste ops supervisor	management, daily monitoring
Richard Devlin	Deputy site manager	Daily management of the facility
David Noone	Plant operator	Operation of loading shovel
John Murphy	Plant operator	Operation of loading shovel
Michael Cooley	General operative	General site requirements

21. Report on training of staff

No staff training took place during the reporting period

22. Any other items

PRTR return detailed below.



Environmental Protection Agency

| PRTR# : W0013 | Facility Name : Carrowbrowne Landfill Site | Filename : W0013_2013.xls | Return Year : 2013 |

[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.18

REFERENCE YEAR	2013
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1. FACILITY IDENTIFICATION

Parent Company Name	Galway City Council
Facility Name	Carrowbrowne Landfill Site
PRTR Identification Number	W0013
Licence Number	W0013-01

Waste or IPPC Classes of Activity

No.	class_name
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
3.13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.
3.6	Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1. to 10. of this Schedule.
3.7	#####
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.
4.9	Use of any waste principally as a fuel or other means to generate energy.
Address 1	Carrowbrowne
Address 2	Headford Road
Address 3	Galway
Address 4	
	Galway
Country	Ireland
Coordinates of Location	-9.01465 53.3292
River Basin District	IEWE
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	ronan o reilly
AER Returns Contact Email Address	Ronan.Oreilly@galwaycity.ie
AER Returns Contact Position	exec eng
AER Returns Contact Telephone Number	091536463
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	
Production Volume	1686.0

Production Volume Units	tonnes
Number of Installations	1
Number of Operating Hours in Year	1956
Number of Employees	4
User Feedback/Comments	
Web Address	www.galwaycity.ie

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5(a)	Installations for the recovery or disposal of hazardous waste
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) ?	
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4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR# : W0013 | Facility Name : Carrowbrowne Landfill Site | Filename : W0013_2013.xls | Return Year : 2013 |

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SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

POLLUTANT		METHOD			Please enter all quantities in this section in KGs			
RELEASERS TO AIR		METHOD USED			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
01	Methane (CH4)	E	ESTIMATE		813.28	813.28	0.0	0.0

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

SECTION B : REMAINING PRTR POLLUTANTS

POLLUTANT		METHOD			Please enter all quantities in this section in KGs			
RELEASERS TO AIR		METHOD USED			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)

POLLUTANT		METHOD			Please enter all quantities in this section in KGs			
RELEASERS TO AIR		METHOD USED			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:

Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour
			Method Code	Designation or Description	
Total estimated methane generation (as per site model)	40664.0	C	from flare data		N/A
Methane flared	39850.0	C	from flare data		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)	813.28	C	from flare data		N/A

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

| PRTR# : W0013 | Facility Name : Carrowbrowne Landfill Site | Filename : W0013_2013.xls | Return Y

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SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
18	Cadmium and compounds (as Cd)	E	ESTIMATE	from test/analysis results	0.23	0.23	0.0	0.0
19	Chromium and compounds (as Cr)	E	ESTIMATE	from test/analysis results	1.18	1.18	0.0	0.0
20	Copper and compounds (as Cu)	E	ESTIMATE	from test/analysis results	4.72	4.72	0.0	0.0
82	Cyanides (as total CN)	E	ESTIMATE	from test/analysis results	0.352	0.352	0.0	0.0
83	Fluorides (as total F)	E	ESTIMATE	from test/analysis results	0.0396	0.0396	0.0	0.0
23	Lead and compounds (as Pb)	E	ESTIMATE	from test/analysis results	1.25	1.25	0.0	0.0
21	Mercury and compounds (as Hg)	E	ESTIMATE	from test/analysis results	0.0264	0.0264	0.0	0.0
22	Nickel and compounds (as Ni)	E	ESTIMATE	from test/analysis results	4.12	4.12	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	E	ESTIMATE	from test/analysis results	0.616	0.616	0.0	0.0
24	Zinc and compounds (as Zn)	E	ESTIMATE	from test/analysis results	1.47	1.47	0.0	0.0
06	Ammonia (NH3)	E	ESTIMATE	from test/analysis results	8.68	8.68	0.0	0.0

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

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
Pollutant No.	Name	M/C/E	Method Used		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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0013 | Facility Name : Carrowbrowne Landfill Site | Filename : W0013_2013.xls | Return Year : 2013 |

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Please enter all quantities on this sheet in Tonnes

3

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility	Haz Waste : Address of Next Destination Facility	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used		Non	Non Haz Waste: Address of Recover/Disposer		
Within the Country	20 03 01	No	743.0	mixed municipal waste	D1	M	Weighed	Offsite in Ireland	barna recycling ltd,wcp-mo-08-0604-01/w0106-02	headford road,carrowbrowne,galway...lreland		

* Select a row by double-clicking the Description of Waste then click the delete button