



Ballyguyroe Landfill Site
Annual Environmental Report
January 2012 – December 2012



Cork County Council

Waste Licence Reg.

No. W0002-02

Prepared by:

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BALLYGUYROE LANDFILL SITE
ANNUAL ENVIRONMENTAL REPORT
January 2012 - DECEMBER 2012

Client:

Cork County Council

Keywords:

Ballyguyroe, Annual Environmental Report (AER), Landfill Monitoring

Reporting Period:

This report presents the landfill monitoring results for Ballyguyroe Landfill, Co. Cork to the Environmental Protection Agency. The report covers the annual reporting period of 2012.

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1. INTRODUCTION

1.1 Scope and Purpose of the Report

Cork County Council held a Waste Licence (Register No. 2-1) to operate Ballyguyroe Landfill Site until 15th March 2004 when it obtained a new Waste Licence (Register No. 2-2/ W0002-2). The aim of this Annual Environmental Report (AER) is to provide a review of activities at Ballyguyroe Landfill Site within the past 12 months. The full scope of the type of report is outlined in Schedule F of the waste licence.

1.2 Background to the Report

The landfill facility at Ballyguyroe North has been in operation since 1990, accepting waste at an annual rate of approximately 20,000 tonnes. The site reached full capacity and closed for the acceptance of waste on Thursday 27th September 2001.

The Environmental Protection Agency (the Agency) issued the site with a waste management licence on December 22nd 1999 (Waste Licence No. 2-2).

In accordance with the requirements of Condition 11.3 of the waste licence, an AER for the facility is submitted to the Agency annually by 31st March.

This is the thirteenth AER to be submitted and covers the reporting period 1st January to 31st December 2012.

1.3 Site Location

The facility is located at:
Ballyguyroe North
Kildorrery
Mallow
Co. Cork

Tel: (063) 91614

The location of the site is shown on Figure 1.1.

The National Grid Reference for the site is: -16625E, 11455N

1.4 Environmental Policy

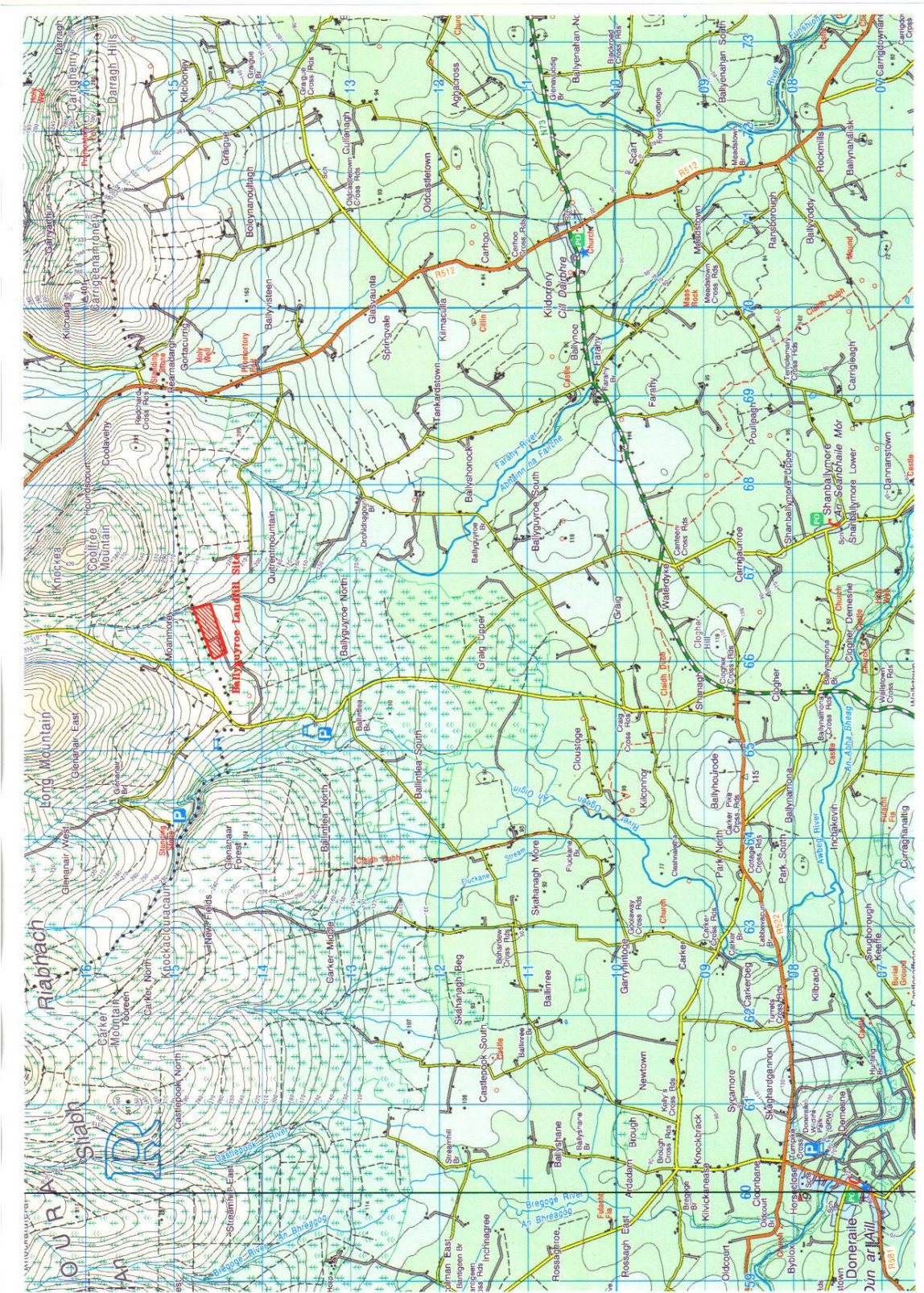
Cork County Council is committed to conducting all activities such that they have a minimal effect on the environment.

The main objectives of the Council are:

- A commitment to comply with the Waste Licence and all relevant environmental legislation and approved code of practice;
- To reduce negative environmental impacts by continually developing and modifying all procedures;

- To provide adequate training and awareness to all employees with regard to minimizing environmental risks; and
- To ensure that management and all personnel working on the site are familiar with the conditions of the Waste Licence, the content of the Environmental Management Plan, Emergency Response Procedures and the Ancillary Safety Statement.

Figure 1.1: Location of Ballyguyroe Landfill



2. SITE DESCRIPTION AND ACTIVITIES

2.1 Description of the Site

Ballyguyroe Landfill Site occupies an area of approximately 15 hectares and is located in the townland of Ballyguyroe North on the southern lower slopes of the Ballyhoura Mountains. It is situated 6 km north-west of the village of Kildorrery.

The site lies in the Blackwater catchment with the Farahy River flowing southwards within a valley outside the eastern boundary. Surface water on the site drains towards this river.

There are no major water abstractions within the immediate catchment of the landfill. Several local residents do depend on water wells for domestic and farm supplies, however, historical monitoring results have confirmed that the landfill is not a threat to these supplies. The groundwater quality is indicative of the overburden geology, being high in manganese, and has not changed in quality over the years.

The meteorological station on site indicates prevailing winds from the southwest. The annual rainfall at the site during 2012 is outlined in Table 2.1.

Table 2.1: Site Rainfall 2012

Month	Rainfall (mm)
January	119.2
February	68.0
March	32.6
April	25.0
May	104.2
June	40.8
July	226.6
August	109.6
September	157.4
October	22.2
November	94.0
December	208.2
Total	1207.8

The site consists of a total of seven waste cells. Cells 1 to 7 have been completed and the site has reached full capacity. The site closed for the acceptance of waste on September 27th 2001.

2.2 Waste Activities carried out at the Facility

Waste Disposal activities at Ballyguyroe Landfill Facility are restricted to those outlined in the Waste Licence as specified below. The only main activity at the site when open was the land-filling of non-hazardous domestic and commercial waste only.

Class 4. Surface impoundment, including placement of liquid or sludge discards into pits, ponds, or lagoons

Class 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.

The Waste Recovery Activities permitted are outlined below:

Class 4. Recycling or reclamation of other inorganic materials

Class 10. The treatment of any waste on land with a consequential benefit for an agricultural activity or ecological system

2.3 Waste Quantity and Composition

The site ceased accepting waste on the 27th September 2001. No waste was accepted at the facility during the reporting period.

The weighbridge was installed at the site in 1997. Therefore, accurate tonnages are only available from 1998 onwards. It is estimated that approximately 20,000 tonnes per annum were land-filled during the period 1990 to 1997.

Table 2.2: Quantities of waste received and disposed of during the lifetime of the site

Year	Quantity of Waste (tonnes)
1990-1997	160,000
1998	18,577
1999	20,207
2000	22,892
2001	16,523
2002	0
2003	0
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	0
2011	0
Total	238,199

2.4 Remaining Capacity

The site reached full capacity on September 27th 2001. The landfill facility ceased to accept waste on this date.

2.5 Methods of waste deposition

No waste was accepted at the site during the reporting period.

2.6 Tank Pipeline and Bund Testing

Integrity testing of the new Leachate lagoon was carried out between December 2002 and June 2003. Results were submitted to the Environmental Protection Agency on September 19th 2003.

A successful structural integrity test was carried out on the new Leachate lagoon by consultants Fehily Timoney and Company in June 2008. Copies of this report have been forwarded to the EPA. (Ref EPA-080901).

The lagoon was re-tested in June 2011 by Geomembrane Testing Services Limited in line with license requirements. The structural integrity test was successful.

A permanent Automatic Pneumatic Leachate Extraction System was commissioned during 2003. The leachate is removed under contract by Cork County Council. The contractor has a site specific risk assessment and operating procedure to ensure any spillages during removal are effectively controlled.

3. SUMMARY OF MONITORING AND EMISSIONS

3.1 Landfill Gas

Condition 8 and Schedule D.2 of the Licence Register W0002-02 requires that the licensee conducts monthly monitoring in the gas borehole/vents/wells in order to detect offsite gas migration and weekly monitoring in the site office, shed and canteen in order to detect accumulation of landfill gas.

The gas is monitored using a GasData LMSx automatic infra-red analyser, which detects levels of carbon dioxide, methane, and oxygen. This analyser is calibrated in accordance with manufacturer's specifications.

All monitoring locations are illustrated in Drawing NC-11-034-001, attached Appendix 1.

3.1.1 Gas Monitoring Results

3.1.1.1 Site Buildings

In September 2008 new gas detectors and alarms were fitted in the office, canteen and the storage container. There is no evidence of landfill gas in site buildings.

3.1.1.2 Gas Wells outside Filled Cells

Elevated levels of gas were detected in gas wells GS1 and GS10. The levels and dates of these exceedences are illustrated in Table 3.1, below.

Table 3.1: Gas Monitoring Exceedences for 2012

Date	Location	Methane (CH ₄) % v/v	Carbon Dioxide (CO ₂) % v/v
		> or = 20%	> or = 1.5%
07/02/2012	GS1	20.1	9.6
	GS10	3.0	5.7
13/02/2012	GS1	41.1	14.1
	GS10	2.0	4.2
21/02/2012	GS1	19.4	7.8
	GS10	3.0	5.2
29/02/2012	GS1	15.8	8.1
	GS10	1.6	2.8
07/0/2012	GS1	12.8	7.1
14/03/2012	GS1	8.2	6.8
21/03/2012	GS1	7.3	5.2
26/03/2012	GS1	7.5	3.8

02/04/2012	GS1	73.0	13.0
11/04/2011	GS1	44.0	12.0
16/04/2012	GS1	0.1	2.8
23/04/2012	GS1	32.0	7.5
30/04/2012	GS1	13.0	4.7
08/05/2012	GS1	21.0	7.2
18/05/2012	GS1	12.0	5.3
22/05/2012	GS1	10.0	4.7
29/05/2012	GS1	70.0	13.0
05/06/2012	GS1	71.0	18.0
12/06/2012	GS1	50.0	16.0
18/06/2012	GS1	64.0	19.0
29/06/2012	GS1	67.0	17.0
03/07/2012	GS1	18.0	12.0
11/07/2012	GS1	6.0	3.0
17/07/2012	GS1	8.2	8.5
24/07/2012	GS1	10.0	8.9
30/07/2012	GS1	5.8	14.0
16/08/2012	GS1	57.0	16.0
22/08/2012	GS1	74.0	19.0
28/08/2012	GS1	12.6	6.0
16/10/2012	GS1	3.5	1.6
25/10/2012	GS1	21.7	13.8

3.1.2 Long Term Proposals

The installation of a permanent gas collection system at the site was carried out during 2003. The gas flaring system has been operating since January 2004. The unit is maintained under contract.

3.2 Surface Water

Condition 8 and Schedule D.4 of the waste licence require the licensee to conduct surface water monitoring at various locations throughout the site and at points upstream and downstream on the River Farahy.

Surface water sampling is carried out monthly, quarterly and annually. Results are compared to limits set out in the Surface Water directive (75/440/EEC).

Suspended solids monthly results at **SS2** and **SS5**, did not exceed the limit of 35 mg/l limit outlined by the EPA.

Up stream, **RS1** did not exceed EQS limits for suspended solids, biochemical oxygen demand, chlorides and ammoniacal nitrogen for 2012. Chemical oxygen demand (COD) ranged from 22 mg/l to 48 mg/l. A limit of 40 mg/l is set under the surface water directive. Levels of phosphate, sodium and nitrate were limit of detection for 2012.

Downstream, **RS2** did not exceed limits set under the surface water directive for suspended solids, biochemical oxygen demand, ammoniacal nitrogen and chlorides for 2012. Chemical oxygen demand ranged from 35 mg/l to 48 mg/l. A limit of 40 mg/l is set under the surface water directive. Levels of total phosphorus and nitrate are below the limits set in the Surface Water Directive.

Site **SS2** did not exceed limits set under the surface water directive for chlorides, suspended solids, ammoniacal nitrogen and pH in 2012. Chemical oxygen demand range from 20 mg/l to 86 mg/l. The limits is 40 mg/l under the surface water directive. Biochemical oxygen demand ranged from <2mg/l to 30mg/l. No details regarding the quality of the sample or the condition of the river were provided by the consultant. Levels of total phosphorus and nitrate are below the limits set in the Surface Water Directive.

Site **V2** did not exceed the limits set under the Surface water Directive for pH, suspended solids, chlorides and ammoniacal nitrogen in 2012. Chemical oxygen demand ranged from 86 mg/l to 98 mg/l. The limit is 40 mg/l. However, Biochemical oxygen demand (BOD) results were below the limit of 5mg/l under the Surface Water Directive. Levels of total phosphorus and nitrate are below the limits set in the Surface Water Directive.

Site **SS5**, did not exceed limits set under the Surface water directive for ammoniacal nitrogen, pH, chlorides. Chemical oxygen demand ranged from 34 mg/l to 82mg/l. The limit for COD is 40 mg/l. However, Biochemical oxygen demand ranged from <2 mg/l to 15 mg/l. The limit for BOD is 5 mg/l. Levels of total phosphorus and nitrate are below the limits set in the Surface Water Directive.

3.2.1. Long Term Trends

In conclusion, surface water monitoring results from the upstream sampling location RS1 and the downstream sampling location RS2 do not indicate that there is any contamination of the Farahy River as a result of activities at the landfill site.

Heavy metals levels do not vary greatly from upstream and downstream monitoring locations. Heavy metals mercury, chromium, copper, lead and arsenic exceeded the limits under the directive at all locations.

3.3. Groundwater

Condition 8 and Schedule D.4 of the waste licence require the licensee to conduct groundwater monitoring on an annual basis at various locations within the site and outside the site boundary including two domestic wells. The samples were taken in quarter two in 2012, in line with direction from the EPA to rotate the quarter that the samples are taken each year.

Ground Water results are compared to Interim Guideline Values (IGV) outlined in the EPA Interim Report for the Protection of Ground Water. No groundwater wells are used from drinking water in 2012.

Ground water wells **96.5s** and **96.5d** did not exceed ELV values for chlorides conductivity and pH. Limits for ammoniacal nitrogen exceeded the ELV of 0.15mg/l in Q3 for both wells. All other results are below the ELV value. No information on the sample condition was provided by the consultant. Exceedance in ammoniacal Nitrogen is not a trend for this ground water well. Phosphate, sodium potassium, total cyanide, magnesium, manganese, fluoride, nitrite, calcium and heavy metals mercury, chromium, copper and lead were not exceeded ELVs. Manganese levels were above the ELV limit of 50ug/l. This is similar to previous results.

Ground water well **94.4s** and **94.5d** did not exceed ELV values for ammoniacal nitrogen, chlorides and pH. Limits for phosphate, sodium potassium, total cyanide, magnesium, fluoride, nitrite, and heavy metals mercury, chromium, copper and lead were not exceeded ELVs. Manganese results for **96.4d** were above the limit of 50ug/l. This is similar to previous results and is due to the geology of the site.

Ground water well **G18** did not exceed limits set under the drinking water directive for ammoniacal nitrogen, chlorides and conductivity. In Q2, ammoniacal nitrogen levels increased to 0.412 mg/l above the ELV of 0.15mg/l. No information was provided about sampling conditions from the consultant. Limits for phosphate, sodium potassium, total cyanide, magnesium, fluoride, nitrite, calcium and heavy metals mercury, chromium, copper and lead did not exceed ELVs. Manganese was above the limit of 50ug/l. This is similar to previous results and is due to the geology of the site.

Ground water wells **96.3d** and **96.3s** did not exceed pH, conductivity, and chlorides IGV values. Ground Water well 96.3d exceeded the ELV value of 0.15mg/l for ammoniacal nitrogen in Q1, Q2 and Q3. No sample was taken in Q4. Annual exceedance in ammoniacal nitrogen is a common trend for this well. Ground water well 96.3s exceeded the ELV value in Q1 only. All other quarterly were below the limit of detection. ELVs for phosphate, sodium potassium, total cyanide, magnesium, fluoride, nitrite, calcium and heavy metals mercury, chromium, copper and lead were not exceeded. Manganese levels for **96.3s** were above the limit of 50ug/l.

Ground water wells **99.1d** and **99.1s** did not exceed ELV values of chlorides, ammoniacal nitrogen and pH in 2012. In 99.1s, Ammoniacal Nitrogen levels were raised in Q2, but decreased under the limit of detection in Q2 and Q3. In 99.1D, ammoniacal nitrogen levels increased in Q3 but reduced again in Q4 2012. Limits for phosphate, sodium potassium, total cyanide, magnesium, fluoride, nitrite, calcium and heavy metals mercury, chromium, copper and lead were not exceeded under the ELVs. Manganese levels for both wells were above the limit of 50ug/l.

Ground water wells **98.1d** and **98.1s** did not exceed IGV values for chlorides, pH and ammoniacal nitrogen in 2012. In Q3 (98.1s), ammoniacal nitrogen limits increased to 3.95mg/l, which is above the guideline value of 0.15mg/l. Limits for phosphate, sodium potassium, total cyanide, magnesium, fluoride, nitrite and heavy metals mercury, chromium, copper and lead were below the IGVs. Manganese was above the limit of 50ug/l.

3.3.1 Long Term Trends

As discussed above, levels of manganese are naturally elevated in the groundwater as a result of the geology of the site.

The normal indicative parameters of leachate contamination in groundwater include ammonia, chloride, total organic carbon (TOC), conductivity, pH, iron and heavy metals such as cadmium, nickel, zinc, copper and lead.

Chloride levels measured in wells, both up gradient and down gradient of the site, throughout the monitoring period were below the Interim Guideline Value (IGV) of 1000uS/cm.

Exceedence in ammoniacal nitrogen for a number of ground water wells is not uncommon on this site. The majority of exceedence only occurred once during 2012. Groundwater well 96.3d remained high in 2012. Attention will be given to this well during 2013 sampling period and any exceedence will be followed up in 2013.

Annual volatile organic results were consistent with previous years and no exceedence above the limit of detection was recorded for 2012.

3.4 Leachate

3.4.1 Leachate Levels

Leachate levels did not exceed limits in the cells during the reporting period.

3.4.2 Chemical Analysis

Indicators of decomposition of leachate include BOD, COD, conductivity, pH, chloride, sodium, iron, manganese, cadmium and VOCs. Generally, leachate constituents tend to rise during landfill operation, peaking approximately at the time of closure followed by a gradual post closure decrease (Krug and Ham, 1997:

Table 3.1 summarises the concentration of analyses in the Leachate in comparison to typical Leachate composition of 30 samples from U.K./Irish landfills accepting mainly domestic waste

Parameters	Typical Leachate Concentration	Ballyguyroe Landfill leachate Concentration 2012
pH	6.4 - 8.0	7.0
Electrical conductivity EC(ms/cm)	503-19,200	
Ammoniacal nitrogen NH ₄ -N	<0.2-1,700	78
Chemical Oxygen Demand mg/l	<10-33,700	224
Biological Oxygen Demand mg/l	<0.5->4,800	23
Cadmium Cd (ug/l)	<0.01-0.03	<0.0001
Chromium Cr µg/l	40.560	0.00314
Copper Cu µg/l	20-160	0.00203
Lead Pb µg/l	<0.04-0.28	0.000081
Mercury Hg (µg/l)	<0.1-1.0	<0.00001

A level of heavy metals recorded in Ballyguyroe landfill is typical of leachate concentrations.

3.5 Biological Monitoring

According to the findings of a Biological Assessment of the quality of surface waters at Ballyguyroe Landfill the Q rating is as outlined in Table 3.20 below. This analysis was carried out by ENVA on 2012. The surface water sites are deemed to be unpolluted and rated at Q4.

Table 3.20 Q Rating

Q Rating - 2012	
Monitoring Locations	Result
RS1	Q4
RS2	Q4
RS2A	Q4
RS4	Q4

4. SITE DEVELOPMENT WORKS

The landfill site has been in operation since 1990, prior to the application for a waste licence, and therefore much of the infrastructure of the site was already complete by the time the licence came into being.

Site development works that were carried out in accordance with the conditions of the licence, during 2003 are outlined below:

- Installation of leachate management system.
- Replacement of gas boreholes and installation of a gas flare system.

4.1 Progress towards Site Restoration

The Cells 1 to 7 inclusive were grassed and a landscaping proposal was approved by the Agency. The final cap was applied to Cell 7 during works carried out in 2002. A surface water settling pond was created in 2004.

4.2 Site Survey

In accordance with Condition 8.3 of the licence, a topographical survey of the site including the void space was conducted in March 2012 and is submitted within this report (Appendix 3 – [Drawing No NC-12-013-001- March 2012](#)).

4.3 Landfill Gas Quantities

The gas flare has been installed and is currently operational. Steady state conditions have not yet been arrived at. Landfill gas emissions will not exceed the capacity of the flare which is 250 m³/hr.

4.4 Indirect Emissions to Groundwater

There are no direct or indirect emissions to groundwater from the site for the following reasons:

- all of the cells are underlain by a very low permeability clay layer (cells 1-6) or are lined with a HDPE liner (cell 7).
- all leachate levels in the cells are kept within limits set by the Agency with the exceptions outlined in section 4.3.1.
- surface water and groundwater monitoring data indicates that there is no direct or indirect emission to the groundwater from the landfill site.

4.5 Monthly Water Balance Calculations

The monthly water balance calculations have been calculated as outlined in Appendix 2. The results are summarized in Table 4.1. The predicted amount of leachate can be compared with the actual amount tankered off site for each month.

The differences in actual and predicted quantities month to month can be explained by the absorptive capacity of the waste mass, which has a balancing effect. That is, high rainfall in one month, which would lead to a high-predicted leachate quantity, may only be realized in actual leachate quantity the following month after the water has percolated down through the waste mass.

Table 4.1 Water Balance Calculations 2012

Month	Predicted Leachate	Actual Leachate
	m3	m3
January	2,284	2,197.24
February	956	914.98
March	858	858.78
April	770	770.80
May	1,223	1,175.86
June	2,884	2,884.46
July	2,416	2,251.46
August	3,163	3,124.58
September	1,194	1,096.26
October	1,636	1,636.22
November	2,053	1,984.64
December	3,221	3,040.94
Total	22,660	21,936.22
		724

Predicted leachate (22,758) — Actual leachate (21936.22) = 724 m³.

It is a condition of the waste licence that the level of leachate in Cells 1 to 7 has to remain within 1m above the base of the cell. As a pumping system is in place on site all efforts are made to maintain the leachate level below 1m above the base of the cell. In order to keep the leachate at this level excess volumes have to be removed.

In conclusion, the volume of leachate tankered off the site in 2012 was 3% less than the predicted volume.

5. WASTE RECEIVED BY THE FACILITY

Ballyguyroe Landfill Facility provided a final disposal point for municipal solid waste up to September 27th 2001, at which stage it ceased to accept waste. No waste was accepted by the facility during the reporting period.

6. ENVIRONMENTAL INCIDENTS AND COMPLAINTS

6.1 Incident Summary

Condition 9 of the waste licence requires that the licensee shall make written records of environmental incidents.

Corrective actions taken in response to incidents and complaints are in accordance with the requirements of the licence and with the site Corrective Action Procedure.

Table 6.1: Recordable Incidents during the Reporting Period

Date	Incident	Cause	Corrective Action
16/08/2012	Failure of flare to operate	Faulty ABB control screen	Procure, programme & fit control screen

6.2 Complaints Received During the Reporting Period

No complaints were received during this reporting period.

7. ENVIRONMENTAL MANAGEMENT PROGRAMME

In compliance with Condition 2.3 of the Waste Licence, an Environmental Management Programme (EMP) has been established for the facility.

The EMP includes the Environmental Management Plan, the Schedule of Drawings, the timescale for achieving the Objectives and Targets and the designation of responsibility for achieving the Objectives and Targets.

7.1 Summary of procedures associated with the facility

Documented procedures governing the operation of the facility are outlined in Table 7.1 below.

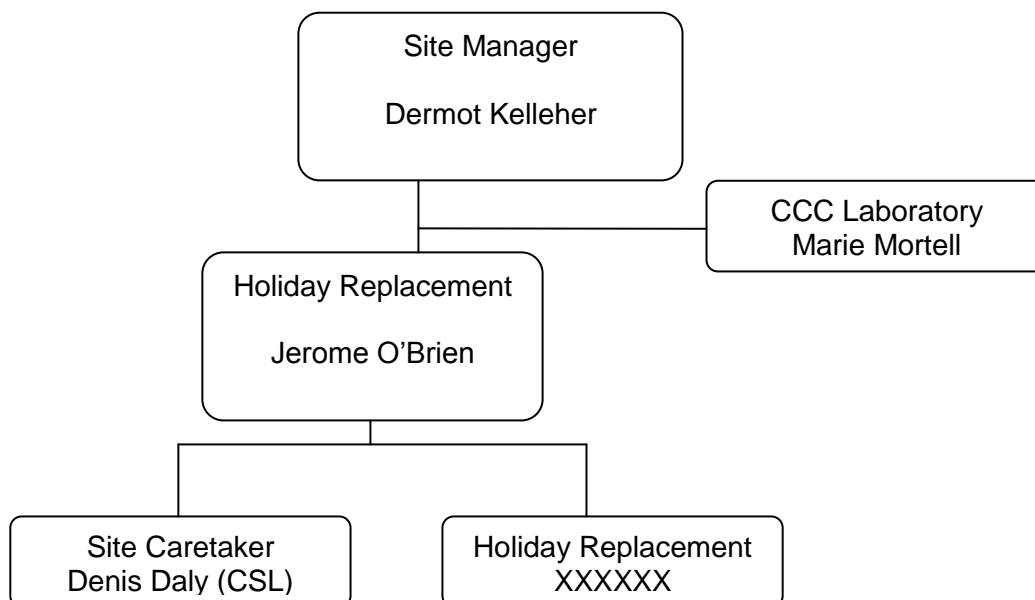
Table 7.1: Operational Procedures

Procedure No.	Procedure Title
2	Smoking rules on site.
3	Rules for the refuse drivers entering the site.
4	Pumping of leachate on site.
5	Leachate levels on site.
7	Gas monitoring on site.
8	Use of absorbent material on site.
9	Site security and site fencing.
10	Loading of leachate.
11	Collection of litter.
12	Water ponding on cells.
14	Filling of the diesel tank
15	Loading of leachate from Cells 1 to 4
16	Discharging of leachate at Charleville Sewage Works
17	Spraying of flies

7.2 Management and Staff Structure

At the start of 2012 Cork County Council operated the landfill facility under the management structure illustrated in Figure 7.1 below.

Figure 7.1: Management Structure



- **Site Manager: Dermot Kelleher**

Responsibilities: Entire management of the facility
Qualifications: B.E.

- **Holiday Replacement Site Manager: Jerome O'Brien**

Responsibilities: Entire management of the facility
Qualifications: B.E

- **Laboratory: Marie Mortell**

Responsibilities: Sampling, analysis and interpretation of all in-house sampling on the landfill site.
Qualifications: Technician Grade

- **Site Caretaker: Denis Daly (on certified sick leave)**

Responsibilities: Control of access to site, all weighbridge duties, canteen/storage container, machinery hire, leachate levels, measurement of stream discharges, gas measurement, well level measurement, daily environmental records.

Experience: Eight years as Site Caretaker on Ballyguyroe Landfill Site

- **Holiday Replacement:**

Responsibilities: As above when substituting for D. Daly

The contingency arrangements for the absences of the main persons from the facility are outlined below:

Person Absent	Replacement
Dermot Kelleher	Jerome O'Brien
Ted O'Connell	Alex Grassick/Marie Mortell

Cork County Council re-structured the Environmental Directorate across the county during 2012. Denis Daly was on certified sick leave and took retirement in 2012. Marie Mortell assumed laboratory duties. Dermot Kelleher, Executive Engineer, acted in the role as facility manager.

7.3 Budget

The operational budget for 2011 was €155,000.

7.4 Staff Training

No training was carried out in this reporting period.

7.5 Nuisance Controls

The nuisance control methods that were in place during the monitoring period have been reviewed and have been deemed as adequate. These include litter fencing, a silt discharge pond and gas detection metres.

7.6 Any Other Items Specified by the Agency

The Agency has not specified any additional items to be included in this report.

8. RESOURCE CONSUMPTION

During the reporting period the following resources were utilised at the site:

- Electricity 55,450 kilowatt hours

Water use on site was for non-domestic use only.

APPENDIX 1
Topographical Survey Contour Drawing

APPENDIX 2
Water Balance Calculations

TITLE: Ballyguyroe Landfill - Regulatory Compliance
CALCULATIONS BY: JOB
DATE: 25/03/2013

Introduction

This calculation is a water balance carried out for Ballyguyroe Landfill. The time period in question is January to December 2012.

Purpose

This water balance is carried out in compliance with the requirements of Waste Licence W0002-02

Design Criteria

The calculation was carried out using MS Excel following the method from the EPA Landfill Manual on Landfill Site Design, as shown:

$$Lo = [ER(A) + LW + IRCA + ER(I)] - a(W);$$

where:

- Lo = leachate produced(m³)
- ER = effective rainfall, actual rainfall is used for active cells (m)
- A = area of cell (m²)
- LW = liquid waste (m³)
- IRCA = infiltration through restored and capped areas (m³)
- I = surface area of lagoons (m²)
- a = absorptive capacity of waste (m³/t)
- W = weight of waste deposited (t/a)

An infiltration rate of 75% is assumed for the temporarily capped areas, and an absorptive capacity of 0.07 m³/t is used. These figures are in line with EPA guidelines.

The waste input data was provided by Cork County Council.

The Evapotranspiration and Rainfall data was also provided by Cork County Council.

Area of the lagoons: 1000 m²

Input Data:

Waste Disposal Data - Provided by Cork County Council		
Month	MSW (tonnes)	Water (tonnes)
Jan-12	-	2,197.00
Feb-12	-	915.00
Mar-12	-	858.00
Apr-12	-	770.00
May-12	-	1,175.00
Jun-12	-	2,884.00
Jul-12	-	2,251.00
Aug-12	-	3,124.00
Sep-12	-	1,096.00
Oct-12	-	1,636.00
Nov-12	-	1,984.00
Dec-12	-	3,040.00
	-	-

21,930.00

Evapotranspiration data - Provided by Cork County Council.			
<i>BGR LF</i>	Month	Rainfall	PE Rossmore
Year		(mm)	(mm)
2012	1	119.2	32
	2	68	27
	3	32.6	41
	4	25	53
	5	104.2	56
	6	40.8	58
	7	226.6	61
	8	109.6	70
	9	157.4	59
	10	22.2	40
	11	94	25
	12	208.2	27

Water Balance Calculation for Ballyguyroe Landfill Facility

Month	Rainfall	Potential Evapotranspiration (P.E)	Effective Rainfall	Waste Input	Capped Cells	Active Area	Temp. Capped Area	Active Infiltration	Infiltration in temp. restored areas*	Liquid Waste	Lagoon Contribution	Absorptive Capacity	Active Leachate
	(mm)	(mm)	(mm)	(tonnes)		(m ²)	(m ²)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)
Jan-12	119.20	32.0	87.2	0	1,2,3,4	0	0	-	-	2,197	87.2	0.0	0
Feb-12	68.00	27.0	41.0	0	1,2,3,4	0	0	-	-	915	41.0	0.0	0
Mar-12	32.60	41.0	0.0	0	1,2,3,4	0	0	-	-	858	0.0	0.0	0
Apr-12	25.00	53.0	0.0	0	1,2,3,4	0	0	-	-	770	0.0	0.0	0
May-12	104.20	56.0	48.2	0	1,2,3,4	0	0	-	-	1,175	48.2	0.0	0
Jun-12	40.80	58.0	0.0	0	1,2,3,4	0	0	-	-	2,884	0.0	0.0	0
Jul-12	226.60	61.0	165.6	0	1,2,3,4	0	0	-	-	2,251	165.6	0.0	0
Aug-12	109.60	70.0	39.6	0	1,2,3,4	0	0	-	-	3,124	39.6	0.0	0
Sep-12	157.40	59.0	98.4	0	1,2,3,4	0	0	-	-	1,096	98.4	0.0	0
Oct-12	22.20	40.0	0.0	0	1,2,3,4	0	0	-	-	1,636	0.0	0.0	0
Nov-12	94.00	25.0	69.0	0	1,2,3,4	0	0	-	-	1,984	69.0	0.0	0
Dec-12	208.20	27.0	181.2	0	1,2,3,4	0	0	-	-	3,040	181.2	0.0	0
Total	1,208	549	730	-				-	-	21,930	730	0.0	-

* Infiltration in temporarily restored 75

Absorptive Capacity (m³/tonne) 0.07

Total Predicted Leachate (m ³)	Cumulative Predicted Leachate (m ³)
2,197.0	2,197.0
915.0	3,112.0
858.0	3,970.0
770.0	4,740.0
1,175.0	5,915.0
2,884.0	8,799.0
2,251.0	11,050.0
3,124.0	14,174.0
1,096.0	15,270.0
1,636.0	16,906.0
1,984.0	18,890.0
3,040.0	21,930.0
21,930.0	

Conclusion

The total annual leachate generation predicted by this model is approximately 22,660 m³. The actual leachate removed from site in 2012 was 21,930 m³. This represents a mathematical difference of just 3% which is an accurate determination in the extreme

APPENDIX 3

E-PRTR

[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.16

REFERENCE YEAR	2012
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1. FACILITY IDENTIFICATION

Parent Company Name	Cork County Council
Facility Name	Ballyguyroe Landfill Site
PRTR Identification Number	W0002
Licence Number	W0002-02

Waste or IPPC Classes of Activity

No.	class_name
3.4	Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
3.13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.
4.10	The treatment of any waste on land with a consequential benefit for an agricultural activity or ecological system.
4.4	Recycling or reclamation of other inorganic materials.
Address 1	Ballyguyroe North
Address 2	Mallow
Address 3	Co. Cork
Address 4	
Country	Cork
Country	Ireland
Coordinates of Location	-8.494134739 52.28249776
River Basin District	IESW
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Jerome O'Brien
AER Returns Contact Email Address	jerome.obrien@corkcoco.ie
AER Returns Contact Position	Senior Executive Engineer
AER Returns Contact Telephone Number	021 4532793
AER Returns Contact Mobile Phone Number	086 8355143
AER Returns Contact Fax Number	021 4532727
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	2
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5(c)	Installations for the disposal of non-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?	
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) ?	
--	--

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#: W0002 | Facility Name: Ballyguyroe Landfill Site | Filename: Appendix 3 E-PRTR.xls | Return Year: 2012 |

02/04/2013 09:14

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

POLLUTANT		METHOD			Please enter all quantities in this section in KGs				
No. Annex II	Name	M/C/E	Method Used		LFG flare		QUANTITY		
			Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	Total est methane generated minus methane flared	20096.0	0.0	599996.0	0.0	579900.0
03	Carbon dioxide (CO2)	C	OTH	Total est CO2 generated minus CO2 flared	35023.0	0.0	600000.0	0.0	564977.0
08	Nitrogen oxides (NOx/NO2)	C	OTH	Testo 350 flue gas analyser	7.58	0.0	7.58	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			
No. Annex II	Name	M/C/E	Method Used		LFG flare		QUANTITY	
			Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
11	Sulphur oxides (SOx/SO2)	C	OTH	Testo 350 flue gas analyser	2.3	2.3	0.0	0.0
02	Carbon monoxide (CO)	C	OTH	Testo 350 flue gas analyser	2.274	2.274	0.0	0.0
80	Chlorine and inorganic compounds (as HCl)	C	OTH	Testo 350 flue gas analyser	3.411	3.411	0.0	0.0
84	Fluorine and inorganic compounds (as HF)	C	OTH	Testo 350 flue gas analyser	0.0303	0.0303	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			
Pollutant No.	Name	M/C/E	Method Used		LFG flare		QUANTITY	
			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: Please enter summary data on the quantities of methane flared and / or utilised	Ballyguyroe Landfill Site				
	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)	600000.0	C	OTH	US EPA LandGem	N/A
Methane flared	20096.0	C	OTH	Flare unit emissions analyser	250.0 (Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0 (Total Utilising Capacity)
Net methane emission (as reported in Section A above)	579900.0	C	OTH	LandGem minus Flare unit	N/A

4.2 RELEASES TO WATERS

[Link to previous years emissions data](#)

| PRTR# : W0002 | Facility Name : Ballyguyroe Landfill Site | Filename : Appendix 3 E-PRTR.xls | Return Year : 2012 |

02/04/2013 09:14

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this only concerns Releases from your facility

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT		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 B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT		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)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT		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

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

| PRTR# : W0002 | Facility Name : Ballyguyroe Landfill Site | Filename : Appendix 3 E-PRTR.xls | Re

02/04/2013 09:14

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
			Method Code	Designation or Description	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 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
			Method Code	Designation or Description	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

4.4 RELEASES TO LAND

[Link to previous years emissions data](#)

| PRTR# : W0002 | Facility Name : Ballyguyroe Landfill Site | Filename : Appendix 3 E-PRTR.xls | Return Year : 2012 |

02/04/2013 09:15

SECTION A : PRTR POLLUTANTS

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

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD			QUANTITY		
Pollutant No.	Name	M/C/E	Method Code	Method Used Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					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# : W0002 | Facility Name : Ballyguyroe Landfill Site | Filename : Appendix 3 E-PRTR.xls | Return Year : 2012 |

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Please enter all quantities on this sheet in Tonnes

5

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	Non	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)
						Haz Waste : Name and Licence/Permit No of Recover/Disposer	Non Haz Waste: Address of Recover/Disposer						
Within the Country	19 07 03	No	21930.0	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	Charleville Waste Water Treatment Plant,D0204		Charleville,Co. Cork,,Ireland		

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

[Link to previous years waste data](#)

[Link to previous years waste summary data & percentage change](#)

Please enter details below then click the OK button

Name of Recoverer / Disposer / Next Destination Facility	
Licence / Permit No. of Recoverer / Disposer / Next Destination Facility	
Address of Recoverer / Disposer / Next Destination Facility	
Address 1 / Street name	
Address 2 / Building number	
Address 3 / City name	
Address 4 / Postcode	
Country	

Please enter a full stop "." in an address field if there is no data to be entered

Alternatively, please select from previously entered details by clicking on the row below then click OK

Name and License / Permit No. Address of Recoverer / Disposer / Broker
Charleville Waste Water Treatment Charleville, Co. Cork, Ireland

Please enter details below then click the OK button

Name of Final Recoverer / Disposer	
License / Permit No. of Final Recoverer / Disposer	
Address of Final Recoverer / Disposer	
Address 1 / Street name	
Address 2 / Building number	
Address 3 / City name	
Address 4 / Postcode	
Country	
Address of Actual Recovery / Disposal Site	
Address 1 / Street name	
Address 2 / Building number	
Address 3 / City name	
Address 4 / Postcode	
Country	

Please enter a full stop "." in an address field if there is no data to be entered

Alternatively, please select from previously entered details by clicking on the row below then click OK

Name and License / Permit No.	Address of Final Recoverer / Disposer	Address of Actual Recovery / Disposal Site
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Previous years data is correct as at 19/03/2013 11:39

Release_To	Year	Pollutant_Number	Pollutant_Description	M_C_E	Method_Code	Method_Description	Total
Air	2011	1	Methane (CH4)	C	OTH	Total estimated methane generated minus methane flared	620910
Air	2011	2	Carbon monoxide (CO)	M	ALT	Testo 350 Flue Gas Analyser	1.102
Air	2011	8	Nitrogen oxides (NOx/NO2)	M	ALT	Testo 350 Flue Gas Analyser	5.2943
Air	2011	11	Sulphur oxides (SOx/SO2)	M	ALT	Testo 350 Flue Gas Analyser	1.2574
Air	2011	80	Chlorine and inorganic compounds (as HCl)	M	ALT	Analysis og gas collected in impenger solution	1.9041
Air	2011	84	Fluorine and inorganic compounds (as HF)	M	ALT	Analysis og gas collected in impenger solution	0.0194
Air	2011	900	Total estimated methane generation	C	US EPA Land Gem	Landgem model	648000
Air	2011	901	Methane flared	C	hitech instruments infrared analyser	flare unit	27090
Air	2011	903	Net methane emission	C	oth	Testo 350 Flue Gas Analyser	620910

Previous years data is correct as at 19/03/2013 11:39

Year	Destination	EWC	Hazardous	Total	Description	TreatmentOperation	M_C_E	MethodCode	TreatmentLocation	Name_Licence_Permit_No	Address	Final_Recoverer_Disposer	Actual_Address_Final_Destination
2011	Within the Country	19 07 03	N	11577	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	Charleville Waste Water Treatment Plant,D0204	Charleville,Co. Cork,,Ireland		

Previous years data is correct as at 19/03/2013 11:39

Type of Waste	Previous Year Total	Current Year Total	Percentage Change
Hazardous Waste inside the country for disposal	0	0	0
Hazardous Waste inside the country for recovery	0	0	0
Hazardous Waste outside the country for disposal	0	0	0
Hazardous Waste outside the country for recovery	0	0	0
Non-Hazardous Waste for disposal	11577	21930	89.42731278
Non-Hazardous Waste for recovery	0	0	0