BALLEALLY LANDFILL
BALLEALLY, LUSK, CO. DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2012

WASTE LICENCE REF. NO. W0009-03

ORIGINAL

February 2013

Comhairle Contae Fhine Gall
Fingal County Council

FEHILY TIMONEY & COMPANY

BALLEALLY LANDFILL
BALLEALLY, LUSK, CO. DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2012

WASTE LICENCE REF. NO. W0009-03

COPY

February 2013

Comhairle Contae Fhine Gall
Fingal County Council

FEHILY TIMONEY & COMPANY

BALLEALLY LANDFILL, BALLEALLY, LUSK, COUNTY DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2012

WASTE LICENCE REF. NO. W0009-03

User is Responsible for Checking the Revision Status of This Document

Rev. Nr.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
C	Issue to Client for approval	JO'N/MG	TR		15.03.2013
D	Minor Edits by Client	JO'N/MG	TR		20.03.2013
0	Issue to Client	JO'N/MG	TR	BG	26.03.2013

Keywords: Annual Environmental Report (AER), landfill monitoring

Abstract: This report represents the monitoring results for Balleally landfill, Balleally, Lusk, Co. Dublin. This report covers the annual reporting period of 2012 in accordance with Waste Licence Reg. No. W0009-03.

BALLEALLY LANDFILL
BALLEALLY, LUSK
COUNTY DUBLIN

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

Page

LIST OF FIGURES

Page

1. INTRODUCTION

In 2000 Fingal County Council was granted a Waste Licence (Reg. 9-1) to continue operating Balleally Landfill. In July 2001 Fingal County Council applied for a review of this licence. Waste Licence W0009-02 was issued on the 8th January 2003. On the 21st December 2009 the Environmental Protection Agency (EPA) issued Fingal County Council a third revision of the waste licence for Balleally Landfill: Waste Licence W0009-03.

This licence permits the operation of a non-hazardous landfill. In accordance with the requirements of Condition 11.6 of the Waste Licence, an Annual Environmental Report (AER) for the facility must be submitted to the EPA.

1.1 Reporting Period

The reporting period for the AER is 1st January to 31st December 2012.

1.2 Facility Location

Fingal County Council has responsibility for the management and operation of the facility. The facility is located at:

Balleally Landfill,
Balleally Lane,
Lusk,
Co. Dublin
Tel./ Fax. (01) 8431600

National Grid reference 322500 252200.

Drawing DE07-164-03-001 (Figure 1) in Appendix I is a map of the facility and the surrounding locations.

1.3 Environmental Policy for Balleally Landfill

- Comply with the terms of our waste licence and all other relevant legislation and codes of practice.
- Strive for continuous improvement in the running of the facility, in order to minimise the effects of the landfill on the environment.
- Create better awareness and training for all staff involved in the running of the landfill.
- Develop a good relationship with local residents around Balleally for the betterment of the surrounding area.

2. SITE DESCRIPTION

2.1 Licensed Waste Activities at the Facility

Balleally Landfill is situated in Lusk, Co. Dublin. It has been in operation since 1971. Waste activities at the facility include landfill, special handling, a construction and demolition (C&D) recycling facility (which ceased in August 2005 due to capping commitments) and a civic amenity site (which ceased in December 2008 due to capping / operational commitments). Balleally Landfill closed to waste on 11th May 2012.

On January 8th 2003 Fingal County Council was licensed to carry out the following waste activities at Balleally Landfill, Lusk, Co. Dublin subject to twelve conditions.

Licensed waste disposal activities, in accordance with the Third Schedule of the Waste Management Act, 1996.

Class 1: Deposit on, in or under land (including landfill).

Class 5 Specially engineered landfill, including placement into lined discrete cells, which are capped and isolated from one another and the environment.

Class 10 Release of waste into a water body (including a seabed insertion).

Class 12 Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.

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.

Licensed waste recovery activities, in accordance with the *Fourth Schedule* of the Waste Management Act, 1996.

Class 2: Recycling or reclamation of organic substances, which are not used as solvents (including composting and other biological transformation processes).

Class 3: Recycling or reclamation of metals and metal compounds.

Class 4: Recycling or reclamation of other inorganic metals.

Class 9: Use of any waste principally as a fuel or other means to generate energy.

Class 11: Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.

Class 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.

2.2 Total Quantity of Waste Accepted and Deposited

Waste received at Balleally to be disposed of at the landfill is weighed at the weighbridge on entry. Construction and demolition (C&D) material is stockpiled or used immediately in Specified Engineering Works (SEW). The quantity and composition of waste received, disposed of and recovered during the reporting period is detailed in Table 2.1.

Table 2.1: Quantity and composition of waste received at the facility 2012

Table does not include materials used in specified engineering works.

	Waste Deposited						
Location & Waste Type	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012***
Tipface							
Household	62,056	63,708	50,489	37,789	30,770	24,007	8,406
Commercial/ Trade	63,819	61,773	46,248	54,093	56,867	60,579	15,667
Sewage Sludge	4,623	7,466	5,091	315	361	281	86
Industrial Non-Hazardous Sludge	6,825	7,061	6,660	6,363	6,690	6,967	0
Civic Amenity				**CLOSED**	**CLOSED**	**CLOSED**	**CLOSED**
Household	4,891	4,867	3,959				
Local Fly Tipped		62	10				
Total	**142,214**	**144,937**	**112,457**	**98,560**	**94,687**	**91,834**	**24,160**

***** Closed to waste other than soil and stones 11th May 2012.

2.3 Remaining Landfill Capacity

As part of the Waste Management Strategy for the Dublin Region an extension to the landfill facility was applied for by reviewing the then current licence Reg. WL 9-2. This was granted on 8th January 2003 (W0009-02) and Priority Construction Ltd. under the supervision RPS-MCOS were appointed to construct 6 No. lined cells at Balleally to provide an additional capacity of 1.29 million m^3. Filling of Cell 1 started on 1st April, 2004, see Table 2.2 for information on inputs to date.

Filling of:

- Cell 1 commenced – 1st April, 2004.
- Cell 2 commenced – 8th June, 2004.
- Cell 3 commenced-22nd June, 2005.
- Cell 4 commenced – 6th October, 2006.
- Cell 5 commenced – 23rd August, 2007.
- Cell 6 commenced – 15th December, 2008.
- Cell 5 & 6 Piggybacking – 2009-May 2012.

Table 2.2: Air space reconciliation for the facility for 2012

Table does not include materials used in specified engineering works.

Description	Tonnes	Cubic Metres
Waste Inputs Jan – Mar 2004	48,802	61,003
Landfill Extension	**Tonnes**	**Cubic Metres**
Total Inputs Apr-Dec 2004	145,223.10	
Total Inputs Jan-Dec 2005	131,236.81	
Total Inputs Jan-Dec 2006	142,215.75	
Total Inputs Jan-Dec 2007	144,937.00	
Total Inputs Jan-Dec 2008	112,457.00	
Total Inputs Jan-Dec 2009	98,560.00	
Total Inputs Jan-Dec 2010	96,459.28	
Total Inputs Jan-Dec 2011	91,834.47	
Total Inputs Jan-Dec 2012	24,159.92	
TOTAL	987,083.33	**1,233,854**
LICENCE LIMIT WL0009-03	1,032,000	**1,290,000**
Remaining Licence Limit	44,916.67	**56,146**

Waste density of 0.8 tonnes/m^3 used for above calculations

Void Space: Total Filled + Total Remaining
1,290,000m^3 = 1,233,854m^3 + 56,146m^3

2.3.1 Balleally Landfill - Short Term Extension

The extension to the facility is approximately 98,200 m^2 (surface area) with composite liner system and leachate collection system including leachate collection chambers. It provided for approximately 1.04 million tonnes of waste.

Table 2.3: Void Space at Balleally Landfill Extension

Cell	Plan Area m^2	Surface Area m^2	Void Space m^3	Void Space Tonnes
Cell 1	15000	18000	193,373.00	164,367.05
Cell 2	18200	19000	306,338.00	260,387.30
Cell 3	13600	14300	204,001.00	173,400.85
Cell 4	15300	16500	265,933.00	226,043.05
Cell 5	16200	17300	283,991.00	241,392.35
Cell 6	12200	13100	160,101.00	136,085.85
Total	**90,500**	**98,200**	**1,413,737**	**1,201,676.45**

Assumptions:

- Geosynthetic Capping of 1.06 m.
- 10% Daily cover to be absorbed by settlement
- Waste density of 0.85 tonnes/ m^3

The remaining capacity in the landfill was surveyed in January 2012. See Table 2.4. for remaining capacity at the end of 2012. The landfill closed to waste on 11th May 2012.

Table 2.4: Remaining void space at beginning of January 2012 (Revised Survey of Remaining Void Space; Jan 2012)

Void Space	Remaining Void Space (tonnes)
JAN 2012	26,374

2.4 Local Environmental Conditions

The landfill site covers approx. 50 ha in total. The east face of the landfill is bordered by the Dublin-Belfast railway line and to the south by Rogerstown Estuary. See Figure DE07-164-03-001, Appendix I.

The former landfill facility was approx. 40ha. The extension to this facility to the north west of the site (OS National Grid Ref. 3225E 2522N) consists of a new engineered lined cell (approx. 10 Ha). The primary objective of its design is to prevent or reduce negative effects on the environment arising from landfilling of waste.

All waste was deposited in a limited working face, covered daily and surrounded by soil bunds. The entire site is surrounded by perimeter berms to reduce the visual impact and to create shelter to minimise the conditions that create windblown litter.

3. ENVIRONMENTAL MONITORING

3.1 Environmental Monitoring

All original monitoring results certificates issued by Alcontrol Laboratories Ltd., for surface water, groundwater, leachate results and from Southern Scientific Services Ltd., for dust have been already included and submitted to the EPA in the four quarterly reports submitted during the reporting period. The original results certificates are not included again in this report. This report only presents summary data.

3.1.1 Groundwater

This section of the Annual Environmental Report presents the groundwater monitoring results.

3.1.2 Monitoring Locations

Groundwater monitoring was carried out at the locations shown on Drawing DE07-164-03-001-(C), Appendix I. As part of a previous extension to the landfill a number of the boreholes stipulated in W0009-02 are no longer accessible. During July 2004 a revised monitoring schedule was agreed with the Environmental Protection Agency (EPA) on which the present monitoring is based. Details of the groundwater locations now monitored are presented in Table 3.1.

Monitoring location MB18 is located up-gradient, approximately 535 m north of the landfill on private agricultural land. Access to the monitoring location was not granted during the monitoring period.

Table 3.1: Groundwater Monitoring Locations

Station	Classification	Easting	Northing
MB18	Eastern Up gradient	323 245	252 783
RC3	Western Up gradient	321 906	252 729
MB35	South western Down gradient	322 029	251 906
CD1	Control Drain N/W of Cell 1	322 008	252 356

Location Description

Borehole MB35
This borehole is situated approximately 190 m south of the landfill on the edge of the Inner Rogerstown Estuary, downgradient of the landfill.

Location CD1
The control drain sampling location CD1 is situated approximately 30 m south of Balleally Lane west of the landfill extension. This drain collects groundwater from underneath the newly constructed lined cells.

MB18
This is an upgradient private well of Rogerstown House which lies to the north east of the landfill site along the estuary.

RC3
This upgradient borehole is situated approximately 535 m north of the landfill on private agricultural land.

3.1.3 Monitoring Parameters

Groundwater levels were monitored and a visual assessment was performed on a monthly basis at all groundwater wells. Groundwater monitoring location CD1 is sampled monthly and analysed for quarterly groundwater parameters, listed in Table D.5.1 of the Waste Licence. MB35 and RC3 are sampled quarterly and analysed for quarterly groundwater parameters, listed in Table D.5.1 of the Waste Licence.

Annual groundwater monitoring was also undertaken for CD1, MB35 and RC3 and the results are presented in Table 3.2

3.1.4 Interpretation of Results

Table 3.2. presents a summary of the groundwater chemical analysis results.

The groundwater results have been compared to the relevant Interim Guideline Value (IGV) set out in the EPA report '*Towards Setting Guideline Values for the Protection of Groundwater in Ireland'.* It should be noted that the groundwater beneath the landfill is likely to be estuarine in nature and would not generally be considered to be potable water.

Monthly monitoring at CD1 shows that chloride results varied through the reporting period with a generally increasing trend from January to April. BOD results remained constant through the reporting period. COD results remained relatively constant through the reporting period having generally shown an increase trend through the first quarter (Figure 3.1).

Quarterly monitoring at groundwater locations indicates that ammoniacal nitrogen levels are lower up gradient at RC3 than down gradient at MB35, suggesting potential landfill impact down gradient (Figure 3.2).

The quarterly chloride (Figure 3.3) and electrical conductivity (Figure 3.4) plots follow a similar trend to each other. Results from both RC3 and CD1 are broadly similar with elevated chloride and electrical conductivity results found in all samples at MB35.

Both chloride and electrical conductivity levels are lower up-gradient at RC3, increasing slightly on-site at CD1 and then greatly down-gradient at MB35. It is observed that up gradient chloride levels at RC3 are elevated slightly (33-39.3 mg/L/) above the IGV level (30 mg/l Cl) during the reporting period except in Quarter 4 where it falls below the IGV level.

Electrical conductivity results from RC3 are under the IGV level (1 mS/cm) in all quarters. All results for CD1 and MB35 are elevated above the IGV level except at CD1 in Q1.

It is likely that this trend in chloride and electrical conductivity values are indicative of saline water intrusion at location MB35 due to its position in close proximity to the Rogerstown estuary. Saline intrusion may also be influencing CD1 and RC3, to a degree.

pH levels in all 3 groundwater wells has remained relatively constant over the monitoring period (Figure 3.5).

Table 3.2: Annual Groundwater Monitoring Results

Groundwater Monitoring 2012		MB35	MB35	MB35	MB35	CD1	CD1	CD1	CD1	RC3	RC3	RC3	RC3
Parameter	MAC	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
pH (Field)	≥ 6.5 &≤ 9.5 [1]	7.08	7.12	7.36	7.11	7.71	7.06	7.02	6.75	7.72	7.48	7.27	7.06
Temperature (°C) (Field)	25 [1]	10.9	12.4	15.3	10.9	11.1	12.6	14.3	11.5	10.7	12.5	15.1	10.7
Ammoniacal Nitrogen as N mg/L	0.12 [1]	5.33	4.6	5.06	4.09	0.814	1.41	1.58	1.35	<0.2	<0.2	<0.2	0.814
Dissolved Oxygen mg/l (Field)	No abnormal change [1]	6.38	3.47	3.78	8.02	4.67	3.44	2.14	7.69	8.6	7.93	7.12	-
Chloride mg/L	30 [1]	15000	16500	15000	15600	109	119	134	125	39.3	31.8	33	24.2
Conductivity (at 25 °C) (mS/cm) (Field)	1 [3]	42.7	44	41	42.3	1.518	1.39	1.427	1.419	0.903	0.786	0.791	0.016
Conductivity (at 25 °C) (mS/cm) (Laboratory)	1 [3]	35.1	39.1	33	35.2	1.2	1.22	1.25	1.2	0.766	0.634	0.761	0.65
Total Organic Carbon	No abnormal change	7.05	6.3	<6	4.07	<3	5.75	4.4	6.22	3.36	4.47	<3	61
Suspended solids	50 [2]	370	145	195	115	<2	<2	<2	<2	73	35	66.5	82.2

Notes:-
[1] = IGV Interim Guideline Values, from EPA, Towards Setting Guideline Values for the Protection of Groundwater in Ireland
[2] = Surface Water Regulations (1989)
[3] = European Communities Environmental Objectives (Groundwater) Regulations, 2010

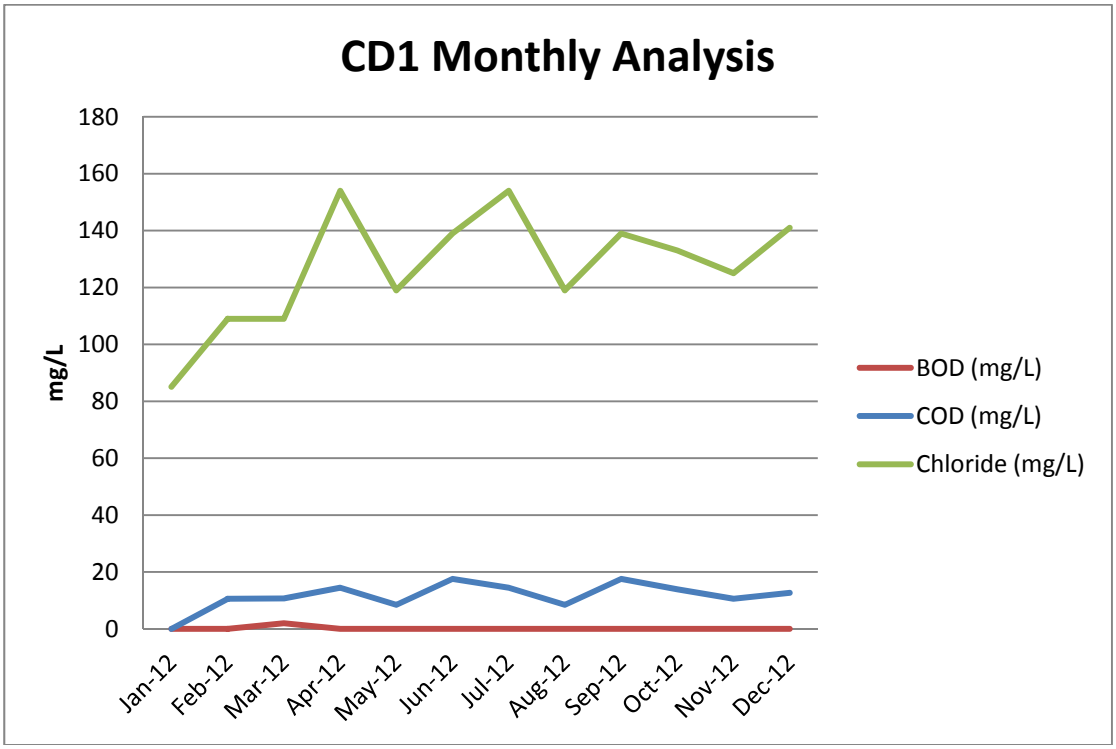


Figure 3.1: CD1 Monthly Monitoring Results

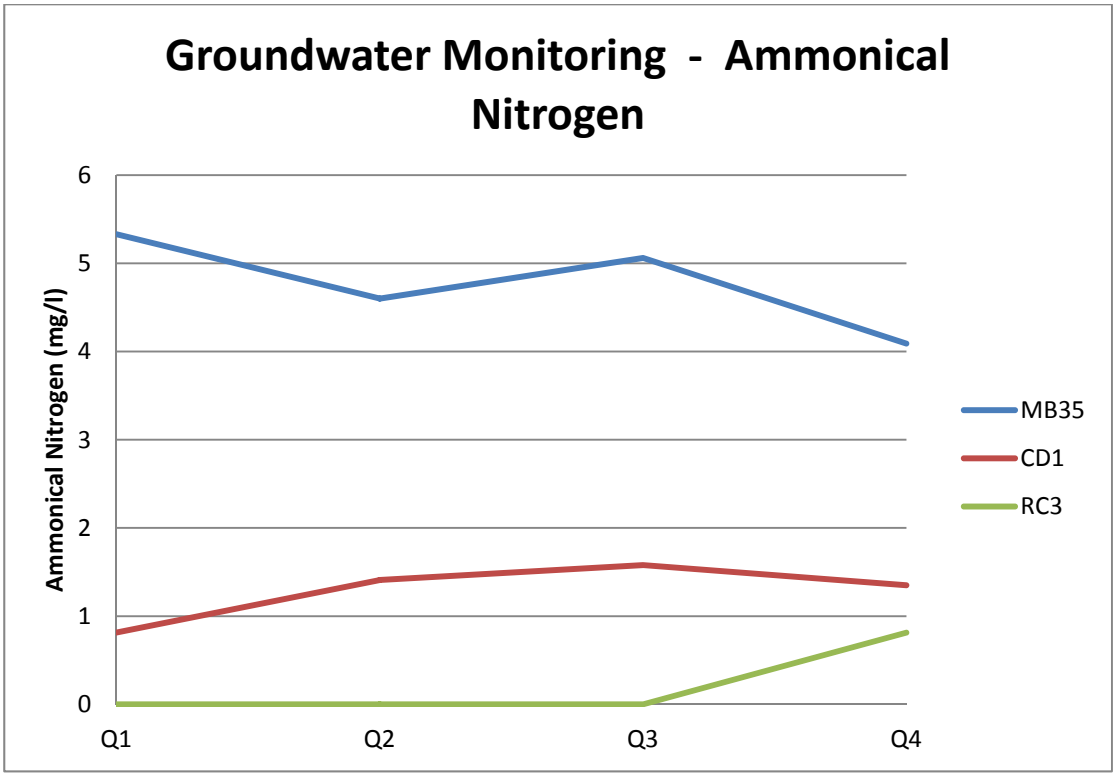


Figure 3.2: Quarterly Ammoniacal Nitrogen Monitoring Results

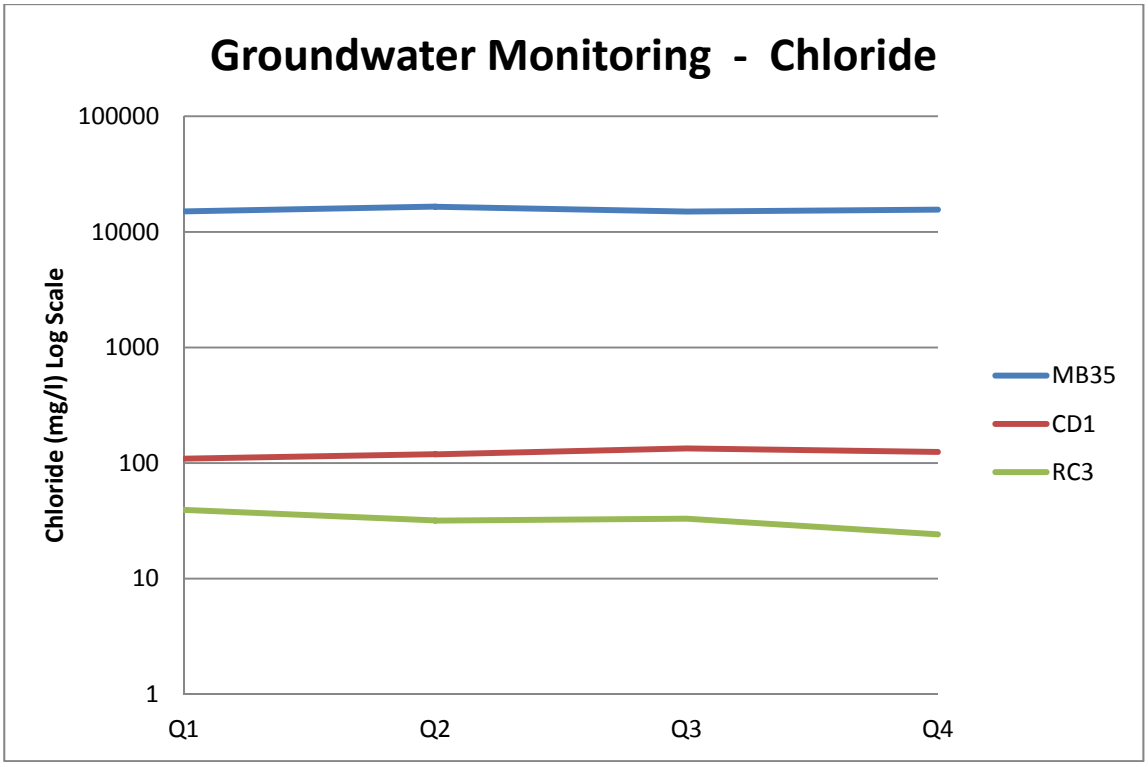


Figure 3.3: Quarterly Chloride Monitoring Results

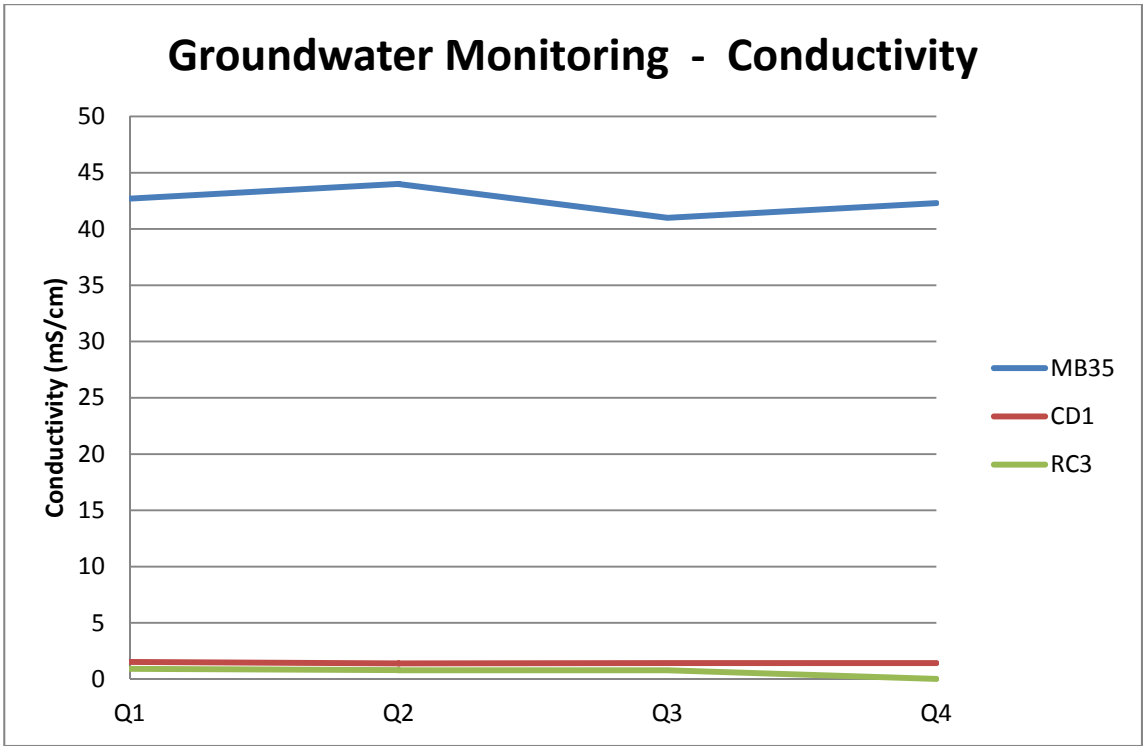


Figure 3.4: Quarterly Electrical Conductivity Monitoring Results

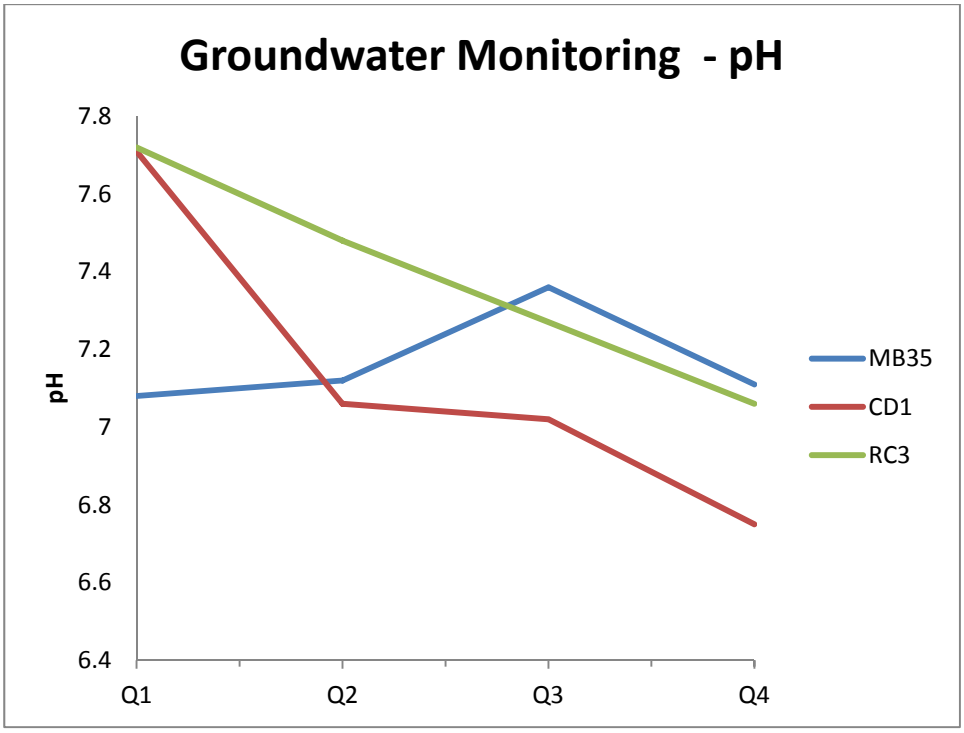


Figure 3.5: Quarterly pH Monitoring Results

3.1.5 Conclusion

Groundwater results indicate that water quality is impacted by both the landfill (which is both dilute and disperse and engineered designed aspects) and the nearby estuary, in terms of salinity sources from the estuary. Quarterly monitoring at groundwater locations indicates that ammonical nitrogen levels are lower up gradient at RC3 than down gradient at MB35, suggesting potential landfill impact down-gradient.

Groundwater results at MB35 showed impact from saline intrusion in chloride and electrical conductivity results, while saline intrusion may also be influencing CD1 and RC3, to a degree.

3.2 Surface water monitoring

This section of the Annual Environmental Report presents the surface water monitoring results.

3.2.1 Introduction

Schedule D of the waste licence requires the monitoring of surface water. The surface water monitoring locations are predominately upstream of the landfill footprint.

3.2.2 Monitoring Locations

The sample locations can be seen in Drawing DE07-164-03-001-(C), Appendix I and are presented in Table 3.3.

Table 3.3: Surface water monitoring locations

Monitoring ID	Easting	Northing
SWFD	322 036	252 412
SWV1	321 980.2	252 187.4
S3	322 985	252 692
S7	322 646	253 213
SW20a	322 897	252 687

SWFD
Discharges to an open drain immediately west of the entrance to the wastewater treatment plant.

SWV1
The surface water discharge at the Western Point Surface Water Outfall – The samples are collected in the open channel immediately upstream of the discharge pipe/cut-off flap.

S3
This sampling point is located on a stream to the north east edge of the landfill site prior to its discharge to the estuary.

S7
This sampling point is located upstream of the site on the stream to the north of the landfill site.

SW20a
This sampling point is located at a drainage ditch to the east of Rogerstown Lane, close to the north-eastern tip of the landfill, currently bunged.

SW1
At the request of the EPA, FCC was required to re-start monitoring at SW1, in Quarter 1, 2010, however monitoring at this point ceased following recommendations by the EPA during a site audit of 31st May 2011.

3.2.3 Monitoring Parameters

Environmental samples taken at the site were submitted for analysis in accordance with Table D.5.1 of Waste Licence W0009-03. As required, a monthly visual assessment of all surface water monitoring locations was undertaken.

Chemical analysis of surface water monitoring point S3 is required monthly. It is analysed monthly for quarterly parameters, so that the surface water chemistry can be characterised. These parameters included pH, temperature, conductivity, Chemical Oxygen Demand (COD), ammoniacal nitrogen, Biochemical Oxygen Demand (BOD), total suspended solids, dissolved oxygen and chloride. Chemical analysis of all surface water sampling points is carried out on a quarterly basis for the parameters listed in Table D.5.1 of Waste Licence W0009-03.

3.2.4 Monitoring Results

The visual assessment results and the full surface water analysis datasets as issued by the Laboratory have been previously submitted in the individual quarterly reports during the reporting period.

A summary of the results is presented in Table 3.4 and continued in Table 3.5. A summary of the monthly chloride, ammoniacal nitrogen, COD and BOD results for samples taken at S3 are shown in Figure 3.5. Quarterly results for all surface water monitoring locations are presented in Figure 3.6 to Figure 3.10.

3.2.5 Interpretation of Results

The surface water results have been compared to maximum admissible concentrations (MAC) as outlined in the Surface Water Regulations, 1989. It can be seen from the results that over the course of the year, several parameters were elevated above the regulations (Table 3.4 & 3.5).

The parameters examined were chosen because they are likely indicators of leachate impact, but they also may demonstrate impact by other sources, such as sewage or the nearby estuary.

For the monthly S3 sample analysis (Figure 3.6), COD and Chloride results were below the MAC in all months. BOD was also under the MAC during the reporting period except in April where a spike in parameters is noted. Ammoniacal N was above the MAC at S3 in every monthly monitoring event for the year.

Electrical conductivity levels (Figure 3.7) varied throughout the monitoring period with S7 recorded below the MAC for the entire period. S3 results were stable in the period Q1-3 with an elevation above the MAC seen in Q4. SW20A was recorded above the MAC for the entire period except in Q4. SWFD was seen to be above the MAC in Q1 however it dropped below the MAC for the period Q2-4. EC in SWV1 was elevated above the MAC for all 4 quarters.

Chloride monitoring shows all results for the monitoring period are under the MAC (250 mg/l Cl) (Figure 3.8) except for SWV1 in Q1 and Q2.

Results elevated above the COD MAC (40 mg/l) were recorded in SWV1 in Q2 and Q3 and in SW20a in Q1 to Q3 (Figure 3.9). Results for SWFD, S3 and S7 were all under the MAC for all samples analysed.

With the exception of Q1 in S3 and S7, all BOD samples were under the MAC (5 mg/l) during the monitoring period (Figure 3.10).

Ammonical nitrogen levels (Figure 3.11) are elevated ranging between <0.2 mg/l to 14.5 mg/l during the reporting period, suggesting potential landfill impact. With the exception of S7 which was below the limit of lab detection in Q3 and Q4. These locations are located circa 700 m north of the site. Higher elevation in Q1 and Q2 suggest that these may be affected by agricultural/market garden growing activity in the area.

Table 3.4: Surface water monitoring Results

			SWV1	SWV1	SWV1	SWV1	SWFD	SWFD	SWFD	SWFD	S3	S3	S3	S3
Sample Identity	**Units**	**MAC**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
pH	pH	5.5 – 8.5[1]	7.64	7.48	7.32	7.05	7.57	7.72	7.66	8.79	7.86	7.94	7.72	7.48
Temperature (°C)	°C	No abnormal change	7.6	12.6	15.7	11.4	7.7	12.6	15.2	10.9	8	11.5	14.7	8.9
Ammoniacal Nitrogen	mg/l	0.23	2.25	2.13	10.5	3.32	0.278	0.238	0.208	<0.2	3	0.607	1.11	0.58
BOD mg/L	mg/l	5 [1]	2.43	2.18	<3	<2	<2	2.23	<2	2.87	6.41	<2	<2	<2
COD mg/L	mg/l	40 [1]	18.2	73.5	135	24.4	18.4	32.4	26.2	34.5	22.3	24.3	15.4	13
T SS mg/l	mg/l	50 [2]	22	267	633	19	2.5	36.5	10.5	53.5	4	18.5	2	5
Dissolved Oxygen mg/l (Field)	mg/l	No abnormal change	9.4	8.34	7.32	7.24	5.72	8.13	5.51	8.9	8.05	8.23	8.68	4.94
Chloride mg/L	mg/l	250 [1]	380	355	140	174	44.1	34.6	20.5	24.6	57.3	47.5	52.6	47.5
Conductivity (Field)	mS/cm	1 [1]	2.45	1.939	2.32	1.598	1.603	1.031	1.637		0.903	0.738	0.884	0.859
Conductivity (Laboratory)	mS/cm	1 [1]	2.04	1.94	1.47	1.37	1.31	0.907	0.564	0.541	0.76	0.647	0.772	1.56

Notes:

– Maximum Admissible Concentration, (MAC) for A1 waters, as classified by the Surface Water Regulations (1989)
Shaded cells are those that exceed the relevant MAC

Table 3.5: Surface water monitoring Results, continued

			S7	S7	S7	S7	SW20a	SW20a	SW20a	SW20a
Sample Identity	**Units**	**MAC**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
pH (pH units) (Field)	pH Units	5.5 – 8.51	7.73	7.81	7.57	7.28	7.68	7.7	7.54	9.97
Temperature (°C) (Field)	°C	No abnormal change	7.9	11.5	13.2	10.1	7.7	12	13.9	9.8
Ammoniacal Nitrogen as N mg/L	mg/l	0.23 [1]	3.44	0.455	<0.2	<0.2	4.07	7.64	14.5	1.19
BOD mg/L	mg/l	5 [1]	6.71	2.16	<2	2.11	<2	2.81	2.19	<2
COD mg/L	mg/l	40 [1]	31	22.9	18.3	29.8	64.1	69.6	70.3	28.5
Total Suspended Solids mg/l	mg/l	50 [2]	3.5	13.5	8.5	50	<6	4.5	3	76
Dissolved Oxygen mg/l (Field)	mg/l	No abnormal change	8.36	8.15	8.07	5.59	7.51	4.47	7.36	6.95
Chloride mg/L	mg/l	250 [1]	53.4	58.3	45.7	45.6	117	116	97.7	36.8
Conductivity (at 25 °C) (mS/cm) (Field)	mS/cm	1 [1]	0.849	0.757	0.831	0.813	1.299	1.363	1.276	0.929
Conductivity (at 25 °C) (mS/cm) (Laboratory)	mS/cm	1 [1]	0.728	0.668	0.719	0.678	1.15	1.18	1.17	0.812

Notes:

[1] – Maximum Admissible Concentration, (MAC) for A1 waters, as classified by the Surface Water Regulations (1989)
Shaded cells are those that exceed the relevant MAC

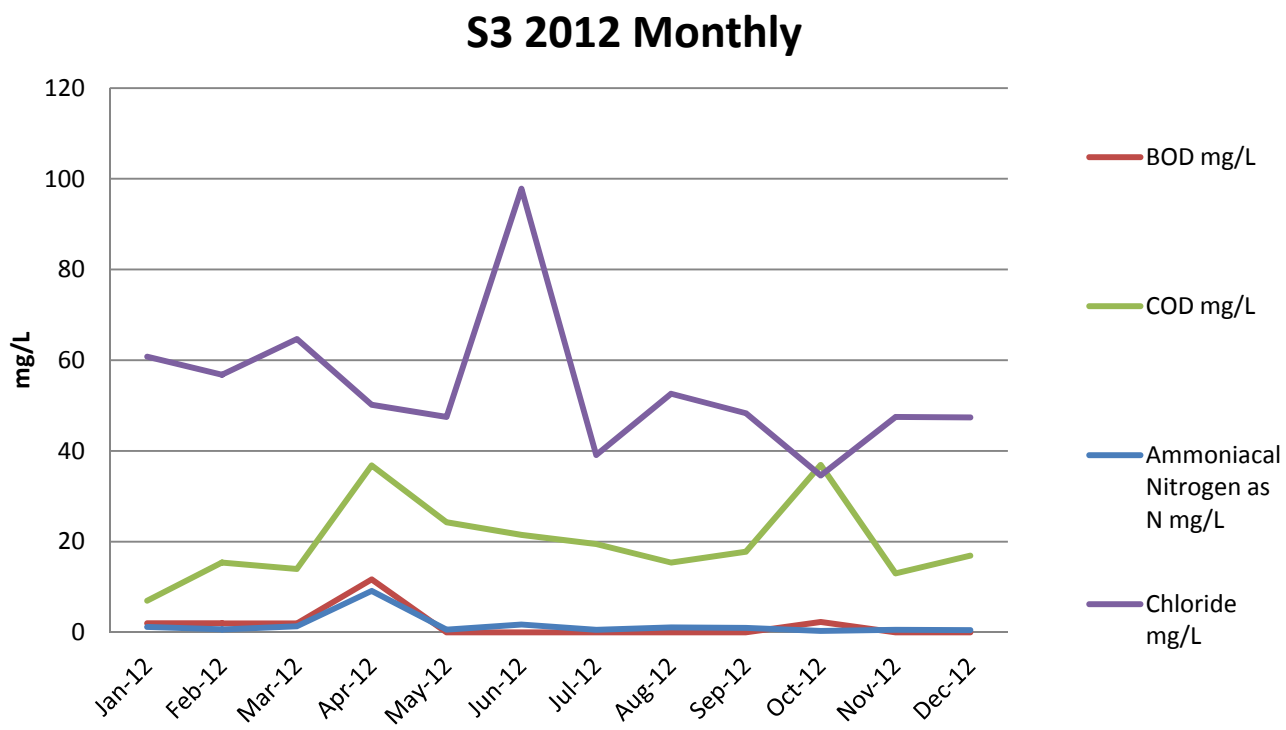


Figure 3.6: Monthly Monitoring Results for S3

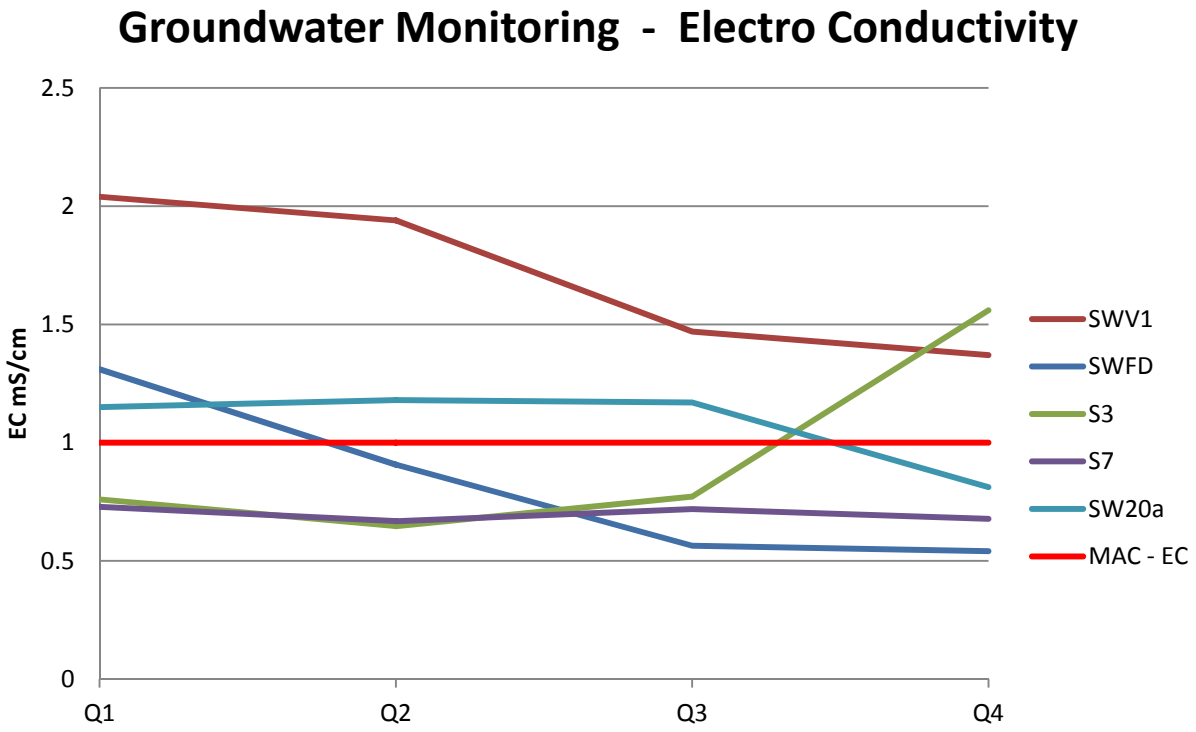


Figure 3.7: Quarterly Surface water Electrical Conductivity Results

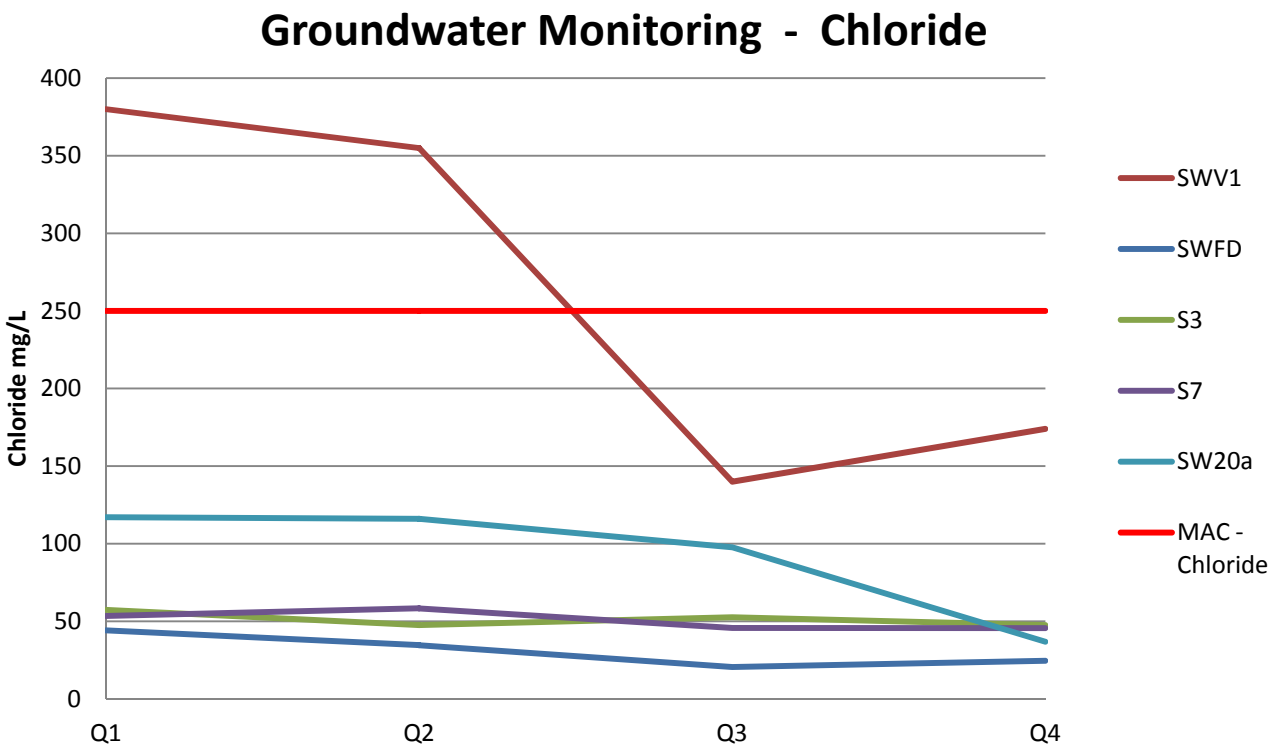


Figure 3.8: Quarterly Surface water Chloride Results

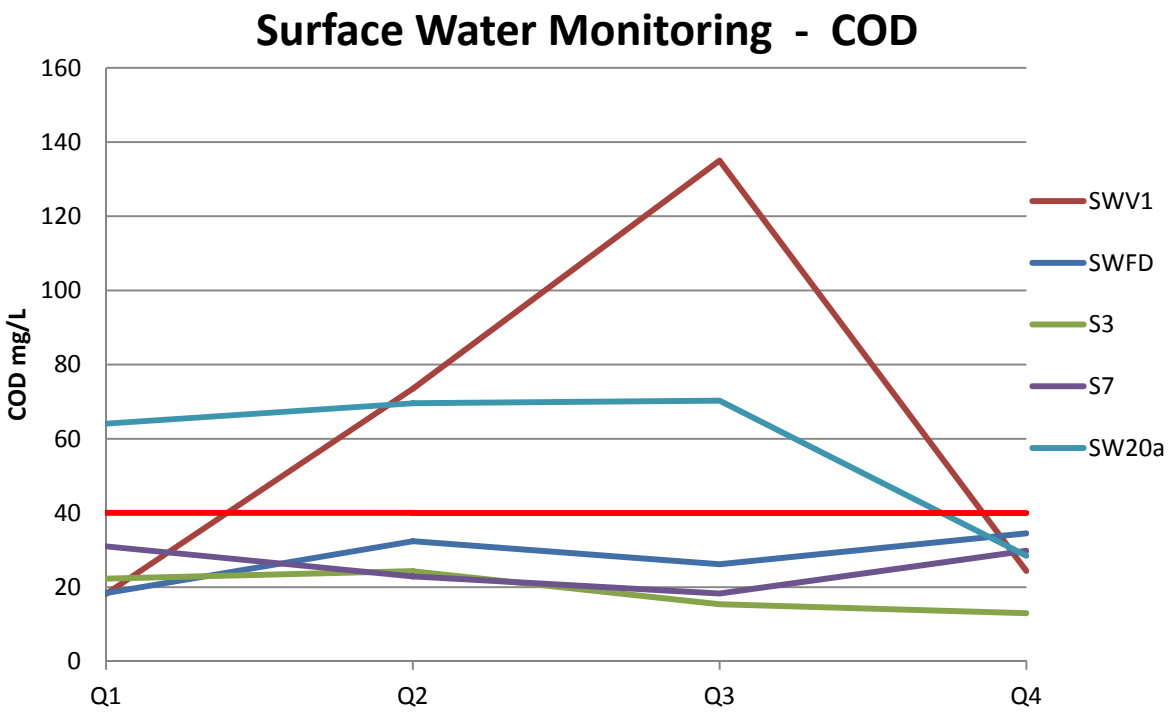


Figure 3.9: Quarterly Surface water COD Results

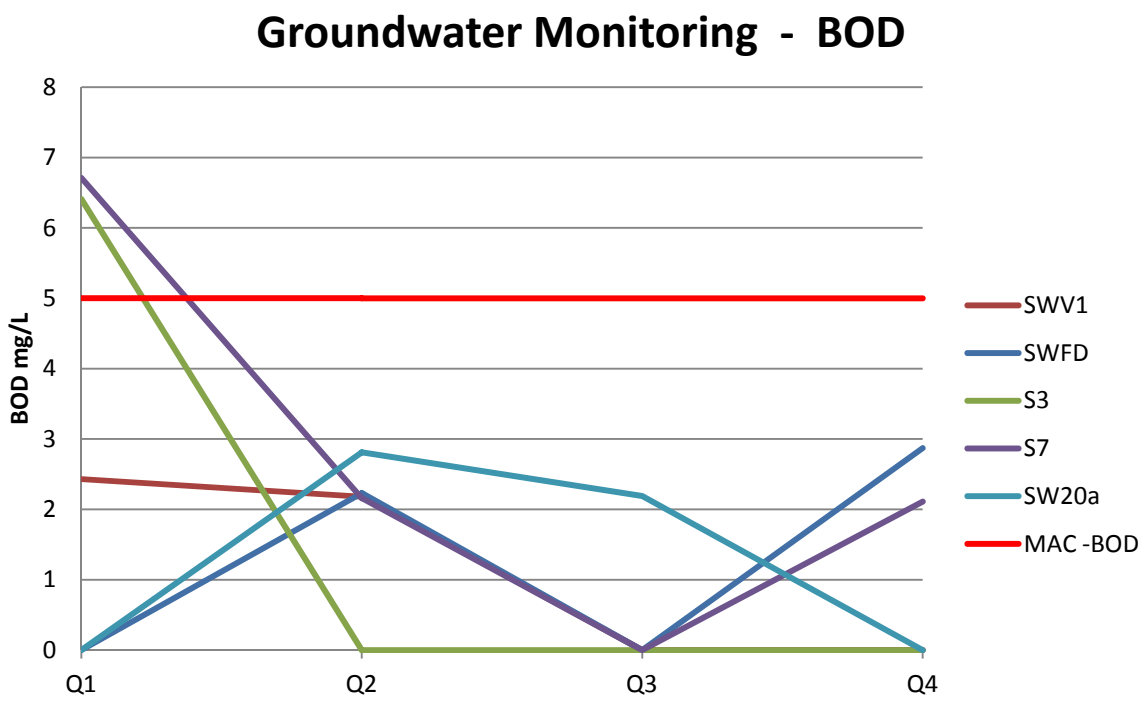


Figure 3.10: Quarterly Surface water BOD results

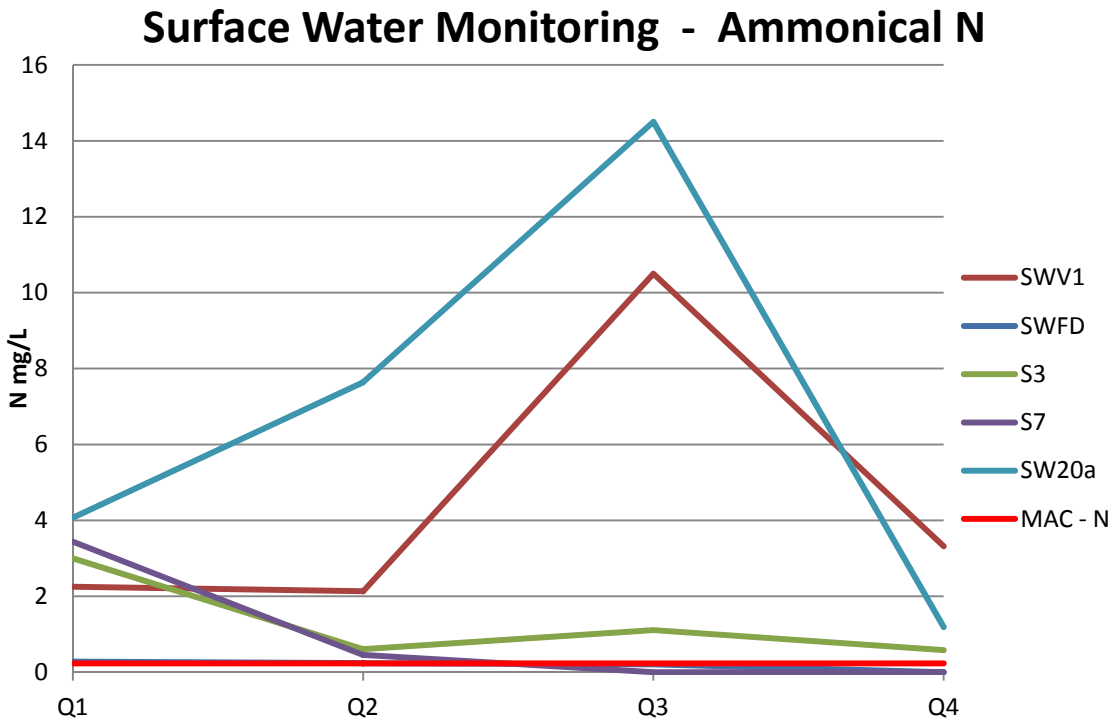


Figure 3.11: Quarterly Surface water Ammonical Nitrogen results

3.2.6 Surface Water Improvements

The ongoing capping programme and final restoration of the landfill will control and contain the breakouts which occasionally occur near the entrance. The shallow vertical barrier surrounding the facility will be completed at the entrance as part of the closure plan. This should help contain any contamination of surface water with leachate.

Remedial works were undertaken during quarter 2, 2009 to protect the surface water drain / ditch in the vicinity of SW20A. A 50 m length of the drain/ditch was excavated and cleaned prior to lining with low-permeability clay and a HDPE liner pinned and stabilised to the underlying clay bank. These two layers of impermeable material serve to minimise inputs into the drainage ditch. The ditch adjacent to SW20a was re-graded with stone fill, which allows the movement of water through the gravel. A manhole access point was built to facilitate visual assessment and the required periodic environmental sampling. There is no flow into the estuary from SW20a as the outfall point is bunged.

After closure the landfill investigation of the vertical barrier adjacent to SW20a will be undertaken in order to assess if seepage is getting through the barrier and potentially resulting in contamination at SW20a.

3.2.7 Conclusions

Surface water results indicate that water quality is impacted by both the landfill (which is both a dilute and disperse land an engineered designed landfill) and the nearby estuary, in terms of salinity sources from the estuary.

Some improvements in surface water quality have been noted through the monitoring period although results over MAC levels are also noted.

A review of surface water contamination is ongoing since August 2011; this review will be the subject of a report that is being prepared for submission to the EPA once sufficient data has been accumulated. This report will detail the investigations and mitigation measures carried out during this review. Four surface water monitoring locations are being monitored on a monthly basis to determine the source of contamination at SWV1. The locations are SWMH7, P2MH, 6"Pump chamber. These results are being presented on a quarterly basis to the EPA. Some trends have been included here. Ammonical N results for the 2012 monitoring period are shown in Figure 3.12. Please note that the results for the leachate sump are shown on the secondary axis. Chloride levels are shown in Figure 3.13 and in this instance both SWV1 and the leachate sump are shown on the secondary axis. EC levels are shown in Figure 3.14.

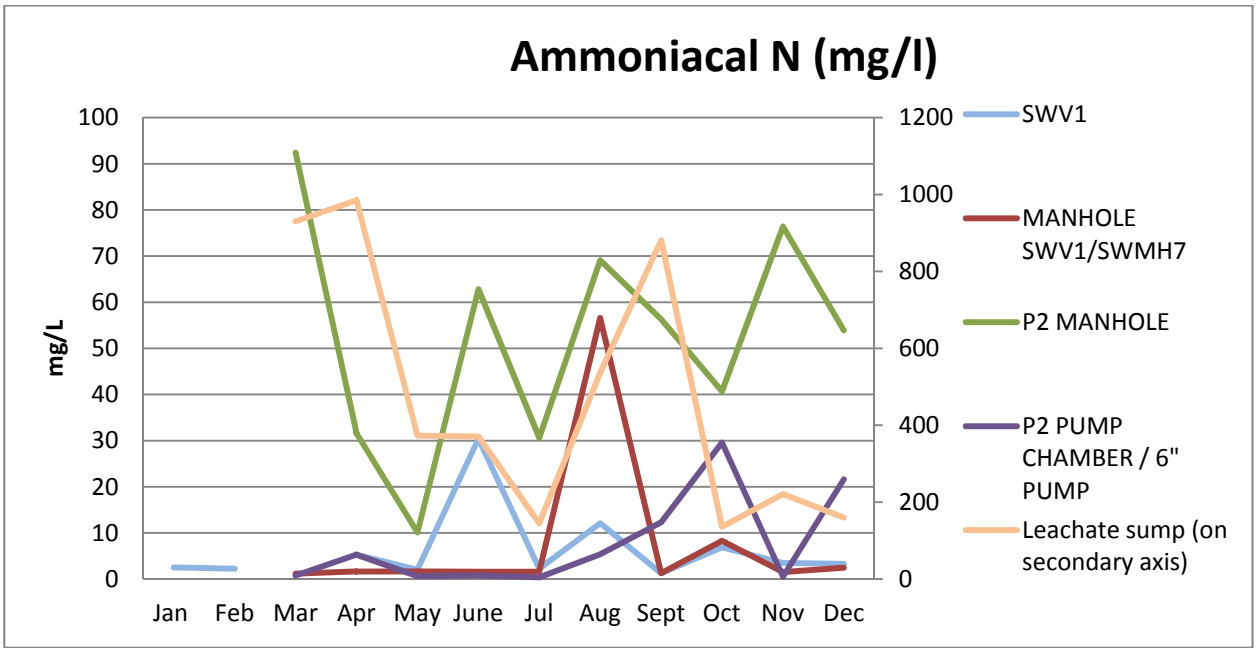


Figure 3.12: Ammonical Nitrogen Levels: Additional SW Locations 2012

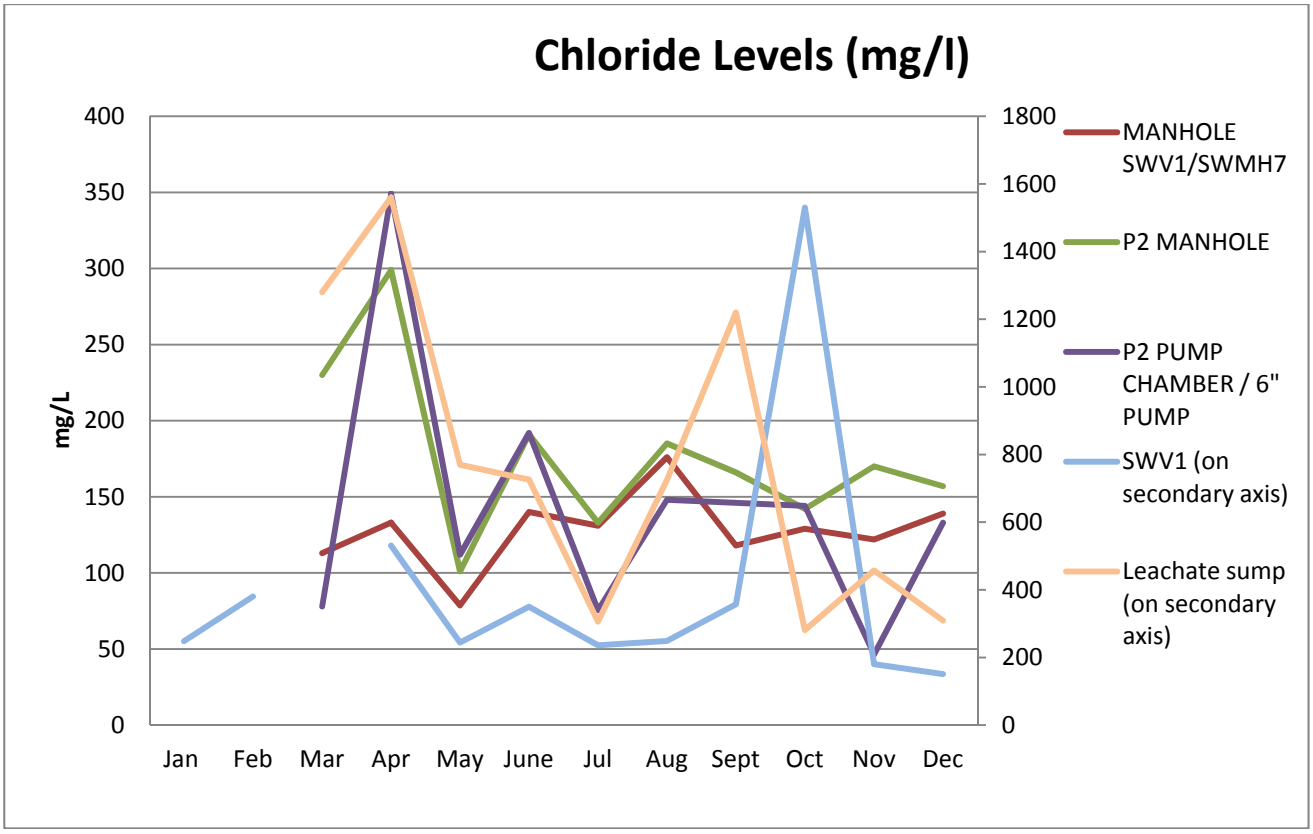


Figure 3.13: Ammonical Nitrogen Levels: Additional SW Locations 2012

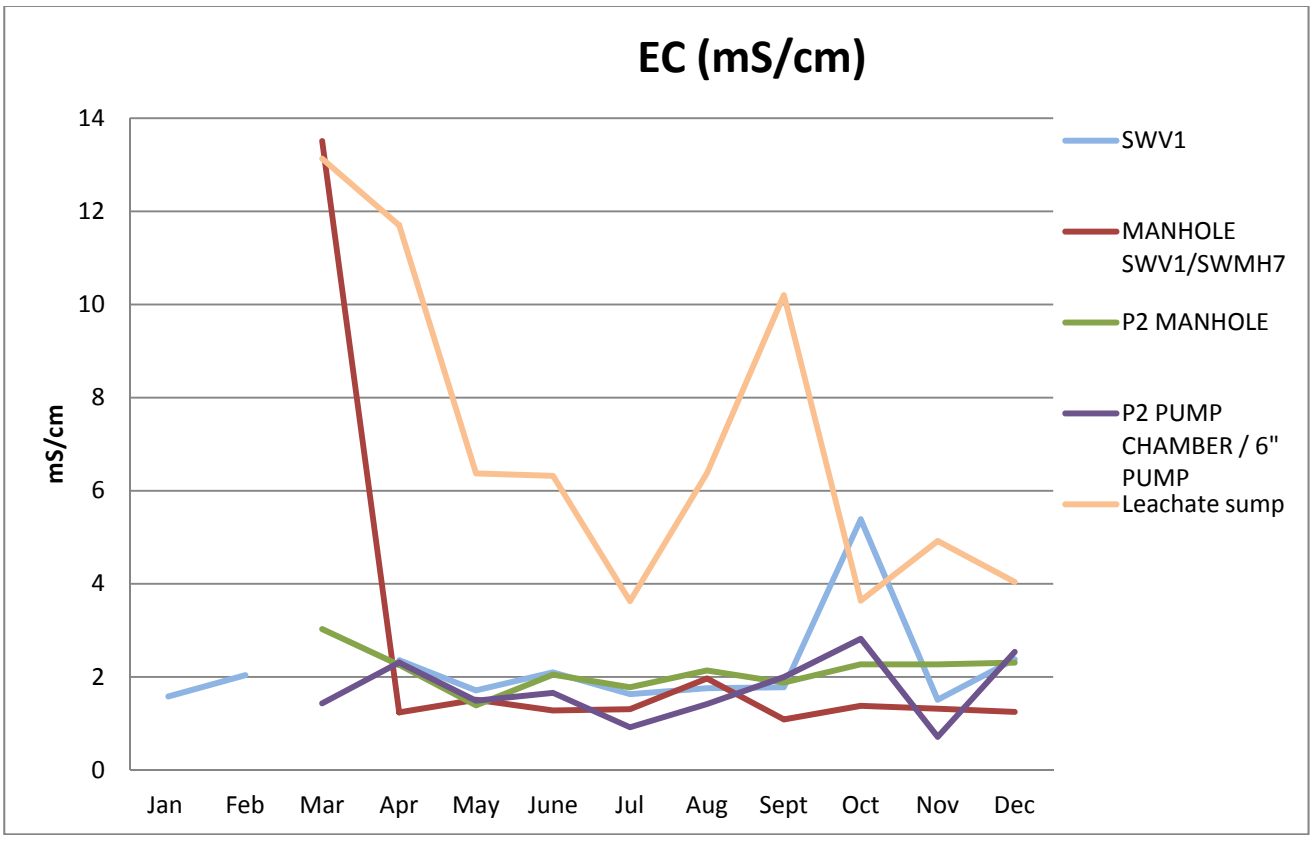


Figure 3.14: EC Levels: Additional SW Locations 2012

3.3 Leachate Monitoring

Leachate monitoring was carried out at the monitoring locations as defined in Schedule D of Waste Licence W0009-03 and shown on Figure DE07-164-03-001-(C), Appendix I.

A number of wells were noted to be destroyed or were inaccessible with the result that no sample was obtained for analysis, namely:- LMW2 (covered with soil), LMW8 (blocked on one occasion), LMW15 (destroyed), and LMW 16 (inaccessible due to height of casing). During 2011 additional Leachate wells were drilled in to facilitate areas where wells had been destroyed or were deemed to be inaccessible. These wells are shown in shown on Figure DE07-164-03-001-(C), Appendix I.

3.3.1 Monitoring Parameters

Waste Licence W0009-03 requires that a visual assessment is undertaken and the leachate level in every second well is monitored and recorded monthly. Chemical analysis of leachate samples is taken annually.

3.3.2 Monitoring Results

Leachate level results since May 2007 are presented in Figure 3.15.

3.3.3 Interpretation of leachate level Results

A trigger level of 5.5 meters above ordnance datum (m AOD) for wells between LMW1 to LMW18 has been established, to indicate when there is too much liquid in the landfill. Leachate was recorded above the trigger level at a number of locations, highlighted in Figure 3.15.

From the results it can be seen that by the end of the reporting period (December 2012) most leachate wells were under the 5.5 m AOD trigger level apart. LMW 4,5 and 6 which were above the trigger for the year, LMW3 hovered around the trigger level. The new wells LMW30 and LMW34 were below the trigger, LMW31 and 32 were above it and LMW33 hovered around 5.5 m AOD.

It is observed that P1a & P1b are typically fully open and thus the northern and southern leachate lines are fully open. Therefore leachate should not be building up in the body of the landfill.

Nevertheless, in accordance with the ERP trigger levels, visual assessments are conducted on these slopes and there is no evidence of large scale leachate break-out.

3.3.4 Leachate Quality

This section presents a summary of the chemical results. The results for leachate monitoring presented in Table 3.6.

The pumping chamber receives leachate from a number of different locations on-site. As it collects leachate from a number of different areas over the site it is representative of general leachate quality over a greater time period than the individual grab samples from each of the leachate wells. The pumping chamber collects leachate from:

Pipe 1A – New cells
Pipe 1B – Old northern boundary
Pipe 1C – Southern boundary

The results of leachate sampled from the pumping chamber are comparable with the results obtained from the individual wells on the landfill.

It is noted that the results for the southern boundary are slightly more concentrated, than the results along the eastern boundary. In general, the reported concentrations for the leachate sample are consistent with the typical composition of leachate sampled from large landfills and in line with the levels presented in the Environmental Protection Agency (EPA) Landfill Manual on Landfill Site Design (2000).

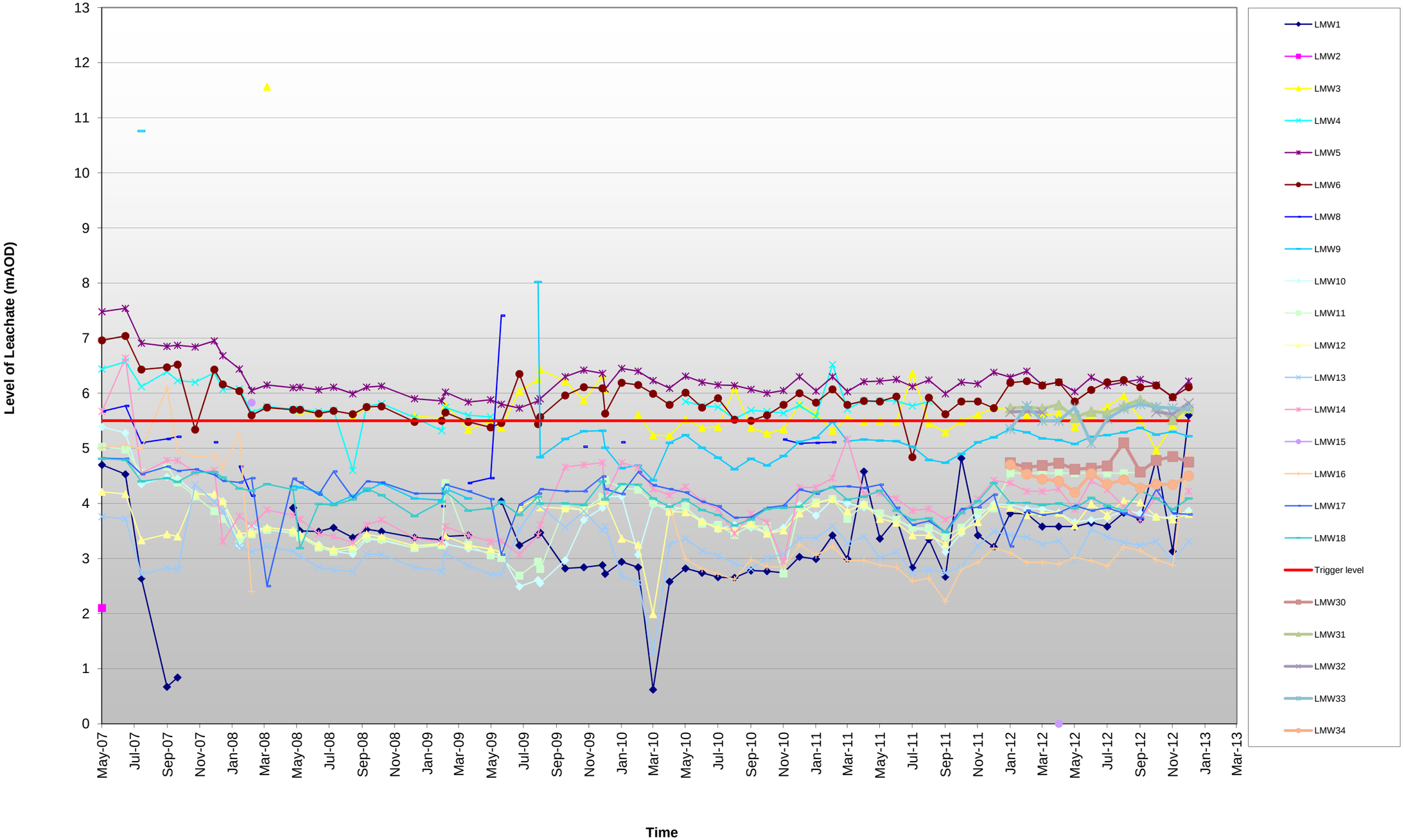


Figure 3.15: Monthly Level of Leachate Recorded in the landfill

Table 3.6: Annual Leachate Monitoring Results

Sample Description		LMW1	LMW10	LMW14	LMW16	LMW17	LMW18	LMW23
Ammoniacal Nitrogen as N	mg/l	406	521	307	89	143	68.9	33
BOD, unfiltered	mg/l	24.2	53	14.8	4.48	16.5	16.4	137
Chloride	mg/l	703	1120	554	235	326	319	41.4
COD, unfiltered	mg/l	476	656	472	184	344	285	3340
Conductivity @ 20 deg.C	mS/cm	6.4	7.99	4.92	3.14	3.09	4.12	1.62
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.058
Fluoride	mg/l	<0.5	0.645	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphate (ortho) as P	mg/l	<0.15	<0.15	<0.03	<0.03	<0.03	<0.03	<0.03
Sulphate	mg/l	124	<10	<2	<2	<2	<2	125
Total Oxidised Nitrogen as N	mg/l	<0.5	<0.5	<0.1	<0.1	0.155	<0.1	<0.1
Boron (diss.filt)	µg/l	1960	3550	2660	1170	876	1050	577
Cadmium (diss.filt)	µg/l	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (diss.filt)	mg/l	232	118	206	419	287	409	325
Copper (diss.filt)	µg/l	1.08	1.25	0.89	<0.85	1.58	<0.85	<0.85
Iron (diss.filt)	mg/l	0.434	0.757	0.378	0.0799	0.076	0.386	1.38
Lead (diss.filt)	µg/l	0.221	0.904	0.08	0.075	0.147	0.139	<0.02
Magnesium (diss.filt)	mg/l	105	134	79.6	75.3	55	74.3	28.2
Manganese (diss.filt)	µg/l	448	269	165	7610	1140	5050	9600
Mercury (diss.filt)	µg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (diss.filt)	µg/l	34	44.4	31.9	21.2	28.3	24.7	11.4
Potassium (diss.filt)	mg/l	309	398	155	88.9	69	114	20.8
Sodium (diss.filt)	mg/l	794	1080	507	253	234	302	43.9
Zinc (diss.filt)	µg/l	15.8	43	6.39	4	15.3	2.7	2.11
Chromium (tot.unfilt)	µg/l	6.75	<30	4.34	<3	6.32	7.08	263

Sample Description		LMW24	LMW30	LMW31	LMW33	LMW34	LMW6	LMW9	NO ID
Ammoniacal Nitrogen as N	mg/l	17.4	148	58.2	17.5	34.6	13	621	128
BOD, unfiltered	mg/l	74	10.2	9.14	3.34	8.64	19.5	79.7	6.21
Chloride	mg/l	31.7	689	385	62.2	129	40.5	783	265
COD, unfiltered	mg/l	662	532	258	65	161	433	815	162
Conductivity @ 20 deg.C	mS/cm	1.21	4.47	2.92	2.11	2.48	0.911	7.4	2.53
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Fluoride	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.62	<0.5
Phosphate (ortho) as P	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.0806	<0.03
Sulphate	mg/l	107	56.4	238	555	353	15.9	<2	<2
Total Oxidised Nitrogen as N	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	0.103	0.127	1.71
Boron (diss.filt)	µg/l	168	982	383	172	423	64.5	3950	836
Cadmium (diss.filt)	µg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (diss.filt)	mg/l	236	243	295	492	436	175	117	74.7
Copper (diss.filt)	µg/l	<0.85	16.8	6.86	7.46	5.08	2.23	1.61	<0.85
Iron (diss.filt)	mg/l	0.271	0.223	0.151	0.11	0.021	0.12	0.489	0.117
Lead (diss.filt)	µg/l	0.132	0.562	0.116	<0.02	0.07	0.035	0.262	0.265
Magnesium (diss.filt)	mg/l	15.8	75.6	54.6	49.3	42.8	8.49	134	36.8
Manganese (diss.filt)	µg/l	1010	15200	16300	8820	5450	113	494	355
Mercury (diss.filt)	µg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (diss.filt)	µg/l	5.61	49.7	18.1	7.67	22.7	7.32	31.7	9.94
Potassium (diss.filt)	mg/l	12.9	98.8	35.4	14.5	22	9.6	335	96.4
Sodium (diss.filt)	mg/l	23.8	464	277	78.8	129	35.1	652	191
Zinc (diss.filt)	µg/l	2.01	7.28	21.5	8.19	4.86	5.37	6.28	35.3
Chromium (tot.unfilt)	µg/l	36	9.23	4.01	<3	3.18	<3	<30	<3

3.3.5 Volume of Leachate transported off-site for treatment:

A water balance for the reporting period has been prepared and is included as Table 3.7. The water balance calculation is derived from EPA Landfill Manuals "Landfill Site Design" (EPA, 2000; p59) and indicates that there was 34,088 m^3 of Leachate Produced at the Landfill. Infiltration rate used was 5% for capped areas and 25% for temporary capped areas.

Leachate tankered off-site was recorded at 47,423 m^3. The volume of leachate tankered off-site was greater than estimated in water balance, but some contaminated water pumped to plant may account for this.

3.3.6 Leachate Treatment Plant

Operation of the leachate treatment plant was suspended during Q2, 2009. During 2009, FCC applied for a full waste licence review for the site. The waste licence review was seeking to remove Chemical Oxygen Demand (COD) as a leachate treatment plant parameter and to raise the ELV levels for some of the other leachate treatment plant parameters. This application was withdrawn and FCC will be seeking a technical amendment to existing licence, possibly based on partial treatment and pumping to Portraine Waste Water Treatment Plant

In the interim period the leachate treatment plant operation will remain suspended and leachate will continue to be tankered off-site.

Table 3.7: Water Balance Calculation for Balleally Landfill 01/01/2012 – 31/12/2012

					old landfill					new landfill (22 acres)							
Month	Leachate Tankered Offsite	Water Balance Calculation	Rainfall	Rainfall	Total Area	Capped	IR	Temp	IR	Total Area	Capped	Temp	Active	sewage sludge	sewage sludges	Waste	Absorptive Capacity
	m3	m3	mm	m	m2	m2	%	m2	%	m2	m2	m2	m2	tonnes	m3	Tonnes	m3/tonne
January	3,038	2,363	63	0.063	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000	16.68	12.51	8,764.35	0.025
February	4,291	707	20.5	0.0205	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000	18.44	13.83	5,711.92	0.025
March	2,976	939	25.6	0.0256	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000	20.62	15.465	4,835.72	0.025
April	2,852	3,598	90.2	0.0902	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000	22.16	16.62	3,921.14	0.025
May	3,162	2,424	60.4	0.0604	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000	8.64	6.48	1,838.28	0.025
June	2,976	6,024	147.7	0.1477	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000	closed	closed	closed	0.025
July	3,255	3,479	85.3	0.0853	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000				0.025
August	3,286	3,186	78.1	0.0781	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000				0.025
September	4,637	3,402	83.4	0.0834	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000				0.025
October	7,145	2,896	71	0.071	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000				0.025
November	4,269	2,937	72	0.072	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000				0.025
December	5,536	2,133	52.3	0.0523	340,028	300,687	5	39,341	25	120,359	93,356	21,003	6,000				0.025
	47,423	**34,088**	**849.5**	**0.8495**										**86.54**	**64.905**	**25,071.41**	

Old Landfill Capped + New Landfill Capped + Old Landfill Temp Cap + New Landfill Temp cap + Active Area + Liquid Waste - Liquid Absorbed
Leachate Produced Landfill = {(.8495 * 300687 *.05) + (.8495 * 93356*.05) + (.8495 * 39341 * .25) + (.8495 * 21003 * .25) + (.8495* 6000) + 86.54}- {25071.41 *.025}

Leachate Produced Landfill m3	**34,088**
Leachate Tankered Off-Site	47,423

3.4 Noise Monitoring

Noise surveys were undertaken during every quarter of the monitoring period (2012) in order to assess the existing noise emissions from the site and to establish the existing noise environment at potentially sensitive receptors near the site in accordance with Schedule D of Waste Licence W0009-03. Noise monitoring was carried out during daytime hours. The location of noise monitoring points can be seen in Figure DE07-164-03-001-(C), Appendix I and presented in Table 3.10.

Noise measurements were taken for 30 minutes at each location.

Noise emission limits are given in Table C.1 of the waste licence and are reproduced here in Table 3.11.

Table 3.8: Noise Monitoring Locations

Monitoring Location	Description	Northings	Eastings
NM1	Situated adjacent to the north-eastern boundary of the site.	321 919	252 357
NM2	Situated north east of the site boundary adjacent to Balleally Lane.	321 779	252 415
NM3	Situated East of the landfill 120m along Balleally Lane.	321 459	252 383
NM4	Situated north of the landfill along Rogerstown Lane.	322 604	252 962
NM5	Situated north of the landfill along Rogerstown Lane.	322 970	254 004

Table 3.9: Noise Emission Limits

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

3.4.1 Monitoring Results

A summary of the quarterly monitoring results are presented in Table 3.10 to Table 3.13.

Table 3.10: Noise Monitoring Results 2012

Location	LAeq			
	Q1	Q2	Q3	Q4
NM1	54	58	53	64
NM2	61	62	56	70
NM3	60	58	59	64
NM4	57	54	62	57
NM5	59	46	62	54

3.4.2 Interpretation of Results

Noise emission limits are presented in Table 3.9 above. There were only five instances during the year during noise monitoring periods which complied with the EPA limit of 55 dB (A) for daytime noise.

Traffic movements on Balleally and Rogerstown lane are the main contributors to noise levels in the area, which includes noise from trucks travelling to and from the site particulary whilst traversing speed limiting ramps. Noise from site does not have as much impact as traffic movements; however a great number of the traffic movements are related to vehicle movements to the site.

The influence of vehicle movements (on the noise results can be seen from the correlation between the L_{Aeq} and the L_{AF10} results. In all cases the L_{Aeg} is closer to the L_{AF10} results than the L_{AF90} results. The L_{AF90} results for all locations are under 55 dB licence limits, while the L_{AF10} results range from 46 to 71 dB(A). This suggests that sound occurring for 10% of the monitoring period, which is greatly influenced by traffic, train, overhead airplane movements (and for this site this would also include bird-scare devices) had a large influence over the final L_{Aeg} levels recorded over the monitoring period and that the background noise, represented by the L_{AF90} is less noisy. The L_{AF10} and L_{AF90} results were presented in each of the quarterly reports.

3.5 Dust and PM10 Monitoring

3.5.1 Dust Monitoring

Dust monitoring was carried out at 4 locations in accordance with Schedule D of the licence. The locations of these monitoring points are shown on Figure DE07-164-03-001-(C), Appendix I and presented in Table 3.11 over.

Bergerhoff style gauges were used to determine total dust deposition levels at the site. Four gauges were set up so that the dust jars were at a height of at least 1.5 m above the ground and the jars were set in place during the monthly monitoring events. The samples were submitted to Southern Scientific Ltd. for analysis of total dust contents.

Table 3.11: Dust Monitoring Locations

Location	Easting	Northing
DM1 (PM1)	321 874	252 321
DM2	321 927	252 482
DM3 (PM2)	322 038	252 484
DM4 (PM3)	322 728	252 671

Note = (PM Labels = PM10 monitoring locations)

3.5.2 Monitoring Results

The annual results for total dust deposition are presented in Table 3.12. Results for organic and inorganic dust were included along with total dust results in the quarterly reports.

Table 3.12: Total Dust Deposition Results ($mg/m^2/day$)

Monitoring Locations	Sept-Oct 2012	Nov-Dec-12
D1	299	37
D2	165	55
D3	65	166
D4	46	37

3.5.3 Interpretation of Results

An organic and inorganic analysis of dust was performed in addition to the total dust deposition analysis to give a greater understanding of the results.

The results indicate that during the monitoring period the all results were under the licence limit of 350 $mg/m^3/day$. Location D1 showed the highest reported dust level in the period Sept-October of 299 mg/m^2.

3.5.4 PM_{10} Monitoring

PM_{10} sampling was not successful in the fourth quarter of 2012 due to a failure of the instrument and therefore there are no results. FCC has communicated this issue to the EPA.

3.6 Landfill gas monitoring

3.6.1 Installation of New Landfill Gas Management Infrastructure

Approximately 15 No. 125 mm diameter temporary gas extraction wells were drilled during 2012 across the piggybacked area (cells 5 & 6). The areas were selected after careful consultation with the staff at Balleally Landfill, in ascertaining the precise locations, which would collect the most gas based on what waste was landfilled. The spacing of the gas extraction system is approximately 45 m between each well on each line. The depth of each of the extraction wells is no deeper that 2 m above the base of the lined landfill at the point of each gas well. The wells were connected to the utilisation plant. The CQA document for these wells is available for inspection at the facility offices.

The licence requires that the licensee conducts monthly monitoring in perimeter gas boreholes/vents/wells in order to detect off-site gas migration. The location of the monitoring positions is shown on Figure DE07-164-03-001-(C), Appendix I.

The locations are presented in Table 3.13. In addition to the perimeter Landfill Gas Monitoring locations two leachate monitoring wells (chosen at random) from each of the southern and eastern boundaries LMW1-LMW18 and two manholes MHL33 and MHL40 (Table 3.14) along Balleally Lane were also monitored. LMW1 – LMW18 boreholes are located in front of the vertical barrier installed along these boundaries and are in the leachate that is collected at these points.

It should be noted that boreholes LMW1-18 are leachate sampling wells and not specifically designed for monitoring landfill gas. See Tables 3.13, 3.14 and 3.15 for grid references.

Table 3.13: Gas Monitoring Locations

Borehole ID	Borehole Description	Easting	Northing	Depth of Borehole *(m)*	Top of casing level	Ground Level *(m O.D.)*	Sample
GA1	Northern corner of Cell 1	321 767	252 159	6	4.155	4.0	Perimeter Borehole
GA2	Western corner of Cell 1	321 986	252 383	6	4.314	3.3	Perimeter Borehole
GA3	Northern boundary of Cell 2	322 070	252 414	10	7.076	7.5	Perimeter Borehole
GA4	Northern boundary of Cell 3	322 170	252 415	10	7.370	7.66	Perimeter Borehole
GA5	Northern boundary of Cell 4	322 291	252 440	15	12.287	14.3	Perimeter Borehole
GA6	Northern boundary of Cell 5	322 389	252 467	15	11.864	13.3	Perimeter Borehole
GA7	Northern boundary of Cell 6	322 490	252 498	10	10.749	9.57	Perimeter Borehole
GA8	Northern boundary beside exit to landfill	322 614	252 542	6	5.503	4.981	Perimeter Borehole
GA9	North of cell 1 beside gate	321 942	252 547	-	-	-	Perimeter Borehole
GA10	Residents land opposite gate	321 942	252 393	-	-	-	Outside Perimeter Borehole
GA11	Lands opposite entrance/exit between cell 6 and LMW18	322 039	252 433	-	-	-	Outside Perimeter Borehole
GA12	Lands opposite entrance/exit	322 669	252 575	-	-	-	Outside Perimeter Borehole
GA13	Lands opposite entrance/exit adjacent to SW20a	322 848	252 666	-	-	-	Outside Perimeter Borehole

Table 3.14: Gas Monitoring Locations (outside waste)

Manhole ID	Manhole ID	Easting	Northing
MH L33	Across from Cell 1	322 001	252 416
MH L40	Across from Cell 6	322 654	252 566

Table 3.15: Leachate/Gas Monitoring Locations

Borehole ID	Easting	Northing	Sample
LMW1	322 006	252 143	Leachate/Gas
LMW2	322 077	252 115	Leachate/Gas
LMW3	322 169	252 084	Leachate/Gas
LMW4	322 271	252 053	Leachate/Gas
LMW5	322 368	252 022	Leachate/Gas
LMW6	322 461	251 991	Leachate/Gas
LMW7	322 559	251 958	Leachate/Gas
LMW8	322 651	251 933	Leachate/Gas
LMW9	322 749	251 903	Leachate/Gas
LMW10	322 844	251 877	Leachate/Gas
LMW11	322 846	251 974	Leachate/Gas
LMW12	322 853	252 074	Leachate/Gas
LMW13	322 859	252 175	Leachate/Gas
LMW14	322 863	252 274	Leachate/Gas
LMW15	322 873	252 375	Leachate/Gas
LMW16	322 880	252 473	Leachate/Gas
LMW17	322 885	252 572	Leachate/Gas
LMW18	322 890	252 657	Leachate/Gas
LMW30	322086.2	252111.2	Leachate/Gas
LMW31	322275.4	252055.5	Leachate/Gas
LMW32	322562.5	251959.1	Leachate/Gas
LMW33	322654.7	251932.7	Leachate/Gas
LMW34	322877.6	252375.6	Leachate/Gas

3.6.2 Monitoring Parameters

In accordance with Table D.2.1 of the Waste Licence, gas wells were monitored for Methane (CH_4), Carbon Dioxide (CO_2), Oxygen (O_2) and atmospheric pressure. It should be noted that the boreholes along the estuary were designed and constructed to sample leachate and groundwater and not specifically landfill gas.

3.6.3 Monitoring Results

The Landfill Gas (LFG) monitoring results are summarised in Figure 3.12 and Figure 3.13.

3.6.4 Interpretation of Results

CH_4 results for the 2012 monitoring period were generally below the 1% trigger level (Figure 3.16). However, results elevated above the trigger level at locations GA3 and GA5 and also once at GA13 are noted. These locations are situated along the north and north-eastern corners of the landfill.

Highly elevated CH_4 levels were recorded in January, July and December with minor deviations above guidelines values throughout the period.

It was seen on a number of occasions across the monitoring locations that the CO_2 level results were elevated above the 1.5% trigger level (Figure 3.18). It is however noted that the general trend towards the end of the year was positive with a number of locations falling below or coming very close to the acceptable level.

High concentrations of CO_2 can occur naturally at shallow depths of up to 2 m due to microbial activity associated with the roots of many types of vegetation.

No CH_4 was recorded above the trigger levels at gas wells adjacent to offsite receptors, GA10 or GA11 during the reporting period.

3.6.5 Conclusion

In general, CH_4 levels appear to be at their highest values during the early and late of the first and fourth quarters of the monitoring period, with a general increase also being noted in July.

During the monitoring period FCC took the proactive approach of monitoring LFG at on-site and off-site locations weekly and they are also monitoring GA5 more frequently. The results of this additional monitoring are retained by FCC on-site and any changes in the trends will be noted. This monitoring is in addition to the licence compliance monitoring being undertaken by FTC.

Additionally FCC are working with Bioverda who manage the landfill gas on-site to effectively balance the gas field and reduce the levels of methane noted in GA5. A number of additional in-waste landfill gas extraction wells have been drilled in the landfill body during the reporting period and have become operational in order to increase LFG abstraction.

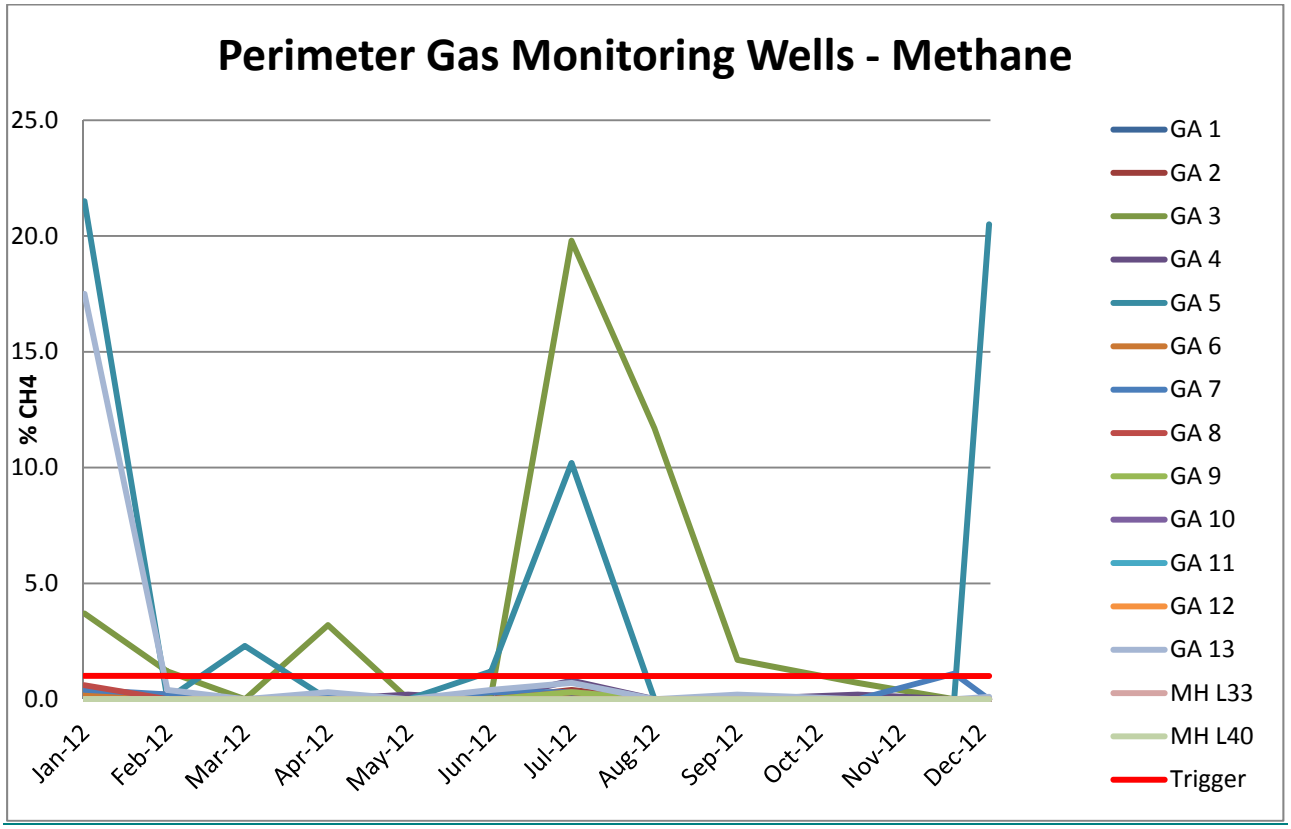


Figure 3.16: Methane Readings at Perimeter Gas Wells

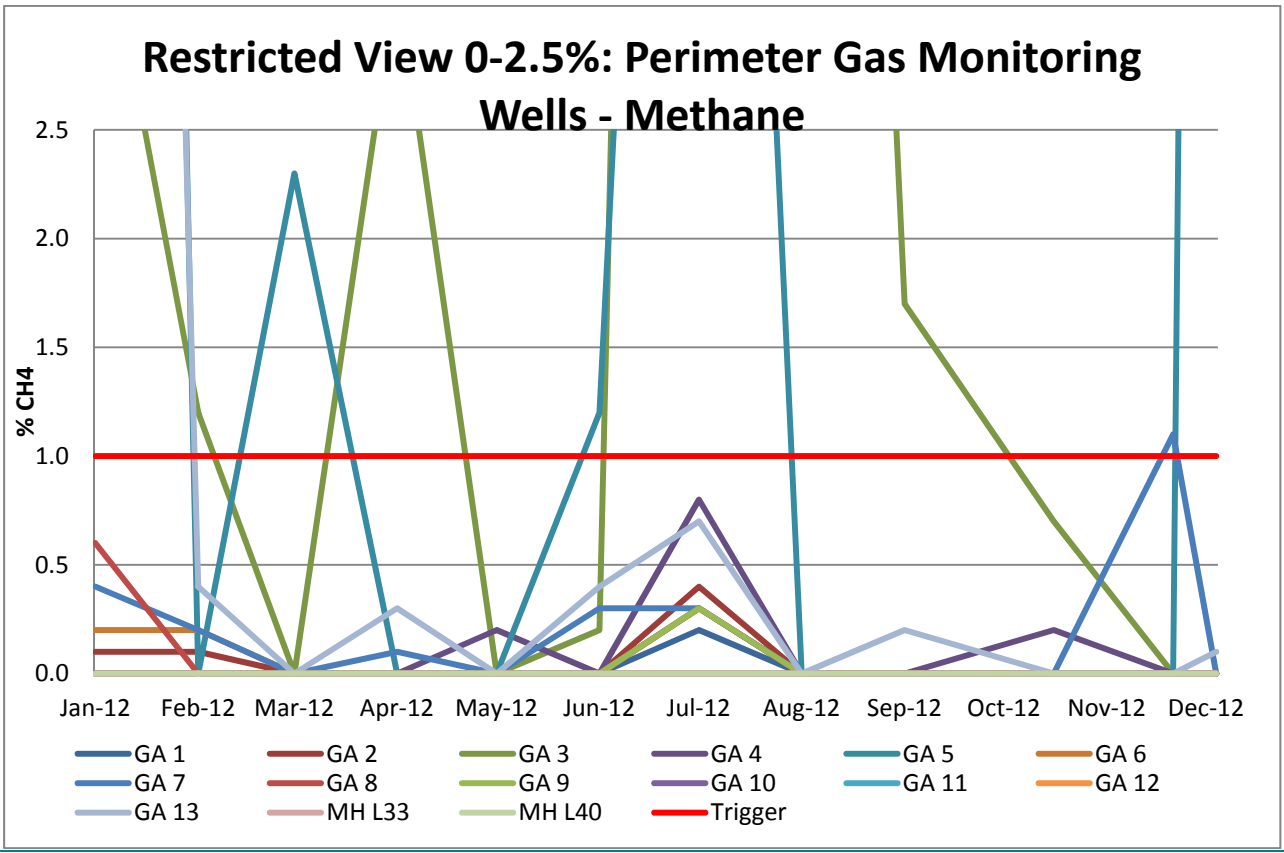


Figure 3.17: Restricted View 0-2.5%: Methane Readings at Perimeter Gas Wells

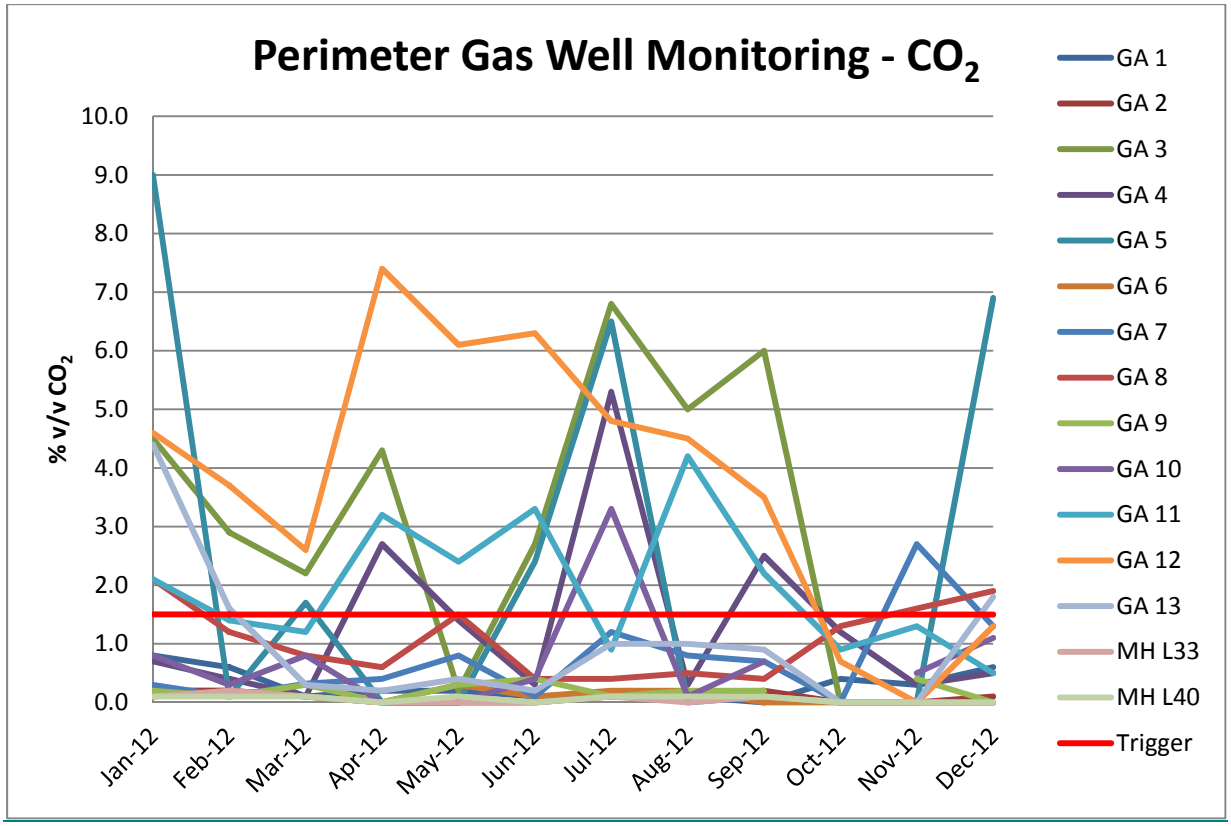


Figure 3.18: Carbon Dioxide Readings at Perimeter Gas Wells

3.6.6 Summary report on emissions

As per Schedule D.7.1 of Waste Licence W0009-03 the licensee is required to carry out annual environmental monitoring of the Gas Combustion Plant/Enclosed Flare. Odour monitoring Ireland personnel conducted the survey on the 15th November 2012.

The monitoring included the gas composition in the flue outlets from the three generators and flare in order to meet the requirements of the waste licence. The monitoring for CO, SO_2, NO_x, and O_2 was carried out *in-situ* using an electrochemical analyser. Temperature, velocity and flow rate were also monitored *in-situ* using a thermocouple and a pilot tube and manometer respectively. Samples were collected for analysis to determine TA Luft Class I, II, III organic substances. In addition, samples were collected for the landfill gas delivery system and determined for chlorine, fluorine and sulphur content.

The compliance status of emissions from the three generators with respect to the Waste Licence Limit is summarised below:

Table 3.16: Result of emissions testing of landfill gas plant 2012

ENGINE #	PARAMETER	COMPLIANCE STATUS
BY 01.	FLOW	COMPLIES
	CO	COMPLIES
	NOx	COMPLIES
	TA LUFT CLASS I ORGANICS	COMPLIES
	TA LUFT CLASS II ORGANICS	COMPLIES
	TA LUFT CLASS III ORGANICS	COMPLIES
	HCl	COMPLIES
	HF	COMPLIES
	PARTICULATES	COMPLIES
2.	FLOW	COMPLIES
	CO	NON COMPLIANCE
	NOx	COMPLIES
	TA LUFT CLASS I ORGANICS	COMPLIES
	TA LUFT CLASS II ORGANICS	COMPLIES
	TA LUFT CLASS III ORGANICS	COMPLIES
	HCl	COMPLIES
	HF	COMPLIES
	PARTICULATES	COMPLIES
3.	FLOW	COMPLIES
	CO	NON COMPLIANCE
	NOx	COMPLIES
	TA LUFT CLASS I ORGANICS	COMPLIES
	TA LUFT CLASS II ORGANICS	COMPLIES
	TA LUFT CLASS III ORGANICS	COMPLIES
	HCl	COMPLIES
	HF	COMPLIES
	PARTICULATES	COMPLIES
FLARE	FLOW	COMPLIES
	CO	COMPLIES
	NOx	COMPLIES
	TA LUFT CLASS I ORGANICS	COMPLIES
	TA LUFT CLASS II ORGANICS	COMPLIES
	TA LUFT CLASS III ORGANICS	COMPLIES
	HCl	COMPLIES
	HF	COMPLIES

NO_x as NO_2, particulates, Total Non Methane Volatile Organic Compounds, Hydrochloric acid and Hydrogen fluoride were low in the gas utilisation engines and within Emission Limit Values set out in Schedule C.5 of the Waste Licence.

CO emission concentration values were above the 650 mg/Nm^3 Emission Limit Value established for Waste Licence W0009-03 at BY01, 02 & 03. These gas utilization engines were below the Emission Limit Value (1400mg/m^3) set for Carbon monoxide in other licences, e.g. W0127-01. Fingal County Council shall seek a technical amendment to address this.

3.7 METEOROLOGICAL MONITORING

Condition 8 and Schedule D.6.1 of Waste Licence W0009-03 require daily monitoring of precipitation volume, temperature (max. /min.), wind force and direction, and atmospheric pressure.

July and August were warmest with the highest maximum mean monthly temperatures. Monthly Rainfall was highest during February and October when highest volumes of rainfall were registered. The site was predominantly affected by south westerly winds. Evaporation and potential evapotranspiration were highest in May and June.

3.7.1 Total Precipitation Volume by Month 2012

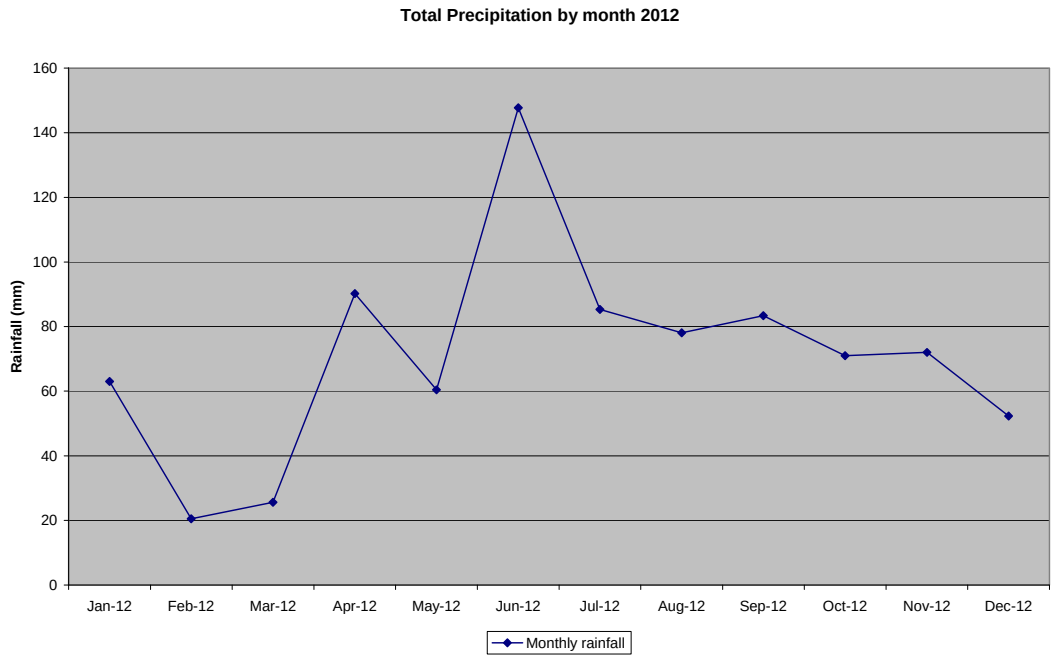


Figure 3.19: Total Precipitation mm by Month 2012

3.7.2 Average Daily Temperatures (minimum /maximum) By Month 2012

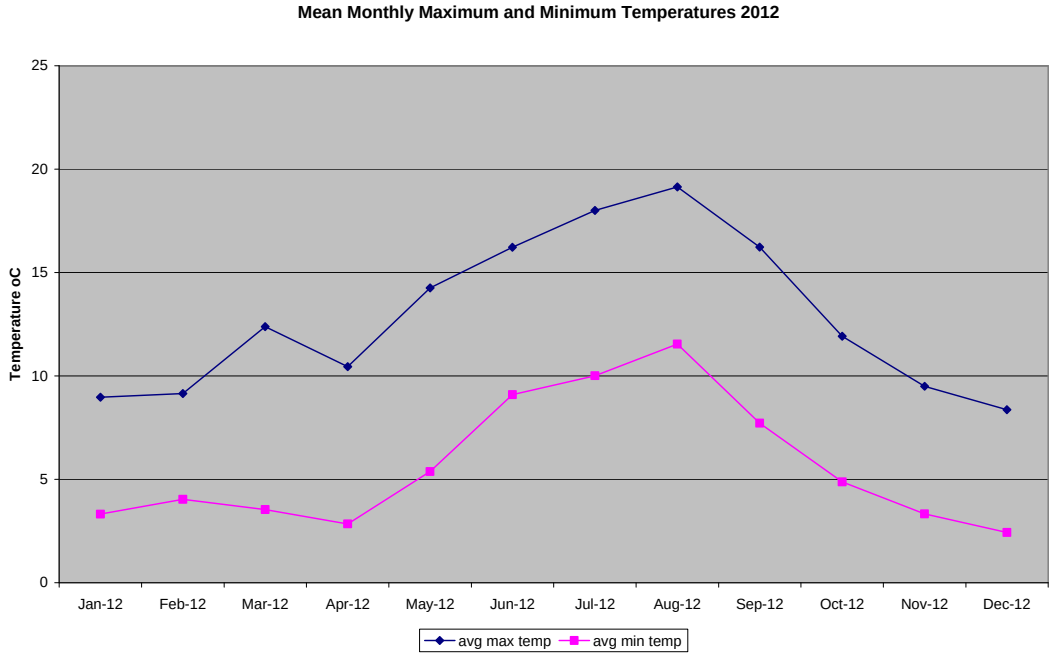


Figure 3.20: Average Daily Temperatures (Minimum/Maximum) by Month 2012

3.7.3 Average Daily Wind speed by Month 2012

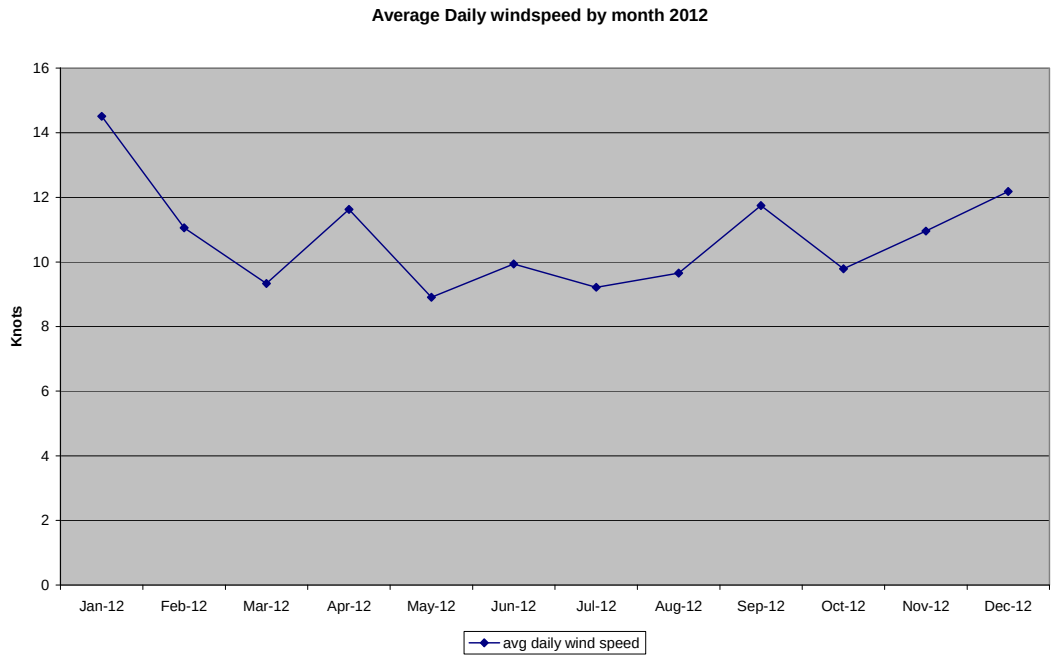


Figure 3.21: Average Daily Windspeed by Month 2012

3.7.4 Average Daily Wind Speed and Direction by Month 2012

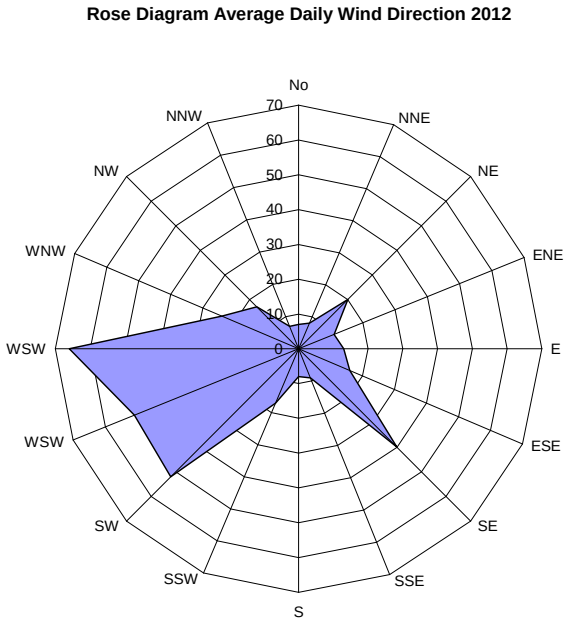


Figure 3.22: Rose Diagram of Average Daily Wind Direction at Dublin Airport

3.7.5 Average Daily Evaporation and Potential Evapotranspiration by Month 2012

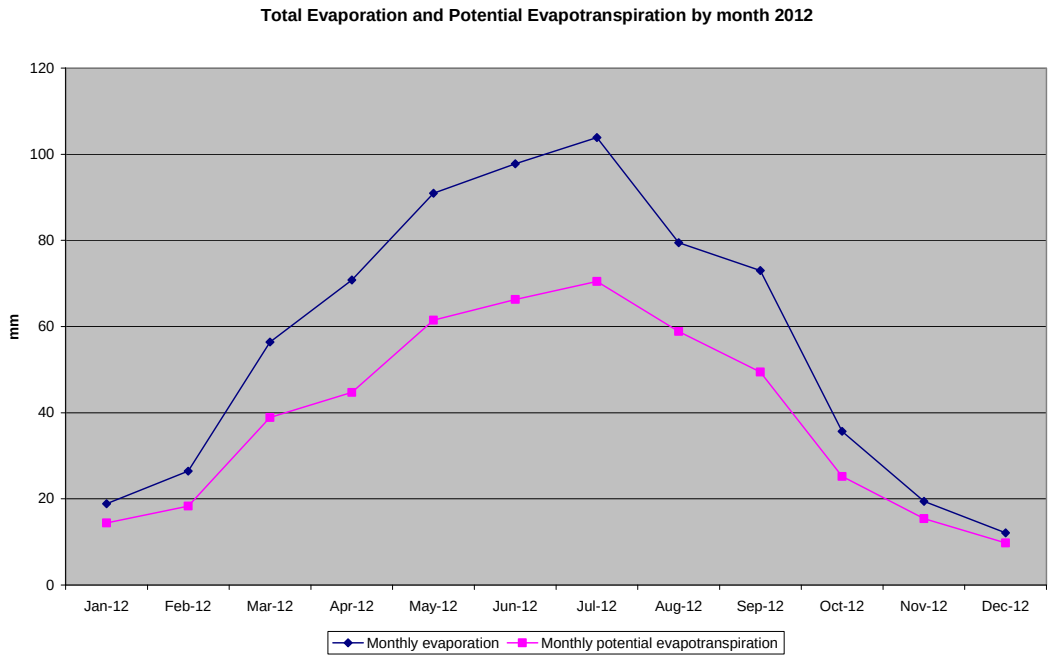


Figure 3.23: Average Daily Evaporation and Potential Evapotranspiration by Month 2012

3.7.6 Average Daily Relative Humidity By Month 2012

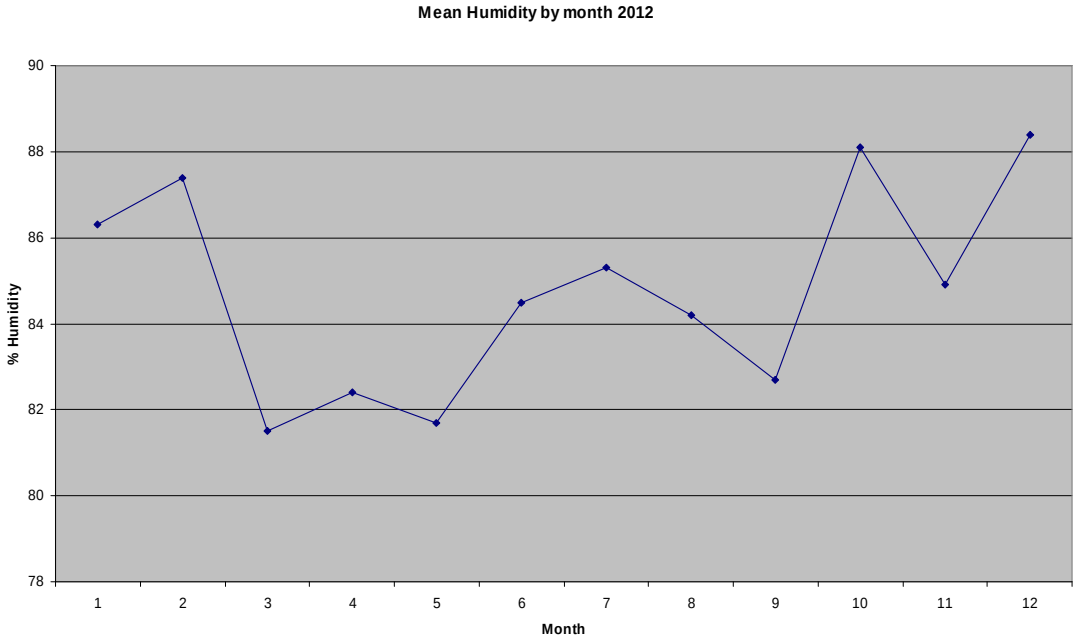


Figure 3.24: Average Daily Relative Humidity by Month 2012

3.7.7 Average Daily Atmospheric Pressure By Month 2012

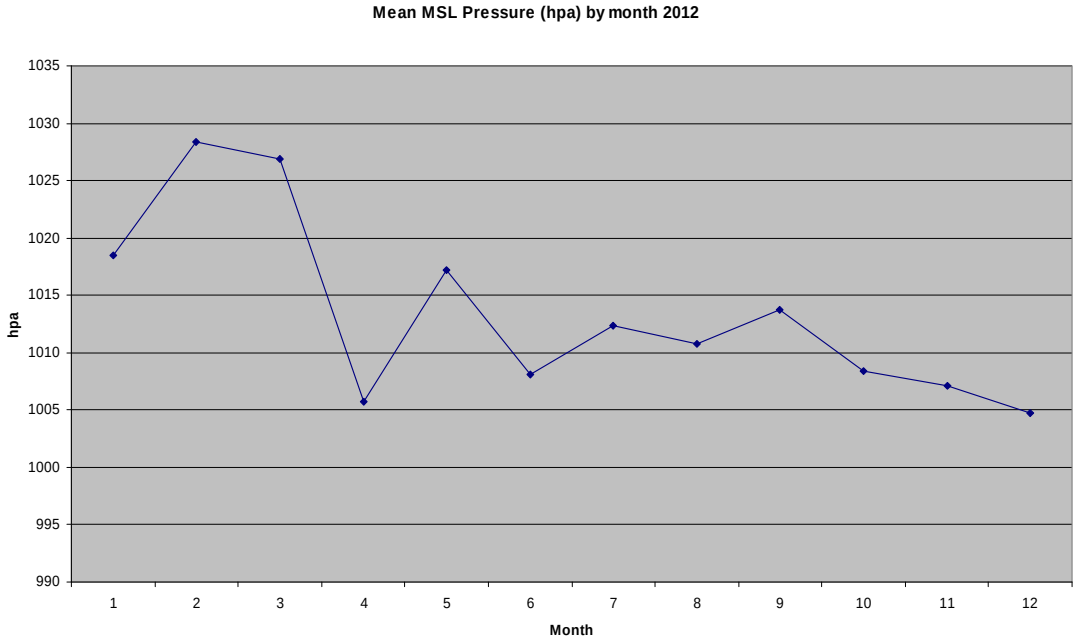


Figure 3.25: Average Daily Atmospheric Pressure by Month 2012

3.8 Resource Consumption

Resources consumed at Balleally Landfill include diesel fuel, electricity, hydraulic oil and lubricating oil. Table 3.17 presents a summary of the quantities of each used on site for the period of this report. Electricity consumed on site was used for the purpose of heating, lighting, the operation of office equipment and the leachate treatment plant. The largest consumer of electricity was the leachate treatment plant until it was mothballed during 2009. There was a sustained and significant drop in energy usage since 2008 peak.

Diesel and petrol consumption in 2012 was down on 2011 reflecting the fact that a number of items of plant transferred to other depots or off-hired following closure for the acceptance of waste.

Water Consumption in Balleally was significantly lower in 2012 than 2011, this was probably due to the first full years use of a different wheelwash system, which was brought into use during 2011.

Table 3.17: Summary of resources used on site 2012

Resource		
Electricity	**64,209 KWh**	**1,924 KWh**
Diesel *	**175,877 litres**	**0 litres**
Petrol*	**9,454litres**	**0 litres**
Lube Oil	**1000 litres (Estimate)**	**23,610 litres**
Water	**1557m3**	
Off-site Leachate Transport	**See Section 3.3.1**	

*Estimates based on average weekly usage

3.10.1 Off-Site transfer of Leachate.

One of the main energy requirements over the lifetime of the facility has been in the treatment and management of leachate. During 2012, a large volume of diesel was used in transporting 47,423 tonnes of leachate 21 km off-site from Balleally Landfill to Ringsend Waste Water Treatment Plant. Previously before the leachate treatment plant was mothballed over 200,000 kwHr of electricity were consumed (2008).

There will be an opportunity to increase energy efficiency when leachate is delivered to Portrane Waste Water Treatment Plant. Electricity usage may increase again, through additional pumping required once technical amendment for delivery to Portraine is secured. The energy implications of this will be addressed in Fingal County Councils long term proposals for the plant.

Table 3.18: Electricity consumption on site for the period January 2000 to December 2012

Year	Site 900109623	Site 901532286 3706699877	Leachate Treatment Plant 902446909 3968799118	KWHr Total
2012	Ceased	58,075	7 ,423	65,498*
2011	Ceased	59,100*	5,109*	64,209*
2010	Ceased	71,575*	6,460*	78,035*
2009	Ceased	82,950*	101,367*	184,317*
2008	1,832*	91,350*	202,739*	295,921*
2007	1,726*	84,900*	202,669*	289,295*
2006	2,109*	97,600*	73,420*	173,129*
2005	1,033*	115,050*	N/R	115,050*
2004	NR	66,250*	N/R	66,250*
2003	NR	NR	N/R	89,155 @
2002	NR	NR	N/R	76,529 @
2001	NR	NR	N/R	55,453 @
2000	NR	NR	N/R	49,016 @

- * Data derived from Website for three accounts registered to Balleally.
- N/R: Accounts not set up at these times.
- @ Data sourced from AER 2006.

Note:

1) There was a significant increase in electricity consumption in the period 2006 – 2008, from previous years as can be observed from Table 3.14. This was attributable to the operation of site leachate treatment plant. The decrease in 2009 was attributable to the mothballing of the leachate treatment plant. The leachate treatment plant remained closed during 2011.

2) The electricity consumption increased each year from 2000 (exception 2004) to 2008 and decreased through to 2011. 2011 decrease may in part be due to milder winter (less heating), direr conditions (less pumping) and the move from an automated to manual wheel wash. The decrease in 2011 was largely sustained during 2012.

Table 3.19: Equipment and Plant list at Balleally Landfill and quantities 2012

Type of Item	Item	Quantity	Resource Used
Transport	05 D 82315 Isuzu 4X4*	1	Diesel
	02 D 76790 Isuzu 4X4 *	1	Diesel
	04 D 68456 Ford Fiesta Van*	1	Diesel
	01 D 72074 Renault Twin Cab Pick Up*	1	Diesel
	97 DD 40957 Toyota Hilux	1	Diesel
Plant	04 D 64948 John Deere 4X4 Tractor*	1	Diesel
	07 D 7332 Same Tractor*	1	Diesel
Heavy Plant	Hanimag Compactor	1	Diesel
	Kamatsu 65px dozer*	1	Diesel
	Cat 130 mini Excavator*	1	Diesel
	Cat excavator 330*	1	Diesel
	30 Ton Vibrating Roller*	1	Diesel
	Diesel H/P power washer and Bowser*	1	Diesel
	10 KVA 3 Phase Generator*	1	Petrol
Auxiliary Plant	Wacker Plate*	1	
	CONSAW*	1	Petrol
	6 inch pump*	1	Diesel
	6.5 KVA diesel generator*	1	Petrol
Equipment	Extrusion welder*	1	
	Wedger Seam Welder*	1	
	Lyster heater / welder*	1	
Survey	Sokkisna level and tripod*	1	
	Sokkisna theodolite & Tripod*	1	
	NIKON auto level*	1	
	Garmen GPS*	1	
	GMI gas monitor*	1	
	GAS DATA LMSXi	1	

Type of Item	Item	Quantity	Resource Used
	GMI FI 2000*	1	
	30 Metre steel Tape*	1	
	30m dip meter*	1	
	Various P.C.s and printers*	1	

GCL – Geosynthetic Clay Liner

3.11 Landfill Gas Utilisation

Landfill gas is actively extracted by means of a series of wells and a collection pipe network in the waste body. The gas is pumped through two main lines to the site utilisation plant. The utilisation plant comprises three generators grouped into two operating units AER1 and AER3 as shown in the schematic diagram of the plant in Appendix I. To achieve maximum design power output from the station the inlet gas must contain 50% methane and the minimum available gas volume must be 3,340 m^3/hr. At present the 50% methane gas concentration is achieved, but the gas volume is not measured at the landfill.

The power station/utilisation plant operators, Bioverda Power Systems Limited, regulate the inflow of gas to the station in order to achieve the 50% Methane target. The total power output from the station for the period is shown in Tables 3.20 & 3.21.

Currently sufficient gas is being extracted to run 3 engines.

Table 3.20: Electricity output (MWhr) from the on site power station at Balleally Landfill per year 2003-2012

YEAR	ELECTRICITY OUTPUT (MWhr)
2003	30,194
2004	21,636
2005	21,234*
2006	20,529*
2007	23,762
2008	27,117
2009	25,429
2010	21,909
2011	20,534
2012	20,928

* Corrected data for 2005-2006 reported by Bioverda Power Systems.

Table 3.21: Electricity output (MW) from the on site power station at Balleally Landfill 2012

Month	Combined BY01-BY03 (MWhrs)
January	1,771
February	1,532
March	1,764
April	1,717
May	1,892
June	1,776
July	1,778
August	1,686
September	1,768
October	1,717
November	1,717
December	1,810
Total	**20,928**

3.12 Review of Nuisance Controls

Condition 7 of Waste Licence W0009-03 requires that vermin, birds, flies, mud, dust, litter and odours do not give rise to nuisance at the facility or in the immediate area of the facility. To this end a review of the nuisance controls was initiated.

The nuisance which gave rise to greatest number of complaints up to 2008 was odour when fourteen such complaints were recorded. However, these complaints are significantly down since then and no odour complaint was recorded in 2012.

This is due to the reduction in sewage sludges and screening brought to Balleally during the period 2008-2012, the roll out of the brown bin service, reduction in biodegradable waste consigned to landfill, movement of tipping face away from sensitive receptors, capping and landfill gas management programmes.

Since the construction of the speed ramps along Balleally Lane, there has been an increase in the amount of mud deposited on the road. FCC reviewed the road-sweeping programme and had a few trial runs with a footpath-cleansing vehicle and various roadsweepers. FCC hire roadsweeping services for Balleally Lane, Tuesdays and Fridays when required. Also, a tractor mounted sweeper was available which was used on site at entrance/exit.

A rodent control programme was maintained on and offsite during 2012, records of which are available on site.

3.13 Review of Bird Control January to December 2012.

Bird Control Ireland Ltd visited Balleally Landfill site for the purpose of Bird Control between January 2012 and April 2012.

During this time site was visited twice per month and a jointly operated programme was run. Site staff at Balleally Landfill were responsible for the daily deployment of equipment and for keeping record of activities on site. These record sheets (*visit logs*) are retained in the Bird Control Manual.

During each visit to site Bird Control Ireland staff undertook efforts to reinforce the daily bird control activities. These included:

- flying of Falcons and Hawks
- use of species specific distress calls
- use of shotgun and Bird scaring pistol
- flying of various kites (visual deterrents)

While open for waste Common Gulls and Corvids were the most common birds on site with a few magpies noted. No gulls were harmed during the process.

Cold weather will increase numbers of scavenging birds on site. Distress calls and shotgun were used to push birds back and prevent them from scavenging.

Throughout the year Bird Control Ireland Ltd undertook the following management activities:

- liaison with site management
- equipment maintenance.
- maintenance of site bird control manual and visit log
- variation of bird control activities on site to achieve best results

In conclusion during the period January-April 2012: The Balleally project has achieved a good measure of success for a low level programme. When site equipment is deployed birds can be moved on easily.

- Birds did attempt raids each month but were cleared using distress calls, other techniques and equipment available.
- The most persistent birds that attempted to raid Balleally Landfill to May 2012 were Corvids and Gulls.

4. SITE DEVELOPMENT WORKS

4.1 Work carried out in the reporting period 2012

Table 4.1: Work carried out during 2012

Objective / Target	Description	Timescale
Objective 1	**To minimise environmental impact on the immediate environment**	
Target 1	To review and extend gas abstraction network in newly capped areas. Significant new areas harnessed 11 new auger wells piggybacked area of cells 5 & 6.	Complete
Target 2	LLDPE capping of phase 12, 8 and 9 completed.	Complete
Target 3	To determine mitigation measures to deal with surface water contamination at SW20a. Some work completed on ditch by SW20a to separate contaminated water from local drainage. Ongoing tankering of liquid from this point.	Ongoing
Target 4	To continue to investigate mitigation measures for the prevention of leachate breakout along the southern boundary of the landfill. Monthly Monitoring of outfalls from Southern Boundary commenced August 2012.	Ongoing.
Target 5	To investigate sources of SW contamination in landfill and propose mitigation measures to The Agency. Flow Metre to be installed. continued monthly monitoring of catchment of SWV1. Plans to decommission some foul lines to be decommissioned around Gas Utilisation Plant	Ongoing.
Target 6	High level alarm installed in leachate storage tanks connected to telemmetry and mobile phones..	Complete.
Objective 2	**Restoration of the facility.**	
Target 1	Grass seeding of capped areas ongoing;	Ongoing
Target 2	Examine the completion of a shallow vertical barrier at the northern boundary for implementation during restoration of site. No Progress to report.	Ongoing

Objective / Target	Description	Timescale
Target 3	Address Flooding Issue at Entrance. On and Off sets for pumps at P2 changed and laying of new drainage levels opposite entrance partially dealt with this.	Following closure of the landfill for clay..
Target 4	To provide for Leachate Recirculation in Cells 5 & 6 and Piggybacked area. Infrastructure installed.	Complete.
Target 5	Fencing along Southern Boundary	Approx. 200 ms of 1000 ms installed.

4.2 Works for next reporting period (2013)

Table 4.2: Works to be carried out during 2013.

Objective / Target	Description	Timescale
Objective 1	**To minimise environmental impact on the immediate environment**	
Target 1	To Commence Leachate Recirculation in Cells 5 & 6.	April 2013.
Target 2	Apply for Technical Amendment for leachate treatment plant for connection to sewer.	Feb-Sept 2013.
Target 3	To prepare final contours, capping and surface water plan for former Civic Amenity Area, offices and entrance area. Specified Engineering Works to be installed in this regard.	Feb-Dec 2013.
Target 4	To complete GCL Capping in remaining areas of Phase 6, 8, 9 & 12.	Feb 2013 – Dec 2014.
Target 5	To determine final mitigation measures to deal with surface water contamination at SW20a and propose Specified Engineering Works if required.	March-Dec 2013.
Target 6	To continue to monitor surface water outfalls and leachate levels along the southern boundary of the landfill to determine if leachate breakout is prevalent and further proposals required.	Jan – Dec 2013.

Target 7	To investigate sources of SW contamination in landfill and propose mitigation measures to *The Agency*. Flow Metre to be installed. continued monthly monitoring of catchment of SWV1. Plans to decommission some foul lines to be decommissioned around Gas Utilisation Plant	Jan – Dec 2013.
Target 8	Apply for Technical Amendment for CO emissions from engine stacks.	Feb-Sept 2013.

Objective 2	**Restoration of the facility.**	
Target 1	Examine the completion of a shallow vertical barrier at the northern boundary for implementation during restoration of site.	Following closure of the landfill for clay.
Target 2	Address remaining flooding issue at Entrance.	Jan – Dec 2013.
Target 3	Fencing along Southern Boundary. 800ms approx.	Jan – Dec 2013.

4.3 Progress on Site Restoration

The Restoration and Aftercare Plan for the landfill was submitted in July 2003 as per condition 4.1. This plan sets out a framework to successfully restore Balleally Landfill to a condition suitable for use as an amenity for the general public. The plan has been prepared in accordance with the EPA Landfill manual 'Landfill Restoration and Aftercare' (1999), the Council Directive (1999/31/EC) on the Landfill of Waste and Waste Licence W0009-02 & -03. Restoration is being undertaken at Balleally Landfill using a phased approach due to the size of the site and seasonal constraints. On completion of restoration in each phase, the aftercare plan to establish and maintain the after use of the site shall be implemented.

Capping of the site is as per Condition 4.3. The geotextile alternative was investigated and agreed in early 2004 with the EPA. This decreased the number of vehicle movements required for importing soil for the final cap.

Figure 2, Appendix 1, indicates the agreed phases for the capping and restoration of Balleally Landfill. The phasing provides for the restoration of the original landfill initially, and then the landfill extension area.

The total area for capping is 46 Hectares approx.

Between 2004 and December 2011, approx 40 Hectares were capped. During 2012, an additional 2 Hectares approx (LLDPE) were capped. The majority of the "Old Landfill" and the new landfill is now 100% capped, see Figure 3 Appendix 1. A total of 42 Hectares is now capped. This equates to 91% of the entire landfill area to be capped. The remaining capping area is the old Landfill (4ha approx), which does not include any overlap between LLDPE and GCL areas.

A proposal was sent to The Agency (Ref: FCC-W0009-02-020) on 22/9/2008 to provide for a second lift "piggybacking" between "new cells" and Top Lobe of the old landfill. This proposal would give a void space of 176,000 tonnes.

This proposal was agreed to, subject to conditions, by *The Agency*, (Ref: W0009-02 / ak61em) and an additional 1.6 ha of the landfill was lined for the reception of waste.

Inert waste to be used for cover / restoration material at the facility

An estimate of soils required for the final capping of the landfill is as follows:

- Expected subsoil tonnages for restoration = 1,180,000 tonnes
- Expected topsoil tonnages for restoration = 580,000 tonnes

This estimate does not take into account any soil requirements for levelling off the contours prior to the placement of the final capping. However, it is expected that material on the landfill site (berms etc.) will be used which will limit the importation of soil/clay.

Onion skin method of filling took place at the tipface at Balleally Landfill as described in the EPA Landfill Operational Practices manual. As a result of this method at the end of each day the tipface was completely covered with clay and other such inert material. This reduced the possibility of windblown litter and provided reasonable surface quality for vehicle access the next day for tipping. This mixed cover material provides drainage, shape and surface stability to the landfill, which is essential, when the final restoration measures above are initiated. All waste acceptance ceased in May 2012.

A filling plan has been prepared for the extension area in 2006 to ensure the integration of waste filling activities with the phased restoration of the site under condition 5.2 of the Waste Licence 9-2.

A revised filling plan was submitted to and approved by the EPA before entering Cell 5; the revised plan took into consideration the EPA Circular Letter to all landfills, dated 20th June 2007.

The total area of the site is 124 Acres. The Licence area is 124 Acres (50.18Hectares). Total Area for Capping 46 Hectares.

See below statistics of capping programme:

Start Date of Capping Programme: May 2004
Progress as of 31st December 2012: 42 ha

The final capping profile is made up of:

1. Topsoil layer of 300 mm thickness.
2. Subsoil layer of 700 mm thickness.
3. Geocomposite Drainage Layer (GDL).
4. Geosynthetic Clay Liner (GCL) / LLDPE membrane liner on New Cells.
5. Geocomposite Gas Collection (GGCL).

See Appendix I, Figures 2 and 3 indicating the areas capped to 2012 and the proposed areas to be capped in 2013

4.4 Annual Topographical Survey

Condition 8.5.1 of WL W0009-03 requires an annual Topographical Survey to be undertaken in Balleally Landfill. The last full topographic survey was completed on 23/12/2011 and submitted to The Agency (Ref: FCC-W0009-03-2012-003). Additionally a partial Topographic Survey was conducted on 24/5/2012 in areas which had received soil or waste in the interim. This was submitted to *The Agency* with Ref FCC-W0009-03-2012-021.

4.5 Slope Stability

As required under Licence Condition 8.8.1. a slope stability survey was undertaken in Balleally Landfill on the 18th December 2012 and was submitted to *The Agency* on 10/1/2013 (Ref: FCC-W0009-03-2013-05).

The conclusions and recommendations in the survey report are noted and will be implemented.

5. WASTE RECEIVED & CONSIGNED FROM THE FACILITY

5.1 Waste Acceptance & Handling

5.1.1 Waste Reception

During operational hours, a qualified person in charge of the landfill is always present on site. A weighbridge system was installed at Balleally Landfill by Precia Molen Irl. Limited. It originally consisted of two Precia Molen VS300CS surface Mounted Weighbridges linked to a GeneSYS PC-based Weighbridge Management System. The GeneSYS Windows – based software, which forms the basis of the PC based system stores all relevant data in database form from which cross-referenced reports can be generated as required by landfill management and the accounts department.

The system has been in operation since the 25th of May 2005 and consisted of two weighbridges, one "in" and one "out". These are linked to a computerised system. The capacity of both weighbridges was 50,000/60,000Kg and the deck size was 18m x 3.6m. The weighbridge system was operating on a one weighbridge from Q3 2011. The last weighbridge ceased operating in May 2012 after the facility closed to waste acceptance.

Extensive protection against lightening was included as standard, this includes earthing bunds for each loadcell and a central earth for the entire weighbridge.

Records of loads arriving on site were recorded as per Condition 10.2 (i) of the Waste Licence W0009-03 detailing the date and type of waste rejected and the facility to which they were directed. These include the date, weight (tonnes), origin (producer/collector), description of waste (EWC code), the carriers name, vehicle registration and special handling/pre-approval permit number (where applicable) is recorded. The initial point of inspection is the weighbridge and the name of the operator is recorded electronically by the GeneSYS system as the person checking the load in the first instance. Written operational procedures for waste acceptance are available and used for training staff on-site.

The weighbridge was located a little south-west of the administration building where a service hatch permited communication with the driver and inspection of documentation accompanying the waste consignment (Waste Acceptance Form A, B or C, Permit (if applicable). The site reception area was laid out in a one-way system, which assisted the through flow of vehicles. Vehicles deemed unfit to use the site roads were refused access.

All vehicles arriving on site were required to be appropriately covered to ensure the transport of the waste did not adversely affect the environment. Warnings were given to the driver where necessary and if the instruction was ignored the company involved was contacted and the load rejected.

Acceptance of waste was as per Schedule A of the Waste Licence Reg. No. W0009-03 Waste Acceptance policy agreed by EPA as per condition 5.1-5.5 and Condition 1.6 of the licence.

Wastes deemed unacceptable included liquid wastes, animal wastes, construction and demolition wastes, whole used tyres and hazardous wastes. Difficult wastes that require special handling could only be accepted if the waste management unit had given prior authorisation at County Hall, Swords. Authorisation was by means of a valid permit (which expired one month after the date of stamping by the Environmental Services Department) and details the waste type, quantity and any special instructions required by site personnel. Following acceptance of the load the weighbridge operator directed traffic to the relevant working area for the waste type where a banksman in charge of traffic gave further instructions to drivers.

5.1.2 Waste Inspection

If the weighbridge operator was unhappy with the documentation, nature and/or source of a load presented for disposal or if the carrier's permit was invalid, he contacted the Site Manager and instructed the vehicle to park (in a holding area) while the legal status of the permit, or the origin, description and nature of the load is confirmed.

A visual inspection was performed at the weighbridge, where possible. Alternatively, the load was tipped adjacent to the relevant tipping face and inspected by the designated waste inspector. Where a breach of the law is suspected, the EPA and the Gardaí would have been informed.

Where a breach of the waste acceptance policy was suspected the load could have been diverted to the Waste Inspection Area/Quarantine Area for further inspection or inspected at a holding area.

In addition to these inspections, checking and confirmation of suspect loads, random checks were also carried out on regular site traffic.

Non-municipal type waste was not accepted on site unless the Environmental Services Department was given prior approval at County Hall, Swords by means of a pre-approval permit.

Fingal County Council personnel responsible for checking the documentation accompanying vehicles must be capable of:

- understanding the waste acceptance criteria for the site in terms of licence requirements, and site management policies,
- understanding the basic underlying reasons for the acceptance criteria for the site,
- understanding the information which should be provided on the documentation accompanying loads,
- identifying non-conformity, and
- following specific procedures in the event that either the documentation is incorrect or the load does not comply with the relevant acceptance criteria.

Where inspection of a load was not possible at the site reception area (e.g. sealed containers), then the waste was deposited on the ground close to the working face. This permitted inspection of the load prior to blading and burial. If a non-conformity was discovered or suspected, the waste was isolated and placed back in the transporting container or suitable alternative and removed to the Quarantine area pending management investigation. If the non-compliance was confirmed and deposition on the site not possible, then the load was returned to the carrier, and the producer and authorities informed. Written records of the incident were recorded at the Weighbridge in the Rejects Book or in the foreman's diary. Loads held on-site overnight were recorded in the Quarantine Register.

5.1.3 Inspection/Quarantine Area

An inspection area was provided as per condition 3.7 of the Waste Licence Reg. No. W0009-03. Any waste not conforming with schedule A and/or agreed Waste Acceptance Policy as per condition 5.1-5.5 & 1.6 was rejected and removed off-site or placed in the quarantine area. Suspect loads were diverted to the Inspection or holding area for spot checks. During 2012, 8 loads were rejected from site on:

- 15/3/2012
- 17/4/2012
- 20/7/2012
- 25/10/2012
- 19/11/2012
- 27/11/2012

Each load was presenting as:

- 17 01 07 Non-Hazardous C&D waste ‹ 150mm, or
- 17 05 04 Excavation spoil clay / sand / gravel / stone.

They were rejected on the basis of being too wet, abundance of piping, wood etc. or mis-declaration.

Summary of Waste Received & Consigned

Table 5.1: Quantity and type of waste deposited in Balleally Landfill in 2003-2012 and waste licence limit for Waste Licence W0009-03

Waste Type	Licence Limit tonnes	2003 tonnes	2004 tonnes	2005 tonnes	2006 tonnes	2007 tonnes	2008 Tonnes	2009 tonnes	2010 tonnes	2011 tonnes	2012 tonnes
Household	152,500	61,201.52	65,814.99 + 6,099.56 C.A 71,914.55	66,203 + 5,801 C.A 72,004	62056 +4,891 C.A. 66,947	63,708 +4,867 C.A. +62 F.T. 68,637	50,489 + 3,959 C.A. +10 F.T. 54,458	37,789	30,769.86	24,007.39	8,406.08
Commercial	200,000	150,454.96	119,890.35	49,195.57	63,819	61,773	46,248	54,093	56,866.74	60,579.04	15667.36
Sewage Sludge	30,000	4,494	5,104.58	3,402.24	4,623	7,466	5,091	315	360.84	280.62	86.48
Industrial Non-Hazardous Sludge	6,000	5,749	5,992.8	6,635	6,825	7,061	6,660	6,363	6,690	6967.42	0
Total	**388,500**	**221,899.48**	**202,902.28**	**131,236.81**	**142,214**	**144,937**	**112,457**	**98,560**	**94,687.44**	**91,834.47**	**24,159.92**

C.A – Civic Amenity

Note: As can be seen from the above figures during 2005-2011, the industrial non-hazardous sludge from Leixlip waste water treatment plant exceeded the licence limit of 6,000 tonnes. This is attributable to the expansion of the plant due to an increase in demand for potable water and subsequently an increase in production. Tonnages of Sewage sludge have dropped off considerably from 2008-2012.

5.2 Discussion of Fingal County Council's Waste Consigned to Balleally Landfill

- **Domestic Waste:** Domestic waste is household refuse that was collected Private Waste refuse freighters from the doorstep of private households. From 2010 the biodegradable content of the waste was limited by licence condition.
- **Road Sweepers:** Road sweepers are lorry type machines that are employed by the Council to sweep channels and kerbing and to remove grit and litter from the road surface.
- **Roads:** The Roads Department carry out repairs to footpaths and roads in the county. The waste material arising from these activities is used in the landfill for berk and internal road construction.
- **Parks:** The Parks Department not only tend to trees, shrubs and plants but also conduct repairs to buildings and structures of a historical nature and clear litter and rubbish from open spaces. Residual materials from these activities were deposited to the landfill. Waste from road cleansing and landscaping also arise from this department. It should be noted that no green waste was disposed of to the facility by this department. In 2011 and 2012 leaves from street-sweepings were diverted from landfill for composting.
- **Drainage:** Sewage sludge consigned to the facility for the period was classified as drainage as it originated in the Drainage Department. This was the only sewage sludge consigned to the facility. This has dropped off considerably in recent years and is mostly confined to sewage screenings.
- **Environment:** Material from the Environment Department originates from activities such as beach cleaning, cemetery management and clean-ups.
- **Cleansing:** The Litter Management Section collects material such as litter bin contents and fly-tipped waste which is consigned to the landfill.
- **Leixlip Waterworks:** Leixlip Waterworks is a potable water treatment plant. A by-product of the treatment process is a non-hazardous sludge cake as well as some screenings. This material ceased coming to Balleally during Q4, 2011.
- **Waterworks:** Waste generated by the operation of the Water and Drainage Division that would include cleanings and inert material arising from the laying of pipes.
- **HQ:** A small quantity of waste produced in the headquarters of Fingal County Council was disposed of at the facility.
- **Balleally.** Balleally Landfill Closed to Waste on 11/5/2012.

6. ENVIRONMENTAL INCIDENTS & COMPLAINTS

6.1 Reported Incidents

Table 6.1 below gives a summary of reported incidents during 2012. More details are available at the facility office.

Table 6.1: Reported Incidents during the Reporting Period 2012

Incident Number	Date of Incident	Nature of Incident
1	5/1/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3,8,10,12 & 13.
2	10/1/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3, 5, 8, 11 &12.
3	17/1/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3,11,12 &13.
4	25/1/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3, 5, 13. Exceeded 1.5% V/V CO2 at GA3, 5, 8, 11,12 &13.
5	1/2/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3, 13. Exceeded 1.5% V/V CO2 at GA3, 8, 11,12 &13.
6	7/2/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA3.
7	17/2/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3,12 &13.
8	29/2/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA5. Exceeded 1.5% V/V CO2 at GA3,8 &12.
9	7/3/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA5. Exceeded 1.5% V/V CO2 at GA3, 5, 11 &12.
10	14/3/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA5. Exceeded 1.5% V/V CO2 at GA3, 5 &12.

Incident Number	Date of Incident	Nature of Incident
11	21/3/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA12.
12	28/3/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA3, 4 &12.
13	11/4/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA5. Exceeded 1.5% V/V CO2 at GA3, 4, 5 &12.
14	18/4/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3, 4, 11 &12.
15	24/4/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA4, 8, 11 &12.
16	2/5/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA11 &12.
17	9/5/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA8, 11 &12.
18	16/5/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA3, 11 &12.
19	22/5/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA3, 4, 11 &12.
20	29/5/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1.5% V/V CO2 at GA3,11 &12.
21	16/6/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3, 4, 5,11 &12.
22	4/9/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3, 5,11 &12.

Incident Number	Date of Incident	Nature of Incident
23	6/11/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA7. Exceeded 1.5% V/V CO2 at GA11 &12.
24	4/12/2012	Landfill Gas: Emission Limit Value Exceeded at Monitoring Wells; Exceeded 1% V/V CH4 at GA3. Exceeded 1.5% V/V CO2 at GA3,5,8 & 13.

6.2 Complaints Summary

A summary of complaints for the reporting period is shown in Table 6.2. The complaints register is available for further inspection at the site office. There were a total of 2 complaints received at the facility for the reporting period-compared, a decrease of three on 2011. One related to mud on Balleally Lane while the other related to dust on crops in a field opposite entrance on Balleally Lane. All complaints were responded to as soon as possible after the time they were reported. Odour monitoring Ireland visited the site twice during 2008 and once during 2009 & 2010 and made many recommendations for odour / surface emission control (EPA Refs. W0009-02/gen43mh & W0009-02 / ak60em). Many of these recommendations have been implemented to date which may account for the reduction in the number of odour complaints received over the last number of years.

Table 6.2: Complaints received for the reporting period 2012

Date of Complaint	Nature of Complaint	Complaint	Corrective Action
30/3/2012	DUST	Farmer complained of Dust on Crop in field opposite Site Entrance.	Investigation Initiated.
5/9/2012	MUD	Clay truck shed part of its load along Balleally Lane.	Fingal County Council Staff deployed to clean up lane.

More Details available on Landfill Complaint Register.

7. ENVIRONMENTAL MANAGEMENT PROGRAMME

7.1 Environmental Objectives and Targets for 2013.

See section 4.2 for environmental objectives and targets.

7.2 Summary of written procedures

There were no new written procedures during the reporting period. The waste acceptance forms were revised to allow for the recording of pre-treatment applied to and biodegradable content of wastes consigned to Balleally.

7.3 Communications Programme for Public Information

The Communications Programme for Fingal County Council contains information on Balleally Landfill. The information can roughly be divided into two areas. Background information prior to granting of waste licence, and information concerning the waste licence (W009-02 & 03). There is also a register of correspondence to and from the Agency, along with the various correspondences relevant to the Licence. This information is updated on a continuous basis.

Environmental Information can be viewed at the following locations:

- At the **Council's Headquarters** between 9.30 a.m. and 12.45 p.m. and 2.00 p.m. and 4.00 p.m. Monday to Friday (excluding public holidays), unless otherwise arranged by prior appointment.
- Permanent facilities for viewing information including a computer to be provided at Balleally Landfill.
- At **Balleally Landfill** by prior appointment with the Landfill Manager.
- Licence and Licence Reports available through the Environmental Protection Agency's Website; www.epa.ie.

Site Visits

- Site visits to **Balleally Landfill** can be arranged by writing to the Landfill Manager requesting the date and time of the proposed visit and indicating the number of visitors and the purpose of such a visit and whether any presentation is required. The use of cameras and video equipment during the visit must be agreed in advance with Fingal County Council.
- Such requests will be accommodated where possible.
-

Balleally Landfill Liaison Committee

- Information relating to the restoration and aftercare of Balleally Landfill is presented to the Liaison Committee for comment and adoption.
- Members of the committee during 2012 were:

Mr. John Barrett, Mr Frank Ruigrok and Ms. Catherine Condrot - Balleally Residents and Farmers Association.

Chairperson of Rush Community Council informed BLLC that Charlie Monks had been appointed as representative for Rush Community Council.

Cllr. May McKeon (Chairperson), Cllr. Anne Devitt, Cllr Ken Farrell and Cllr. Gerry McGuire.

Mr. John Daly, Ms. Linda Lally, Mr. Hans Visser, Mr. David Devine and Mr. Mortimer Loftus. - Fingal County Council.

The Committee met six times during 2012. Agenda were set and minutes kept. An Annual report of the committee's activities during 2011 was presented through The Balbriggan Swords Area Committee meeting during 2012.

Table 7.1: Reports and information available for Public Inspection 1993 - 2012

Information Available	Report Date
Balleally Landfill Preliminary Technical Report & Scoping Study	September 1993
Balleally Landfill Study, Improvement of Balleally Landfill Site & Lusk Sewage Outfall, Inception Report	October 1996
Balleally Landfill Study, Improvement of Balleally Landfill Site & Lusk Sewage Outfall, Safety & Environment Assessment Report	January 1997
Balleally Landfill Study, Improvement of Balleally Landfill Site & Lusk Sewage Outfall, Preliminary Report on Recycling of Construction/ Demolition Waste	January 1997
Environmental Impact Statement for Balleally Landfill and Rush/Lusk Wastewater Treatment Plant, Volumes 1 - 8	September 1997
Waste Licence Application, Application Form	October 1997
Waste Licence Application, Monitoring Data	October 1997
Balleally Landfill Report on Interpretation of Baseline Monitoring Programme	November 1998
Waste Licence Request for Additional Information Waste Licence Request for Additional Information Article 6(1)	February 1998 September 1998
Waste Licence 9 – 1, Issued by the EPA	16th February 1996
Report on Short Term Options at Balleally Landfill	July 1999
Waste Management Plan for the Dublin Region, Accepted by Fingal County Council	10th May 1999
Dublin Landfill Site Selection, Phase 1 Report Report on Short Term Options at Balleally Landfill Report on Short Term Options (capacity) at Balleally Landfill	July 1999 July 1999 Aug. 2000
Construction & Demolition Waste Recycling Project, Contracts Documents	
Hydrology Study at Balleally Landfill	March 1993
Groundwater Quality at Balleally Landfill	June 2000
Groundwater Quality at Balleally Landfill	December 2000
Construction & Demolition Waste Recycling Project, Contract Documents	April 2001
Ground & Surface Water Quality at Balleally Landfill	April 2001

Information Available	Report Date
Proposal for Leachate Management at Balleally Landfill in Response to Condition 4.17 of Waste Licence 9-1	July 2001
Environmental Monitoring at Balleally Landfill	July 2001
Noise Monitoring at Balleally Landfill	August 2001
Environmental Monitoring at Balleally Landfill	October 2001
Environmental Monitoring at Balleally Landfill	Jan 2002
Birdcounts from Rogerstown Estuary	1995 2001
Environmental Monitoring at Balleally Landfill	April 2002
Balleally Landfill Vertical Barrier - Specified Engineering Works/ Tenders	May 2002
Environmental Monitoring at Balleally Landfill	July 2002
Annual Environmental Report 2000	
Annual Environmental Report 2001	Nov 2002
Balleally Landfill/ Short Term Extension Program - updated tender Jan 2003	Jan 2003
Annual Environmental Report 2002 / 9-1	February 2003
Environmental Monitoring at Balleally Landfill Nov - Dec 2002 Environmental Monitoring at Balleally Landfill Jan 2003	February 2003
Ecological Monitoring of Rogerstown Estuary May & July 2002	February 2003
Study of Scavenging Birds at Balleally Landfill December 2002	February 2003
Ecological Monitoring of Rogerstown Estuary Oct & Nov 2002	February 2003
Dust Monitoring Locations April 2003	July 2003
Environmental Monitoring April 2003	July 2003
Revised Restoration and Aftercare Plan Balleally landfill July 2003	July 2003
Slope Stability Assessment for Balleally Landfill July 2003	July 2003
Environmental Monitoring at Balleally July 2003	July 2003
Environmental Monitoring at Balleally July 2003 C001983/4	July 2003
Rogerstown Estuary Final Report June 2003	June 2003
Environmental Monitoring at Balleally July 2003 C002631/1	October 2003
Construction Quality Assurance Report/Schedule B	September 2003
Environmental Monitoring Report Balleally Dec 2003 (including Appendices)	December 2003
Balleally Landfill AER 2003	February 2004
Environmental Monitoring Report January 2004	April 2004
Environmental Monitoring Report March 2004	March 2004
December '03 Environmental Noise Report	July 2004
Quarterly Monitoring Report Q2 June 2004	August 2004
Construction Quality Assurance Report/Schedule B	August 2004
Quarterly Monitoring Report Q3 October 2004	October 2004
Quarterly Monitoring Report Q4 December 2004	January 2005
Annual Environmental Report 2004	February 2005
Quarterly Monitoring Report Q1 January 2005	April 2005
Quarterly Monitoring Report Q2 & Noise monitoring report Q2 April 2005	July 2005
Quarterly Monitoring Report Q3 July 2005	October 2005
Quarterly Monitoring Report Q4 October 2005	January 2006
Annual Environmental Report 2005	January 2006
Environmental Management Plan 2005	February 2006
Quarterly Monitoring Report and Noise Survey Q1 2006	April 2006
Quarterly Monitoring Report and Noise Survey Q2 2006	July 2006
Quarterly Monitoring Report and Noise Survey Q3 2006	September 2006
Resource Use and Energy Efficiency Audit	October 2006
Quarterly Monitoring Report Q4 2006	January 2007
Noise Survey Q4 2006	January 2007
2006 Annual Emissions Survey IPS Gas Plant	January 2007
Annual Environmental Report 2006	January 2007
Quarterly Monitoring Report and Noise Survey Q1 2007	April 2007

Information Available	Report Date
Quarterly Monitoring Report Q2 2007	July 2007
Noise Survey Q2 2007	July 2007
Quarterly Monitoring Report and Noise Survey Q3 2007	October 2007
Flooding Report	November 2007
Slope Stability Survey Report	December 2007
Quarterly Monitoring Report and Noise Survey Q4 2007	January 2008
Annual Environmental Report 2007	January 2008
Quarterly Monitoring Report Q1 2008	April 2008
Quarterly Monitoring Report Q2 2008	July 2008
Rogerstown Estuary Treated Leachate Discharge Modelling Report.	October 2008
Slope Stability Survey	November 2008
Landfill Gas Trace Element Analysis Report	November 2008
Biological Monitoring Report	November 2008
2008 Annual Emissions Survey IPS Gas Plant	January 2009
Quarterly Monitoring Report and Noise Survey Q4 2008	January 2009
Annual Environmental Report 2008	January 2009
Quarterly Monitoring Report Q1 2009	April 2009
Quarterly Monitoring Report Q2 2009	July 2009
Quarterly Monitoring Report Q3 2009	October 2009
Slope Stability Survey	November 2009
2009 Annual Emissions Survey IPS Gas Plant	January 2010
Quarterly Monitoring Report and Noise Survey Q4 2009	January 2010
Annual Environmental Report 2009	March 2010
Quarterly Monitoring Report Q1 2010	April 2010
Quarterly Monitoring Report Q2 2010	July 2010
Quarterly Monitoring Report Q3 2010	October 2010
Quarterly Monitoring Report Q4 2010	January 2011
Slope Stability Survey	January 2011
2010 Annual Emissions Survey IPS Gas Plant	January 2011
Quarterly Monitoring Report Q1 2011	April 2011
Quarterly Monitoring Report Q2 2011	July 2011
Quarterly Monitoring Report Q3 2011	October 2011
Quarterly Monitoring Report Q4 2011	January 2012
Slope Stability Survey	January 2012
2011 Annual Emissions Survey IPS Gas Plant	January 2012
Quarterly Monitoring Report Q1 2012	April 2011
Quarterly Monitoring Report Q2 2012	July 2011
Quarterly Monitoring Report Q3 2012	October 2011
Investigation into Southern Boundary Drainage	April 2012
Investigation into Surface Water Quality	March 2012
Quarterly Monitoring Report Q4 2012	January 2013
Slope Stability Survey 2012	January 2013
2012 Annual Emissions Survey IPS Gas Plant	January 2013

Map Information Available	Report Date
Re-location C&D at Balleally	March 2003
Wall & Railing along landfill at Balleally	April 2003
C&D Waste Recovery Area, Balleally	June 2003
Topographical Survey for Balleally June 2003	June 2003
Re-location of Gas Compound at Balleally / 4 Drawings	July 2003
Proposed gas extraction pipe to new gas plant	November 2003
Monitoring Map (J1/DG0008) For Balleally	December 2003
Balleally Leachate Treatment Plant Process & Instrumentation Drawing	July 2004
Balleally Leachate Treatment Plant Site Plan Layout	July 2004

Map Information Available	Report Date
Topographical Survey for Balleally Landfill June 2004	August 2004
Revised Monitoring Drawing	October 2004
Installation of new landfill gas management infrastructure.	February 2005
Topographical Survey	October2005
Topographical Survey	August 2006
Provision of Public Car Park and Walkway	February 2007
New IPS Gas Wells	February 2007
Phase 2 Piggybacking	April &July 2007
Joining of existing two vertical barrier walls	June 2007
Installation of New Landfill Gas Management Infrastructure	July 2007
Topographical Survey	December 2007
Updated as built drawings for surface water / leachate infrastructure	October 2008
Topographic Survey	October 2008
Topographic Survey	October 2009
Landfill Gas Infrastructure	October 2009
Topographic Survey	October 2010
Topographic Survey	December 2011
Topographic Survey	May 2012

7.4 Financial Provisions

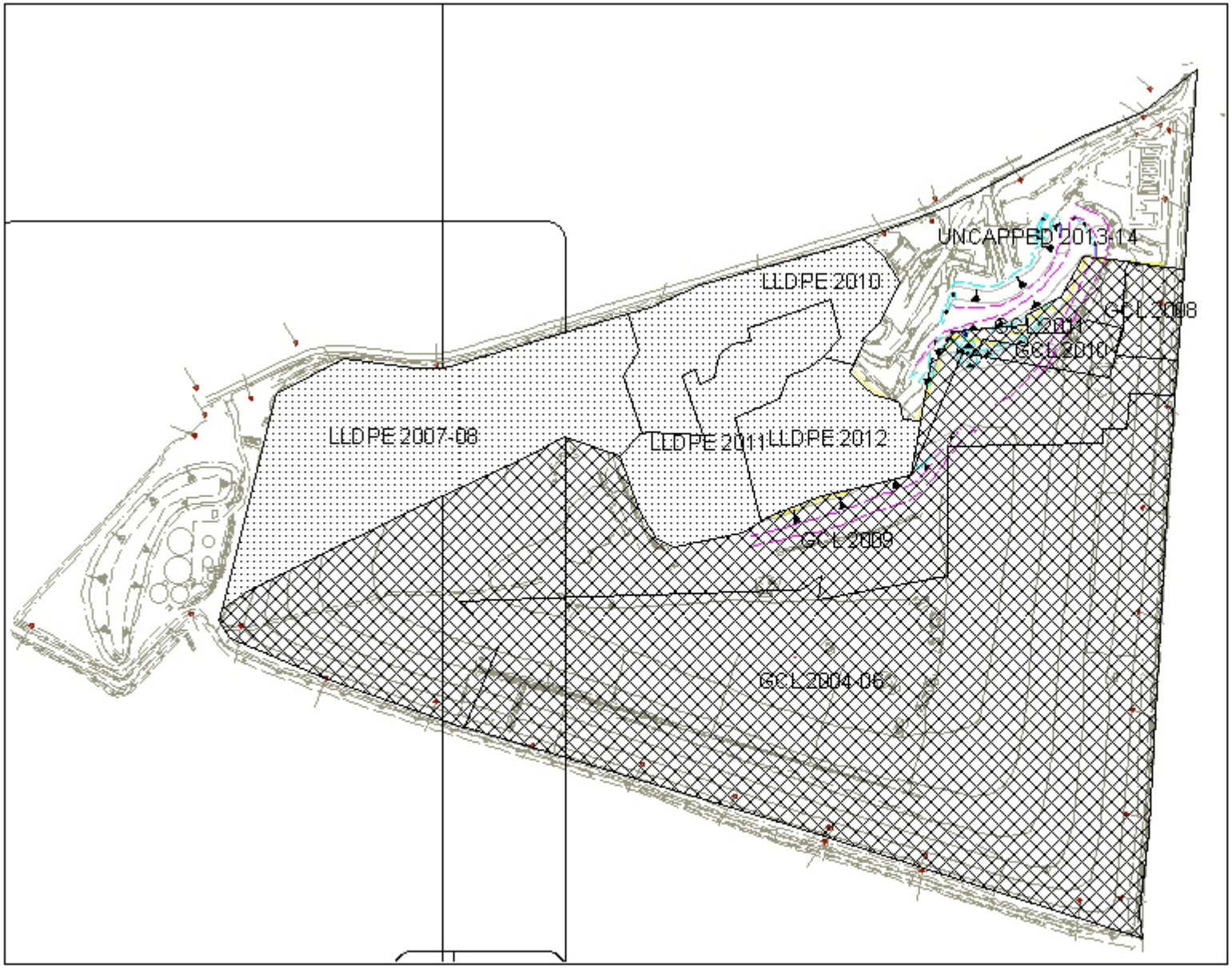
Condition 12.2 of the licence requires the establishment of a fund to implement the Restoration and Aftercare Plan. Fingal County Council has provided in it's accounts a reserve for the restoration of the site which amounted to €6,005,172 on 31/12/2012.

7.5 Management Structure

The facility is owned and operated by Fingal County Council. The Environmental Services Department of Fingal County Council manage the landfill facility. Some changes in the management structure occurred during 2012. A description of the current management structure is included in Appendix 3.

APPENDIX I

DRAWINGS



Balleally Capping Detail

Capping 2012 AER

Id

- GCL CAPPING
- LLDPE CAPPING
- TO BE DETERMINED

N

0 40 80 160 240 320

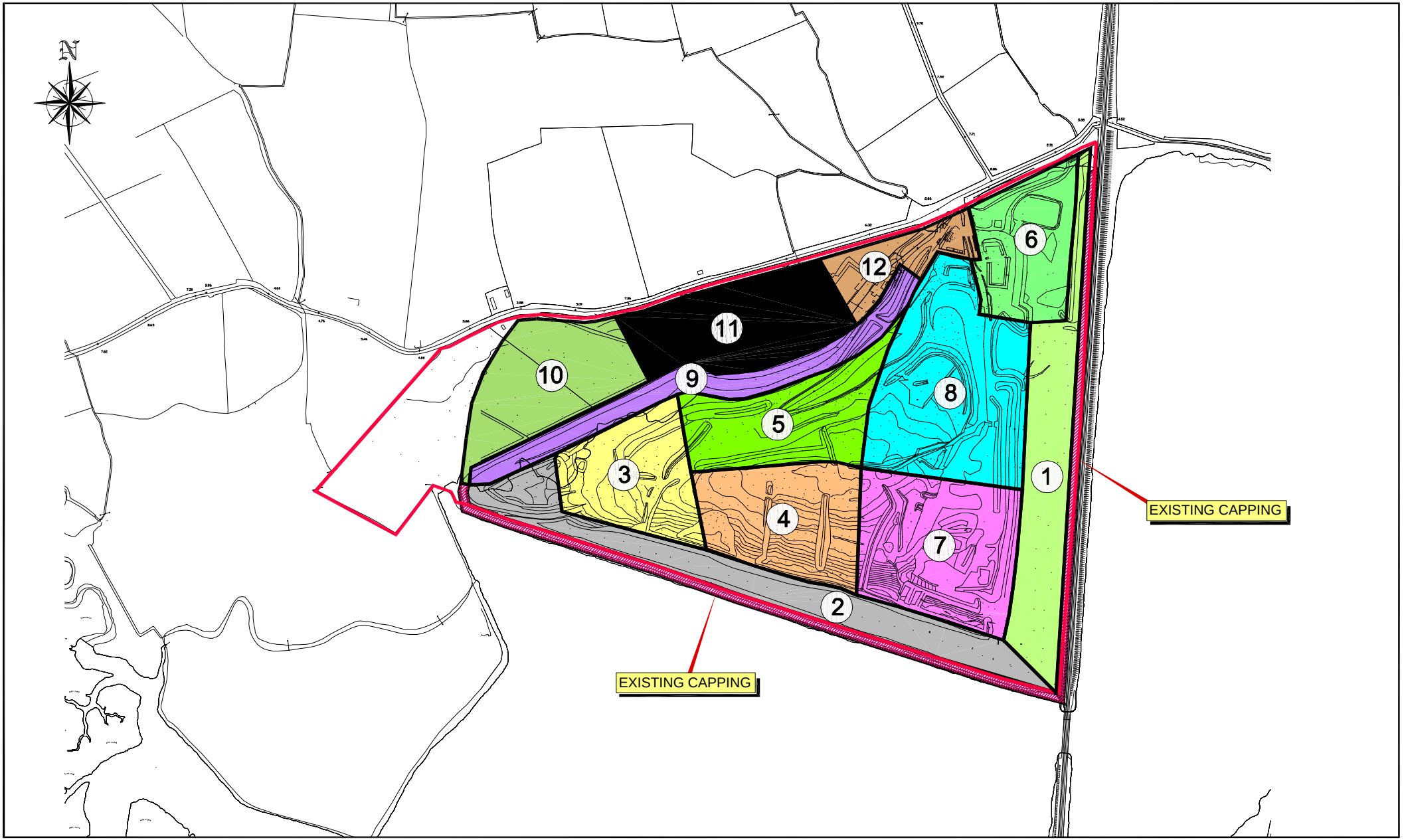
Meters

FINGAL COUNTY COUNCIL
BALLEALLY LANDFILL

CAPPING PROGRESS DRAWING

DRN. M LOFTUS

20-02-2013



Comhairle Chontae Fhine Gall
FINGAL COUNTY COUNCIL
Mr.P.J.Howell,
Director of Service
Phone: (01) 890 5000

mcos COWI
Carnegie House,
Library Road,
Dun Laoghaire,
Co. Dublin.
Phone 01 - 2020870
Fax 01 - 2020707

No.	Date	By	Amendments
A04	May'03	HF	RE-ISSUED FOR APPROVAL
A03	Apr'03	RH	RE-ISSUED FOR APPROVAL
A02	Nov'02	GDB	RE-ISSUED FOR APPROVAL
A01	Oct'02	SBG	ISSUED FOR APPROVAL

Job: BALLEALLY LANDFILL RESTORATION AND AFTERCARE PLAN

Title: RESTORATION PHASING

Drawn:	HF
Checked:	HD
Approved:	CB
Scale:	1:7500
Date:	Oct'02

File Ref.: 149507002FG0300

Drawing No. FIG 3.0

Rev. A04

APPENDIX II

BALLEALLY MANAGEMENT STRUCTURE

Balleally Landfill – Waste Licence W0009-03:
Condition 2.2.1. Management Structure – 2012

TITLE	NAME	BASE	DUTIES AND RESPONSIBILITIES	QUALIFICATIONS	EXPERIENCE
Senior Engineer, Environment	Mr. J. Daly	HQ	Responsible for Waste Management and Waste Infrastructure.	B.E. (Civil Engineering), 1986. M.Sc. Environmental Engineering, 1993. MIEI.	17 years Water Service and Waste Management experience. 16 years LA experience.
Landfill Manager, Executive Engineer	Mr. David Devine	Balleally Landfill & HQ.	Landfill Management. Management of Waste Licence Compliance. Specified Engineering Works.	BSc Civil Engineering, MIEI, Chartered Engineer, F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	15 years Civil Engineering and Project Management experience, 7 Years local authority experience.
Acting Executive Scientist,	Mr. Mortimer Loftus	HQ & Balleally Landfill	Supervision of scientific monitoring, reporting and liaison with the Environmental Protection Agency on issues relating to environmental monitoring.	Ph.D. Ecology, B.Sc. Environmental Science, Dip Environmental Impact Assessment Management, Dip Environmental Management, F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	1996-2004 Soil Research and Mapping in Teagasc. Joined the Environmental Services Department in July 2004.
Executive Engineer,	Ms Linda Lally	HQ & Balleally Landfill	Supervision of external contracts. Liaison with consultants and contractors for development works and capping program.	BSc(Eng) Dip(Eng) CEng MIEI, Chartered Engineer. F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	9 years Consultant Structural Engineer with Kavanagh Mansfield & Partners. Joined the Environmental Services Department in January 2008.
	Mr. Richard Donnelly	Balleally Landfill	Deputy in the absence of the Landfill Manager, Waste Acceptance Manager, safety inspections and day to day supervision of staff.	Completed course in Health and Safety (SAFE PASS), Manual Handling, Specified Signing Lighting and Guarding Training, CONSAW Training. Also Elected Health and Safety Rep.	Over 30 years Local Authority Service. Assistant Foreman in Dunsink Landfill for 12 years before being appointed Foreman for Balleally Landfill in 1998.

APPENDIX III

PRTR

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.16

REFERENCE YEAR	2012

1. FACILITY IDENTIFICATION

Parent Company Name	Fingal County Council
Facility Name	Balleally Landfill
PRTR Identification Number	W0009
Licence Number	W0009-03

Waste or IPPC Classes of Activity

No.	class_name
	Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the
3.5	environment.
3.1	Deposit on, in or under land (including landfill).
3.10	Release of waste into a water body (including a seabed insertion).
3.12	Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.
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.
3.2	Land treatment, including biodegradation of liquid or sludge discards in soils.
3.4	Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
4.10	The treatment of any waste on land with a consequential benefit for an agricultural activity or ecological system.
4.11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
4.12	Exchange of waste for submission to any activity referred to in a preceding paragraph of this Schedule.
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.
4.9	Use of any waste principally as a fuel or other means to generate energy.

Address 1	Balleally
Address 2	Lusk
Address 3	Co. Dublin
Address 4	
	Dublin
Country	Ireland
Coordinates of Location	-7.26329 55.2542
River Basin District	IEEA
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Mortimer Loftus
AER Returns Contact Email Address	mortimer.loftus@fingalcoco.ie
AER Returns Contact Position	Acting Executive Scientist
AER Returns Contact Telephone Number	018905000
AER Returns Contact Mobile Phone Number	01 8905000
AER Returns Contact Fax Number	01 8905000
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	4
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5(d)	Landfills
5(c)	Installations for the disposal of non-hazardous waste
5(d)	Landfills
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

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs						
POLLUTANT		METHOD							QUANTITY		
			Method Used								
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	MAB	Calculation below	0.0	0.0	0.0	0.0	3297300.0	0.0	3297300.0
03	Carbon dioxide (CO2)	C	PER		22074.47	851460.0	967414.0	880793.0	2721741.47	0.0	0.0
02	Carbon monoxide (CO)	M	PER	Testo 350/454 MXL Flue Gas Analyser	18.71	15449.0	16145.0	11753.0	43365.71	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	M	PER	Testo 350/454 MXL Flue Gas Analyser	30.16	1857.0	2685.0	1667.0	6239.16	0.0	0.0
07	Non-methane volatile organic compounds (NMVOC)	M	PER	Portable Signal 3030PM FID calibrated with Propane in accordance with EN1526:2002 non-methane hydrocarbon cutter	0.0	10.0	11.0	6.0	27.0	0.0	0.0
11	Sulphur oxides (SOx/SO2)	M	PER	Testo 350/454 MXL Flue Gas Analyser	12.19	4491.0	4662.0	2788.0	11953.19	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 AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

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

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs						
POLLUTANT		METHOD							QUANTITY		
			Method Used								
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
244	**Total Particulates**	M	PER	TCR Tecora isokinetic Particulate sample with QMA high temerature filter in accordance with ISO9096:2003	0.0	567.0	393.0	316.0	1276.0	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: Balleally Landfill

Please enter summary data on the quantities of methane flared and / or utilised			Method Used			
	T (Total) kg/Year	**M/C/E**	**Method Code**	**Designation or Description**	**Facility Total Capacity m3 per hour**	
Total estimated methane generation (as pe site model)	7976768.4	C	MAB	GasSim model	N/A	
Methane flared	35075.0	M	MAB	Calculated based on flare flo	2500.0	(Total Flaring Capacity)
Methane utilised in engine/s	4644393.0	M	MAB	Calculated based on engine	1865.0	(Total Utilising Capacity)
Net methane emission (as reported in Sectio A above)	3297300.4	C	MAB	Calculation	N/A	

Please enter all quantities on this sheet in Tonnes

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: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	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					
Within the Country	19 07 03	No	47423.0	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	Ringsend Wastewater Treatment Plant,-,Dublin,-,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