

# *Annual Environmental Report 2011*



## *Derryconnell Landfill and Civic Amenity Site*

WASTE LICENCE REGISTRATION NO. W0089-02

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## **1. INTRODUCTION**

### **1.1 Scope and Purpose of the Report**

Waste Licence No. 89-1 was issued to Cork County Council by the Environmental Protection Agency (EPA) for Derryconnell Landfill Site in October 2000. In November 2008, Waste Licence No. W0089-02 was issued by the EPA, replacing 89-1, and is the current Waste Licence relating to the site.

Condition 11.12 of the waste licence states the following:-

*'The licensee shall submit to the Agency, by the 31<sup>st</sup> March of each year, an AER covering the previous calendar year.'*

### **1.2 Reporting Period**

This Annual Environmental Report (AER) covers the reporting period 1<sup>st</sup> January 2011 to 31<sup>st</sup> December 2011.

### **1.3 Site Location**

The facility address and contact numbers are detailed below:-

Derryconnell Landfill,

Derryconnell,

Schull,

Co. Cork

Tel. (028) 37048

Fax: (028) 37742

The National Grid Reference for the site is E9627, N3396.

## **2. DESCRIPTION OF THE SITE**

### **2.1 Waste Management Activities at the Facility**

Waste Activities at the Derryconnell landfill site are restricted to those outlined below: -

#### Waste Management Act 1996 to 2008: Third Schedule

- Class 1. Deposit on, in or under land (including landfill).
- Class 4. Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
- Class 5. Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment.
- Class 12. Repacking prior to submission to any activity referred to in a preceding paragraph of this Schedule (Principal Activity).
- 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.

#### Waste Management Act 1996 to 2008: Fourth Schedule

- Class 2. Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological processes).
- Class 3. Recycling or reclamation of metals and metal compounds.
- Class 4. Recycling or reclamation of other inorganic materials.
- 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.

In accordance with Schedule A of the Waste Licence, the waste categories and quantities acceptable at the facility are limited to those shown in Table 2.1.

<b>Waste Types</b>		<b>Maximum Tonnes Per Annum</b>
<b>Non-Hazardous Waste</b>	<i>Residual Municipal Waste For disposal</i>	17,000
	<i>Storage of Waste prior to recovery</i>	7,000
<b>Hazardous Waste</b>	<i>Storage of Waste prior to recovery or disposal</i>	152
<b>Total including disposal and recovery</b>		<b>24,152</b>

***Table 2.1: Waste Categories and Quantities Acceptable at the Facility***

## **2.2 Management and Staffing Structure of the Facility.**

The following staff were employed on site during 2011: -

- One Facility Manager
- Two General Operatives / Deputy Facility Managers
- In addition there are part-time, relief General Operatives.

Site and managerial staff details are shown in the following tables 2.2(a) and 2.2(b).

<b>Employee</b>	<b>Position</b>	<b>Duties and Responsibilities</b>	<b>Experience / Qualifications</b>
<b><i>Mr. Joe Newman</i></b>	General Operative  Deputy Facility Manager	General site operation and maintenance.  Collection of gate fees. Administration of on-site records.  Implementation of waste acceptance procedures.  Coordination and control of customer activities.  Deputising as Facility Manager	13 years landfill operation experience. Completed Site Operative modules of FAS Waste Management Course. Trained in operation and management of various on site systems.
<b><i>Mr. Frank Cronin</i></b>	General Operative  Deputy Facility Manager	General site operation and maintenance.  Collection of gate fees. Administration of on-site records.  Implementation of waste acceptance procedures.  Coordination and control of customer activities.  Deputising as Facility Manager	11 years landfill operation experience. Completed Site Operative modules of FAS Waste Management Course. Trained in operation and management of various on site systems.
<b><i>Mr. Jerry McCarthy; Mr. Patrick Forrester</i></b>	Relief General Operative	General site operation and maintenance.  Collection of gate fees.  Implementation of waste acceptance procedures.  Coordination and control of customer activities.	5 years landfill operation experience. Completed Site Operative modules of FAS Waste Management Course. Trained in operation and management of various on site systems.

***Table 2.2(a): Site Staff***



The following staff were also responsible for operation and management of the facility.

<b>Position</b>	<b>Contact Details</b>
<b>Senior Executive Officer</b> <i>Ms. Gráinne O'Mahony</i>	Cork County Council, Environment & Recreation, Hume House, Wolfe Tone Street, Clonakilty, Co. Cork.  Tel: 023 8858812 Fax: 023 8858814
<b>Senior Engineer</b> <i>Mr. Liam Singleton</i>	
<b>Senior Executive Engineer</b> <i>Mr. Paudie Hegarty, B.E.</i> <i>Mr. Jerome O'Brien, B.E.</i>	
<b>Facility Manager / Executive Engineer</b> <i>Ms. Mairéad Hales, B.E.</i>	

**Table 2.2(b): Managerial Staff**

### 2.3 Waste Quantities and Composition

The quantity and composition of the waste **received and disposed of** offsite from the facility during the reporting period is recorded in table 2.3(a). No waste was deposited directly in the landfill in 2011.

<b>Waste Received at Derryconnell Landfill (Tns) – 2011</b>			
<b>Month</b>	<b>Household Bagged</b>	<b>Bulky</b>	<b>Total</b>
January	14.22	0.00	14.22
February	11.82	0.00	11.82
March	22.16	1.90	24.06
April	20.96	4.32	25.28
May	17.02	3.52	20.54
June	21.72	2.74	24.46
July	20.68	2.66	23.34
August	42.68	8.98	51.66
September	16.98	3.32	20.30
October	18.54	3.22	21.76
November	14.28	1.52	15.80
December	29.04	3.82	32.86
<b>Totals</b>	<b>250.10</b>	<b>36.00</b>	<b>286.10</b>

**Table 2.3(a): Quantities of Waste received and disposed during the reporting period January 2011 to December 2011.**

The quantity and composition of the waste **received and recovered** during the reporting period, at the facility is recorded in table 2.3(b).

<b>Waste Recovered at Derryconnell Landfill (Tns) – 2011</b>													
<b>Month</b>	<b>Paper Card Plastic</b>	<b>Glass Bottles</b>	<b>Alum. Cans</b>	<b>Steel Cans</b>	<b>Scrap Metal</b>	<b>Timber</b>	<b>Batt.</b>	<b>Aerosl</b>	<b>Textiles</b>	<b>Oils</b>	<b>WEEE</b>	<b>Light Tubes</b>	<b>Paint</b>
January	13.36	8.66	0.16	0.56	4.82	0.00	0.00	0.00	0.76	0.00	7.42	0.00	0.00
February	7.16	0.00	0.06	0.34	5.28	3.60	0.00	0.06	0.30	0.00	4.38	0.00	0.00
March	13.66	8.68	0.14	0.52	7.24	3.52	0.00	0.00	0.90	0.00	14.00	0.00	0.00
April	11.98	0.00	0.04	0.56	3.76	3.86	0.00	0.44	0.58	2.38	0.00	0.00	0.60
May	10.28	5.02	0.18	0.00	4.32	3.88	4.00	0.00	0.68	0.00	0.00	0.00	0.00
June	14.90	8.38	0.00	0.74	5.18	6.90	0.00	0.06	0.76	0.00	5.74	0.00	0.74
July	15.52	0.00	0.12	0.78	7.76	3.54	0.00	0.14	0.62	0.00	0.00	0.00	0.72
August	19.58	16.86	0.32	0.00	5.52	5.80	0.00	0.00	0.70	0.00	11.64	0.00	0.00
September	10.04	0.00	0.00	0.84	3.92	3.62	0.00	0.18	1.04	0.00	0.00	0.10	0.94
October	8.20	0.00	0.12	0.28	3.04	4.06	0.82	0.00	0.46	1.12	5.00	0.18	0.00
November	9.08	8.96	0.04	0.54	5.30	3.64	0.52	0.00	0.84	0.00	0.00	0.00	0.00
December	13.26	3.92	0.08	0.00	0.00	0.00	0.52	0.62	0.00	0.00	11.38	0.08	0.84
<b>Totals</b>	<b>147.02</b>	<b>60.48</b>	<b>1.26</b>	<b>5.16</b>	<b>56.14</b>	<b>42.42</b>	<b>5.86</b>	<b>1.50</b>	<b>7.64</b>	<b>3.50</b>	<b>59.56</b>	<b>0.36</b>	<b>3.84</b>

*Table 2.3(b): Quantity of Waste received and recovered during the reporting period January 2011 to December 2011.*

## 2.4 Site Capacity

The filling sequence outlined shows the sequence of cell to cell filling.

<b>Phase</b>	<b>Available Capacity</b>	<b>Available Capacity</b>	<b>Filling Commencement</b>	<b>Filling Completion</b>	<b>Restoration Completion</b>
	<b>(m3)</b>	<b>Months</b>	<b>Date</b>	<b>Date</b>	<b>Date</b>
Cell 1	0	0	Feb 2004	Nov 2004	March 2005
Cell 2	0	0	Nov 2004	Aug 2006	Temp. Cap Aug 2006
Cell 3	0	0	Sept 2006	Aug 2010	Q2 2011
<b>Total</b>	<b>0</b>	<b>0</b>			

*Table 2.4: Phasing of Filling and Restoration Operations*

### **3. SITE DEVELOPMENT WORKS**

#### **3.1 Works During 2011**

Final Capping and Gas Management works on site were substantially completed in 2010. However, final topsoiling and landscaping works were deferred until the spring of 2011. These works were complete by Q2 2011.

Other works which were carried out on site in 2011 are as follows:

- General maintenance works and upkeep of site.
- Energy Report prepared for site
- Environmental Liabilities Risk Assessment, Including CRAMP prepared for site
- Fire Water Risk Assessment prepared site

#### **3.2 Proposed Works for 2012**

Apart from general maintenance works and upkeep of the site, no other works are planned for 2012.

#### **4. EMISSIONS AND ENVIRONMENTAL MONITORING DATA:**

##### **4.1 Monitoring points**

All surface environmental monitoring points are shown on drawing No.1.

These consist of the following:

- **Groundwater Emissions monitoring Points: (7 no.)**  
(GW1, GW2, GW4, GW5, GW6, GW7, GW8)
- **Surface Water Emissions monitoring Points: (9 no.)**  
(SW1, SW2, SW3, SW4, SW5, SW6, SW7, SW8, SW9)
- **Leachate Quality monitoring Points: (8 no.)**  
(L1, L2, L3, L4, L5, L6, L7, L8)
- **Gas Emissions monitoring Points: (8 no.)**  
(L1, L2, L3, L4, L5, L6, L7, L8)
- **Dust Emissions monitoring Points: (4 no.)**  
(D1, D3, D6, D8) – number of points reduced with EPA agreement
- **Noise Emissions monitoring Points: (5 no.)**  
(N1, N6, N7, N10, N12) - number of points reduced with EPA agreement
- **Emissions to air monitoring Point: (1 no.)**  
Flare Stack

All sampling on site in 2011 was carried out by Enva Environmental Ltd. personnel. Following the granting of Waste Licence W0089-02, environmental monitoring reporting is now via the AER. This replaces the previous system of reporting via two biannual reports.

The results of all environmental monitoring carried out on site during 2011 are tabulated in appendix 1.

## 4.2 Leachate

The leachate lagoon was operational throughout 2011. The total volume of leachate removed from the lagoon in 2011 was 5,917.76 M<sup>3</sup>. All leachate extracted was transported to Bandon waste water treatment plant. Quantities extracted monthly are shown in table 4.2.

<i>Month</i>	<i>Vol (L)</i>
January	732,760
February	686,220
March	831,320
April	608,660
May	773,860
June	211,100
July	131,120
August	77,600
September	188,240
October	428,420
November	718,180
December	530,280
<b>Total Leachate</b>	<b>5,917,760</b>

*Table 4.2: Leachate Disposal per Month 2011*

## 4.3 Continuous Monitoring Systems utilised on site:

### 4.3.1 Surface water emissions monitoring (SCADA):

Surface water emissions from site are continuously analysed by means of a SCADA system that measures the following: TOC (Total Organic Carbon), pH, Conductivity, Ammonia as N, Temperature and Flow. A full record of hourly SCADA results is kept electronically and in hard copy on site.

#### **4.3.2 Flare Emissions Monitoring:**

A 500 M<sup>3</sup>/Hr Flaring system was in operation on site throughout 2011. Gas quality and emissions are continuously analysed for the following: Methane %, Carbon Dioxide %, Oxygen %, Carbon Monoxide, Combustion Temperature, Flow & Pressure.

Flare monitoring results and emissions analysis are tabulated in appendix 2.

## **5.0 ENERGY CONSUMPTION**

### **5.1 General**

- Water supply to the site is not yet metered.
- Electricity usage at the site during 2011 was estimated at approximately 104kWh per day.

## **6.0 ENVIRONMENTAL INCIDENTS, NON-COMPLIANCES AND COMPLAINTS**

### **6.1 Environmental Incidents reported to EPA in 2011**

A schedule of reported incidents and relevant remedial action is detailed in the following table.

<b>Date</b>	<b>Nature of Incident</b>	<b>Corrective Action</b>
24/01/11	Exceedance of emission limits	Further monitoring
19/05/11	Exceedance of emission limits	Further monitoring

*Table 6.1: Environmental Incidents*

### **6.2 Agency Notifications of Non-Compliance in 2011**

A schedule of non-compliance's and relevant action is detailed in the following table.

<i>Date</i>	<i>Nature of Non Compliance</i>	<i>Corrective Action</i>
-------------	---------------------------------	--------------------------

*Table 6.2: Non-Compliances.*

### **6.3 Complaints Summary**

There were no complaints in 2011. An odour log kept on site has not indicated any notable problems with odours during 2011.

### **6.4 Nuisance Controls**

#### **6.4.1 Litter**

There were no serious littering incidents during 2011. Litter can become apparent on site during periods of high wind but this is always dealt with in a timely fashion by site staff.



#### **6.4.2 Birds**

Following initial capping works in August and September 2010 where waste was no longer exposed on site, professional bird control was no longer deemed necessary on site.

#### **6.4.3 Vermin & Flying Insects**

Vermin and fly control is carried out under contract with pest specialists and a record of same kept on site as required under condition 11.3 of the Waste Licence.

#### **6.4.4 Scavenging**

Scavenging did not occur on site during 2011. A CCTV system is operational on site to deter and record any potential scavenging incidents.

### **6.5 Programme for Public Information**

#### **6.5.1 Information Available to the Public**

A site notice at the facility entrance states the following displays information on the facility including the following:-

- Facility name and address and telephone number
- Emergency contact information
- Opening hours
- Waste Licence information

Personnel associated with the facility are also available by appointment to meet with members of the public and answer queries regarding the facility if requested. The following information is held in a public file at the facility offices, available for the public to inspect: -

- A copy of the waste licence application.
- A copy of the current waste licence W0089-02.
- All correspondence from the Agency relating to the facility.
- All correspondence from Cork County Council to the Agency relating to the facility.
- Copies of environmental monitoring reports.

## **7. ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

An Environmental Management Plan was prepared for the site in accordance with EPA guidance documents. A copy is kept on site and acts as a manual for the operation of Derryconnell Landfill. It outlines the requirements of the Waste Licence and sets out a programme for achieving the schedule of objectives and targets.

### **7.1 Schedule of Objectives and Targets for Year 2011**

There were no new objectives proposed for 2011

### **7.2 Implementation of Objectives and Targets From 2010**

**Objective 1:** Complete Final Capping works on site

This objective has been achieved.

### **7.3 Update of Procedures Associated with the Facility**

General Site procedures associated with the facility remained unchanged throughout 2011. Due to changes in Cork County Council's Health & Safety Policy, additional H&S inspections and audits were carried out in 2011.

### **7.4 Staff Training**

Site Operatives underwent the following training in 2011:-

- Safe Pass
- Manual Handling
- First Aid
- Site specific JCB Teletruck Training

## **7.5 Financial Provision**

Cork County Council has the ability to meet any financial commitments or liabilities incurred by the carrying out of the disposal activities relating to the Derryconnell Landfill. These commitments include compliance with the waste management licence (No. W00089-02) and restoration and aftercare of the site as specified in Condition 8 of the licence.

Under Section 38 of the Waste Management Act, 1996, Cork County Council ‘‘shall provide and operate, or arrange of, such facilities as may be necessary for the recovery and disposal of household waste arising within the functional area’’. Compliance with Section 38 and all other relevant sections of the Waste Management Act, 1996 is a statutory obligation of Cork County Council. Cork County Council annually, in the preparation of budget estimates and the passing of these estimates, shall make provision for any capital works and maintenance works required to fulfil conditions of the waste licence for the Derryconnell Landfill.

## **APPENDICES**

## **APPENDIX 1**

### **SUMMARY OF ENVIRONMENTAL MONITORING**

- On site monitoring and sampling was carried out by Cork County Council Personnel and .  
Enva Ireland Ltd., Rafeen Industrial Estate, Ringaskiddy, Co. Cork.
- All Surface Water, Groundwater, Leachate and Dust analysis was carried out by Enva Ireland  
Ltd., Rafeen Industrial Estate, Ringaskiddy, Co. Cork.
- (Note: Blank results indicate monitoring location was dry at time of sampling)
- Noise Monitoring was carried out by McSwiney Environmental & Safety Consulting Ltd.,  
Corner House, Kenmare, Co. Kerry, Ireland.

## LANDFILL GAS MONITORING

The Waste Licence specifies monitoring of landfill gas emissions on a monthly basis.

Additional monitoring is carried out by the Licencee for informational purposes.

### L1 – L2 MONITORING RESULTS

L1							L2					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	4.21	9.90	1030	0.10	37.90	71.80	6.74	6.80	1030	1.10	35.30	72.50
23/02/2011	4.30	6.20	1002	0.00	39.10	68.40	6.81	9.40	1002	0.90	32.10	73.80
24/03/2011	3.91	13.20	1020	0.20	36.90	13.10	6.94	12.40	1020	-	-	-
29/04/2011	3.95	10.40	1019	-	-	-	6.98	9.60	1019	-	-	-
27/05/2011	3.86	10.10	1012	-	-	-	6.84	9.60	1012	-	-	-
27/06/2011	4.20	17.40	1011	-	-	-	6.50	17.80	1011	-	-	-
21/07/2011	4.22	18.20	1010	-	-	-	6.91	18.00	1010	-	-	-
24/08/2011	4.18	18.90	1009	-	-	-	6.30	19.10	1009	-	-	-
14/09/2011	4.13	18.00	1007	-	-	-	6.30	16.20	1007	-	-	-
28/10/2011	4.09	15.90	1004	-	-	-	6.22	16.20	1004	-	-	-
30/11/2011	4.20	11.20	1001	-	-	-	6.38	10.40	1001	-	-	-
20/12/2011	4.31	19.30	1009	-	-	-	6.73	13.60	1009	-	-	-

### L3 – L4 MONITORING RESULTS

L3							L4					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	Dry	9.60	1030	16.90	0.70	0.00	6.30	8.20	1030	0.00	41.30	68.40
23/02/2011	Dry	8.60	1002	17.30	0.40	0.00	6.62	7.50	1002	0.00	31.00	70.40
24/03/2011	Dry	12.70	1020	18.80	0.20	0.00	6.81	11.80	1020	-	-	-
29/04/2011	Dry	10.70	1019	19.40	0.30	0.00	6.87	11.20	1019	-	-	-
27/05/2011	Dry	8.30	1012	18.60	0.70	0.00	6.81	8.90	1012	-	-	-
27/06/2011	Dry	17.10	1011	20.20	0.40	0.00	6.71	18.10	1011	-	-	-
21/07/2011	Dry	19.10	1010	20.80	0.00	0.00	6.74	18.60	1010	-	-	-
24/08/2011	Dry	17.80	1009	20.90	0.00	0.00	6.74	19.40	1009	-	-	-
14/09/2011	Dry	15.40	1007	20.80	0.00	0.00	6.75	16.30	1007	-	-	-
28/10/2011	Dry	16.10	1004	20.90	0.00	0.00	6.68	16.40	-	-	-	-
30/11/2011	Dry	10.90	1001	21.00	0.00	0.00	6.79	11.00	1001	-	-	-
20/12/2011	Dry	10.40	1009	21.00	0.00	0.00	6.40	12.20	1009	-	-	-

### L5 – L6 MONITORING RESULTS

L5							L6					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	0.68	2.10	1030	16.50	0.40	0.00	2.17	6.90	1030	15.20	1.60	0.00
23/02/2011	0.71	7.90	1002	17.90	0.20	0.00	2.20	8.40	1002	16.70	1.40	0.00
24/03/2011	0.94	12.50	1019	19.00	0.10	0.00	2.28	11.40	1019	16.80	1.20	0.00
29/04/2011	0.88	10.30	1019	19.70	0.20	0.00	2.30	10.90	1019	17.10	1.30	0.00
27/05/2011	0.81	8.40	1012	19.20	0.40	0.00	2.24	9.60	1012	18.10	0.12	0.00
27/06/2011	0.67	16.40	1011	18.90	0.60	0.00	2.01	16.80	1011	18.80	1.10	0.00
21/07/2011	0.72	17.10	1010	21.00	0.90	0.00	2.22	18.70	1010	19.80	0.30	0.00
24/08/2011	0.60	18.70	1009	20.60	0.30	0.00	1.98	18.80	1009	19.90	0.50	0.00
14/09/2011	0.56	15.70	1007	20.70	0.90	0.00	1.96	15.80	1007	19.70	0.90	0.00
28/10/2011	0.67	15.80	1004	20.10	0.70	0.00	1.74	15.70	1004	20.40	0.40	0.00
30/11/2011	0.91	10.40	1001	20.40	0.40	0.00	1.82	11.60	1001	20.20	0.50	0.00
20/12/2011	0.72	10.70	1009	20.10	0.50	0.00	2.07	10.20	1009	20.30	0.30	0.00

### L7 – L8 MONITORING RESULTS

L7							L8					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	1.26	6.70	1030	14.20	3.70	0.00	3.88	9.20	1030	5.00	8.50	26.70
23/02/2011	1.31	6.50	1002	15.30	3.00	0.00	4.00	9.00	1002	6.70	4.90	31.40
24/03/2011	1.89	12.30	1020	15.90	2.40	0.00	3.84	11.70	1019	-	-	-
29/04/2011	1.94	10.10	1019	14.90	1.40	0.00	3.86	9.80	1019	-	-	-
27/05/2011	1.86	10.70	1012	13.80	1.30	0.00	3.80	10.20	1012	-	-	-
27/06/2011	1.44	17.30	1011	16.40	1.40	0.00	3.89	17.90	1011	-	-	-
21/07/2011	1.38	18.80	1010	18.90	1.20	0.00	3.97	19.20	1010	-	-	-
24/08/2011	1.41	19.10	1009	18.20	1.40	0.00	3.94	19.00	1009	-	-	-
14/09/2011	1.12	18.20	1007	18.50	1.30	0.00	3.98	17.40	1007	-	-	-
28/10/2011	0.23	16.00	1004	19.70	1.10	0.00	3.79	16.60	1004	-	-	-
30/11/2011	0.32	11.90	1001	19.80	1.00	0.00	3.90	12.00	1001	-	-	-
20/12/2011	0.41	12.10	1009	19.90	0.90	0.00	3.83	11.00	1009	-	-	-



### GW1 – GW2 MONITORING RESULTS

GW1							GW2					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	2.53	9.60	1030	17.30	0.30	0.00	1.49	8.70	1030	18.70	0.20	0.00
23/02/2011	2.59	8.40	1002	18.70	0.20	0.00	1.55	7.30	1002	19.00	0.10	0.00
24/03/2011	2.69	12.10	1020	19.20	0.60	0.00	1.91	11.20	1020	20.00	0.00	0.00
29/04/2011	2.71	10.50	1019	19.80	0.60	0.00	1.98	9.80	1019	21.00	0.00	0.00
27/05/2011	2.70	9.60	1012	20.80	0.00	0.00	1.81	8.40	1012	20.90	0.00	0.00
27/06/2011	2.68	17.10	1011	21.00	0.00	0.00	1.74	18.20	1011	20.80	0.00	0.00
21/07/2011	2.71	20.10	1011	21.00	0.00	0.00	1.80	18.60	1010	20.90	0.00	0.00
24/08/2011	2.51	18.10	1009	20.20	0.30	0.00	1.68	17.60	1009	21.00	0.00	0.00
14/09/2011	2.40	19.20	1007	20.00	0.50	0.00	1.56	14.60	1007	20.80	0.10	0.00
28/10/2011	2.36	16.40	1004	20.40	0.20	0.00	1.42	15.80	1004	21.00	0.00	0.00
30/11/2011	2.49	10.40	1001	19.90	0.40	0.00	1.68	9.80	1001	20.70	0.10	0.00
20/12/2011	2.36	11.10	1009	20.10	0.20	0.00	1.71	10.80	1009	20.90	0.00	0.00

### GW4 – GW5 MONITORING RESULTS

GW4							GW5					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	0.60	13.20	1030	16.00	0.20	0.00	0.90	4.20	1030	15.70	0.50	0.00
23/02/2011	0.90	9.60	1002	19.00	0.00	0.00	1.50	5.10	1002	18.10	0.70	0.00
24/03/2011	0.98	11.90	1020	21.00	0.00	0.00	1.34	11.63	1020	19.60	0.50	0.00
29/04/2011	1.01	8.60	1019	21.00	0.00	0.00	1.40	10.10	1019	16.50	0.30	0.00
27/05/2011	0.96	8.90	1012	21.00	0.00	0.00	1.32	10.40	1012	19.60	0.20	0.00
27/06/2011	0.91	17.40	1011	20.70	0.00	0.00	1.11	17.90	1011	20.20	0.00	0.00
21/07/2011	0.99	20.50	1010	20.80	0.00	0.00	1.29	20.10	1010	20.60	0.00	0.00
24/08/2011	0.89	17.90	1009	21.00	0.00	0.00	1.02	18.40	1009	21.00	0.00	0.00
14/09/2011	0.75	14.80	1007	21.00	0.00	0.00	0.98	15.30	1007	21.00	0.00	0.00
28/10/2011	0.71	15.20	1004	21.00	0.00	0.00	0.88	14.70	1004	20.90	0.00	0.00
30/11/2011	1.09	10.70	1001	20.90	0.00	0.00	1.32	10.90	1001	21.00	0.00	0.00
20/12/2011	0.92	9.70	1009	21.00	0.00	0.00	1.12	11.00	1009	21.00	0.00	0.00

### GW6 – GW7 MONITORING RESULTS

GW6							GW7					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	0.19	3.30	1030	18.20	1.40	0.00	0.15	2.80	1030	19.10	0.00	0.00
23/02/2011	0.42	2.80	1002	17.20	1.20	0.00	0.69	1.90	1002	19.00	0.00	0.00
24/03/2011	0.29	11.45	1020	19.90	0.00	0.00	0.81	11.20	1020	21.00	0.00	0.00
29/04/2011	0.32	9.40	1019	20.80	0.00	0.00	0.87	9.70	1019	20.90	0.00	0.00
27/05/2011	0.41	10.10	1012	20.40	0.00	0.00	0.89	9.30	1012	20.50	0.00	0.00
27/06/2011	0.40	16.50	1011	19.80	0.00	0.00	0.82	18.10	1011	21.00	0.00	0.00
21/07/2011	0.50	19.40	1010	20.00	0.00	0.00	0.89	20.80	1010	21.00	0.00	0.00
24/08/2011	0.44	18.00	1009	21.00	0.00	0.00	0.61	17.60	1009	21.00	0.00	0.00
14/09/2011	0.48	15.60	1007	21.00	0.00	0.00	0.33	15.50	1007	21.00	0.00	0.00
28/10/2011	0.44	16.80	1004	21.00	0.00	0.00	0.32	15.50	1004	21.00	0.00	0.00
30/11/2011	0.29	11.40	1001	21.00	0.00	0.00	0.49	10.90	1001	21.00	0.00	0.00
20/12/2011	0.35	10.60	1009	21.00	0.00	0.00	0.61	10.40	1009	21.00	0.00	0.00

### GW8 & SITE OFFICE MONITORING RESULTS

GW8							Site Office					
Date	Depth (m)	Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %		Temp °C	Pressure Mb	O <sub>2</sub> %	CO <sub>2</sub> %	CH <sub>4</sub> %
21/01/2011	1.08	5.10	1030	19.00	0.00	0.00		13.50	1030	21.00	0.00	0.00
23/02/2011	1.21	6.00	1002	19.00	0.00	0.00		11.40	1002	21.00	0.00	0.00
24/03/2011	1.40	11.00	1020	20.80	0.00	0.00		12.40	1019	21.00	0.00	0.00
29/04/2011	1.49	10.40	1019	21.00	0.00	0.00		11.20	1019	21.00	0.00	0.00
27/05/2011	1.34	8.20	1012	21.00	0.00	0.00		11.30	1012	21.00	0.00	0.00
27/06/2011	1.14	17.30	1011	21.00	0.00	0.00		17.80	1011	21.00	0.00	0.00
21/07/2011	1.38	19.70	1010	21.00	0.00	0.00		14.60	1010	21.00	0.00	0.00
24/08/2011	1.10	17.90	1009	20.90	0.00	0.00		17.50	1009	21.00	0.00	0.00
14/09/2011	1.11	17.10	1007	20.70	0.00	0.00		16.90	1007	21.00	0.00	0.00
28/10/2011	1.00	16.30	1004	20.60	0.00	0.00		15.20	1004	21.00	0.00	0.00
30/11/2011	1.27	11.10	1001	21.00	0.00	0.00		10.40	1001	21.00	0.00	0.00
20/12/2011	1.40	10.90	1009	21.00	0.00	0.00		12.20	1009	21.00	0.00	0.00

## SURFACE WATER

### SURFACE WATER MONITORING RESULTS

SW1	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	0.442	1.000	1.000	0.069
Chloride	mg/l	27.000	30.000	34.000	33.000
Conductivity	us/cm	174.000	351.000	235.000	182.000
Dissolved Oxygen	mg/l	-	-	-	8.660
Boron	mg/l	-	-	-	<.0161
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	11.900
Chromium (total)	ug/l	-	-	-	<0.03
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.152
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	3.180
Manganese	ug/l	-	-	-	0.108
Nickel	ug/l	-	-	-	0.001
Potassium	mg/l	-	-	-	<2.340
Sodium	mg/l	-	-	-	41.100
Zinc	ug/l	-	-	-	0.000
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	<2.000
Total Phosphorous	mg/l P	-	-	-	0.053
Total Coliforms	No/100ml	-	-	-	22
E.Coli	No/100ml	-	-	-	1

SW2	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	<0.2	Monitoring	<0.200	0.069
Chloride	mg/l	19.500	Location	24.000	25.000
Conductivity	us/cm	125.000	Dry	140.800	126.000
Dissolved Oxygen	mg/l	-	-	-	9.600
Boron	mg/l	-	-	-	0.011
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	4.970
Chromium (total)	ug/l	-	-	-	<3.000
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.185
Lead	ug/l	-	-	-	<.00002
Magnesium	mg/l	-	-	-	2.720
Manganese	ug/l	-	-	-	0.004
Nickel	ug/l	-	-	-	0.001
Potassium	mg/l	-	-	-	<2.340
Sodium	mg/l	-	-	-	16.300
Zinc	ug/l	-	-	-	0.003
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	<2.000
Total Phosphorous	mg/l P	-	-	-	0.053
Total Coliforms	No/100ml	-	-	-	201
E.Coli	No/100ml	-	-	-	0

SW3	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	<0.2	0.459	0.353	0.189
Chloride	mg/l	27.000	27.500	31.000	30.000
Conductivity	us/cm	204.000	242.000	201.000	146.000
Dissolved Oxygen	mg/l	-	-	-	9.830
Boron	mg/l	-	-	-	0.014
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	8.650
Chromium (total)	ug/l	-	-	-	<3.000
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.162
Lead	ug/l	-	-	-	<0.0002
Magnesium	mg/l	-	-	-	3.160
Manganese	ug/l	-	-	-	0.048
Nickel	ug/l	-	-	-	0.002
Potassium	mg/l	-	-	-	<2.340
Sodium	mg/l	-	-	-	22.500
Zinc	ug/l	-	-	-	0.002
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	2.600
Total Phosphorous	mg/l P	-	-	-	<0.020
Total Coliforms	No/100ml	-	-	-	201
E.Coli	No/100ml	-	-	-	3

SW4	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	3.260	7.150	12.000	4.640
Chloride	mg/l	37.000	55.000	53.000	61.000
Conductivity	us/cm	180.000	478.000	488.000	322.000
Dissolved Oxygen	mg/l	-	-	-	5.050
Boron	mg/l	-	-	-	0.041
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	20.900
Chromium (total)	ug/l	-	-	-	<3.000
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.320
Lead	ug/l	-	-	-	<.00002
Magnesium	mg/l	-	-	-	5.400
Manganese	ug/l	-	-	-	0.339
Nickel	ug/l	-	-	-	0.002
Potassium	mg/l	-	-	-	5.180
Sodium	mg/l	-	-	-	39.300
Zinc	ug/l	-	-	-	0.005
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	3.200
Total Phosphorous	mg/l P	-	-	-	<0.020
Total Coliforms	No/100ml	-	-	-	25
E.Coli	No/100ml	-	-	-	3

SW5	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	0.202	0.419	0.372	0.162
Chloride	mg/l	27.000	30.000	36.000	38.000
Conductivity	us/cm	204.000	320.000	208.000	150.000
Dissolved Oxygen	mg/l	-	-	-	9.500
Boron	mg/l	-	-	-	0.014
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	8.560
Chromium (total)	ug/l	-	-	-	<3.000
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.159
Lead	ug/l	-	-	-	<.00002
Magnesium	mg/l	-	-	-	3.140
Manganese	ug/l	-	-	-	0.044
Nickel	ug/l	-	-	-	0.002
Potassium	mg/l	-	-	-	<2.30
Sodium	mg/l	-	-	-	22.600
Zinc	ug/l	-	-	-	0.002
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	2.800
Total Phosphorous	mg/l P	-	-	-	<0.02
Total Coliforms	No/100ml	-	-	-	62
E.Coli	No/100ml	-	-	-	4

SW6	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	<0.2	0.034	<0.200	0.741
Chloride	mg/l	33.000	50.000	60.000	29.000
Conductivity	us/cm	291.000	1412.000	1589.000	290.000
Dissolved Oxygen	mg/l	-	-	-	6.050
Boron	mg/l	-	-	-	0.045
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	32.600
Chromium (total)	ug/l	-	-	-	<3.000
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.117
Lead	ug/l	-	-	-	<.00002
Magnesium	mg/l	-	-	-	5.300
Manganese	ug/l	-	-	-	0.004
Nickel	ug/l	-	-	-	0.002
Potassium	mg/l	-	-	-	5.700
Sodium	mg/l	-	-	-	25.800
Zinc	ug/l	-	-	-	0.016
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	10.600
Total Phosphorous	mg/l P	-	-	-	<0.020
Total Coliforms	No/100ml	-	-	-	201
E.Coli	No/100ml	-	-	-	1



SW8	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	<0.2	Monitoring	<0.200	0.056
Chloride	mg/l	19.500	Location	22.500	25.000
Conductivity	us/cm	113.000	Dry	119.000	106.000
Dissolved Oxygen	mg/l	-	-	-	11.030
Boron	mg/l	-	-	-	0.012
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	5.330
Chromium (total)	ug/l	-	-	-	<3.000
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.255
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	2.740
Manganese	ug/l	-	-	-	0.396
Nickel	ug/l	-	-	-	0.011
Potassium	mg/l	-	-	-	<2.340
Sodium	mg/l	-	-	-	17.000
Zinc	ug/l	-	-	-	0.004
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	<2.000
Total Phosphorous	mg/l P	-	-	-	0.048
Total Coliforms	No/100ml	-	-	-	10
E.Coli	No/100ml	-	-	-	0

SW9	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	0.278	Monitoring	<0.200	0.116
Chloride	mg/l	31.500	Location	34.500	43.000
Conductivity	us/cm	137.000	Dry	159.000	162.000
Dissolved Oxygen	mg/l	-	-	-	5.690
Boron	mg/l	-	-	-	0.012
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	2.740
Chromium (total)	ug/l	-	-	-	<3.000
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.519
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	2.620
Manganese	ug/l	-	-	-	0.725
Nickel	ug/l	-	-	-	0.002
Potassium	mg/l	-	-	-	<2.34
Sodium	mg/l	-	-	-	26.400
Zinc	ug/l	-	-	-	0.004
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	<2.000
Total Phosphorous	mg/l P	-	-	-	<0.02
Total Coliforms	No/100ml	-	-	-	6
E.Coli	No/100ml	-	-	-	0

## GROUNDWATER

### GROUND WATER MONITORING RESULTS

GW1	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	0.310	0.282	0.284	0.295
Conductivity	us/cm	254.000	279.000	254.000	259.000
Chloride	mg/l	-	-	-	23.300
Boron	mg/l	-	-	-	0.010
Cadmium	ug/l	-	-	-	<0.0001
Calcium	mg/l	-	-	-	36.300
Chromium (total)	ug/l	-	-	-	0.004
Copper	mg/l	-	-	-	0.001
Iron	ug/l	-	-	-	<0.019
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	5.290
Manganese	ug/l	-	-	-	1.110
Nickel	ug/l	-	-	-	0.001
Potassium	mg/l	-	-	-	<2.340
Sodium	mg/l	-	-	-	16.200
Zinc	ug/l	-	-	-	<0.00041
Cyanide (total)	ug/l	-	-	-	<0.05
Flouride	mg/l	-	-	-	<0.5
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	6.900
Total Phosphorous	mg/l	-	-	-	0.518
Total Coliforms	MPN/100ml	-	-	-	78
E. Coli	MPN/100ml	-	-	-	0

GW2	Units	23-Mar-11	30-Jun-11	21-Sep-11	23-Nov-11
Ammoniacal N	mg/l N	<0.2	0.068	<0.200	<0.200
Conductivity	us/cm	263.000	273.000	268.000	268.000
Chloride	mg/l	-	-	-	18.600
Boron	mg/l	-	-	-	0.017
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	40.500
Chromium (total)	ug/l	-	-	-	0.003
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	<0.019
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	3.070
Manganese	ug/l	-	-	-	0.087
Nickel	ug/l	-	-	-	0.001
Potassium	mg/l	-	-	-	2.810
Sodium	mg/l	-	-	-	11.800
Zinc	ug/l	-	-	-	<.00041
Cyanide (total)	ug/l	-	-	-	<.05
Flouride	mg/l	-	-	-	<0.500
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	20.000
Total Phosphorous	mg/l	-	-	-	0.218
Total Coliforms	MPN/100ml	-	-	-	15
E. Coli	MPN/100ml	-	-	-	0



<b>GW4</b>	<b>Units</b>	<b>23-Mar-11</b>	<b>30-Jun-11</b>	<b>21-Sep-11</b>	<b>23-Nov-11</b>
Ammoniacal N	mg/l N	<0.2	0.059	<0.200	0.295
Conductivity	us/cm	312.000	264.000	221.000	234.000
Chloride	mg/l	-	-	-	32.300
Boron	mg/l	-	-	-	0.123
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	66.700
Chromium (total)	ug/l	-	-	-	0.006
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	<19.000
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	3.550
Manganese	ug/l	-	-	-	0.258
Nickel	ug/l	-	-	-	0.003
Potassium	mg/l	-	-	-	<2.340
Sodium	mg/l	-	-	-	22.700
Zinc	ug/l	-	-	-	0.002
Cyanide (total)	ug/l	-	-	-	<0.050
Flouride	mg/l	-	-	-	<0.500
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	8.000
Total Phosphorous	mg/l	-	-	-	0.176
Total Coliforms	MPN/100ml	-	-	-	0
E. Coli	MPN/100ml	-	-	-	0

<b>GW5</b>	<b>Units</b>	<b>23-Mar-11</b>	<b>30-Jun-11</b>	<b>21-Sep-11</b>	<b>23-Nov-11</b>
Ammoniacal N	mg/l N	<0.2	0.061	<0.200	<0.200
Conductivity	us/cm	256.000	312.000	297.000	248.000
Chloride	mg/l	-	-	-	30.900
Boron	mg/l	-	-	-	0.016
Cadmium	ug/l	-	-	-	<0.03
Calcium	mg/l	-	-	-	36.700
Chromium (total)	ug/l	-	-	-	0.004
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.113
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	3.130
Manganese	ug/l	-	-	-	0.014
Nickel	ug/l	-	-	-	0.003
Potassium	mg/l	-	-	-	<2.340
Sodium	mg/l	-	-	-	16.200
Zinc	ug/l	-	-	-	0.038
Cyanide (total)	ug/l	-	-	-	<0.05
Flouride	mg/l	-	-	-	<0.500
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	<2.000
Total Phosphorous	mg/l	-	-	-	0.057
Total Coliforms	MPN/100ml	-	-	-	29
E. Coli	MPN/100ml	-	-	-	0

<b>GW6</b>	<b>Units</b>	<b>23-Mar-11</b>	<b>30-Jun-11</b>	<b>21-Sep-11</b>	<b>23-Nov-11</b>
Ammoniacal N	mg/l N	1.810	1.080	0.561	0.386
Conductivity	us/cm	405.000	445.000	51.000	466.000
Chloride	mg/l	-	-	-	43.100
Boron	mg/l	-	-	-	<0.0094
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	77.400
Chromium (total)	ug/l	-	-	-	0.007
Copper	mg/l	-	-	-	0.004
Iron	ug/l	-	-	-	<19.000
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	7.850
Manganese	ug/l	-	-	-	2.080
Nickel	ug/l	-	-	-	0.002
Potassium	mg/l	-	-	-	<2.34
Sodium	mg/l	-	-	-	41.100
Zinc	ug/l	-	-	-	0.004
Cyanide (total)	ug/l	-	-	-	<0.050
Flouride	mg/l	-	-	-	<0.500
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	4.300
Total Phosphorous	mg/l	-	-	-	2.380
Total Coliforms	MPN/100ml	-	-	-	0
E. Coli	MPN/100ml	-	-	-	0

<b>GW7</b>	<b>Units</b>	<b>23-Mar-11</b>	<b>30-Jun-11</b>	<b>21-Sep-11</b>	<b>23-Nov-11</b>
Ammoniacal N	mg/l N	6.220	5.610	4.490	4.330
Conductivity	us/cm	739.000	765.000	765.000	753.000
Chloride	mg/l	-	-	-	35.500
Boron	mg/l	-	-	-	0.049
Cadmium	ug/l	-	-	-	<0.100
Calcium	mg/l	-	-	-	111.000
Chromium (total)	ug/l	-	-	-	0.013
Copper	mg/l	-	-	-	<0.00085
Iron	ug/l	-	-	-	0.025
Lead	ug/l	-	-	-	<0.00002
Magnesium	mg/l	-	-	-	10.300
Manganese	ug/l	-	-	-	5.350
Nickel	ug/l	-	-	-	0.004
Potassium	mg/l	-	-	-	9.480
Sodium	mg/l	-	-	-	66.900
Zinc	ug/l	-	-	-	0.089
Cyanide (total)	ug/l	-	-	-	<0.050
Flouride	mg/l	-	-	-	<0.500
Mercury	ug/l	-	-	-	<0.010
Sulphate	mg/l	-	-	-	69.200
Total Phosphorous	mg/l	-	-	-	0.038
Total Coliforms	MPN/100ml	-	-	-	0
E. Coli	MPN/100ml	-	-	-	0

<b>GW8</b>	<b>Units</b>	<b>23-Mar-11</b>	<b>30-Jun-11</b>	<b>21-Sep-11</b>	<b>23-Nov-11</b>
<b>Ammoniacal N</b>	<b>mg/l N</b>	<0.2	0.078	<0.200	<0.200
<b>Conductivity</b>	<b>us/cm</b>	332.000	360.000	258.000	389.000
<b>Chloride</b>	<b>mg/l</b>	-	-	-	45.800
<b>Boron</b>	<b>mg/l</b>	-	-	-	0.013
<b>Cadmium</b>	<b>ug/l</b>	-	-	-	<0.100
<b>Calcium</b>	<b>mg/l</b>	-	-	-	52.700
<b>Chromium (total)</b>	<b>ug/l</b>	-	-	-	0.005
<b>Copper</b>	<b>mg/l</b>	-	-	-	<0.00085
<b>Iron</b>	<b>ug/l</b>	-	-	-	0.073
<b>Lead</b>	<b>ug/l</b>	-	-	-	<0.00002
<b>Magnesium</b>	<b>mg/l</b>	-	-	-	9.180
<b>Manganese</b>	<b>ug/l</b>	-	-	-	1.420
<b>Nickel</b>	<b>ug/l</b>	-	-	-	0.001
<b>Potassium</b>	<b>mg/l</b>	-	-	-	<2.340
<b>Sodium</b>	<b>mg/l</b>	-	-	-	32.300
<b>Zinc</b>	<b>ug/l</b>	-	-	-	0.004
<b>Cyanide (total)</b>	<b>ug/l</b>	-	-	-	<0.050
<b>Flouride</b>	<b>mg/l</b>	-	-	-	<0.500
<b>Mercury</b>	<b>ug/l</b>	-	-	-	<0.010
<b>Sulphate</b>	<b>mg/l</b>	-	-	-	8.700
<b>Total Phosphorous</b>	<b>mg/l</b>	-	-	-	<0.020
<b>Total Coliforms</b>	<b>MPN/100ml</b>	-	-	-	2
<b>E. Coli</b>	<b>MPN/100ml</b>	-	-	-	0

## LEACHATE

### LEACHATE MONITORING RESULTS

23-Nov-11	Units	L1	L2	L3	L4	L5	L6	L7	L8
Ammoniacal N	mg/l N	68.700	90.600	Monitoring	Monitoring	4.120	0.376	Monitoring	Monitoring
BOD	mg/l	54.000	814.000	Location	Location	160.000	18.900	Location	Location
COD	mg/l	242.000	3520.000	Dry	Dry	839.000	115.000	Dry	Dry
Chloride	mg/l	50.000	60.000	-	-	70.000	35.000	-	-
Conductivity	us/cm	1119.000	1648.000	-	-	630.000	330.000	-	-
pH	pH units	6.707	6.839	-	-	6.573	6.806	-	-
Boron	mg/l	0.171	0.191	-	-	0.019	0.031	-	-
Cadmium	mg/l	<0.0001	<0.100	-	-	<0.100	<0.100	-	-
Calcium	mg/l	70.200	99.800	-	-	83.400	41.600	-	-
Chromium (total)	mg/l	<0.03	<30.000	-	-	<3.000	<.03	-	-
Copper	mg/l	0.001	<.00085	-	-	0.001	0.002	-	-
Iron	mg/l	0.044	18.200	-	-	<0.019	0.075	-	-
Lead	mg/l	0.000	1.030	-	-	<0.00002	<0.00002	-	-
Magnesium	mg/l	15.400	22.400	-	-	7.410	4.270	-	-
Manganese	mg/l	5.890	9.620	-	-	3.480	0.016	-	-
Nickel	mg/l	0.024	0.004	-	-	0.009	0.002	-	-
Potassium	mg/l	47.500	45.300	-	-	2.850	2.950	-	-
Sodium	mg/l	75.000	79.600	-	-	27.600	19.100	-	-
Zinc	mg/l	0.640	0.002	-	-	0.174	0.001	-	-
Cyanide (total)	mg/l	<0.05	<0.05	-	-	<0.050	<0.050	-	-
Flouride	mg/l	<0.500	<0.500	-	-	<0.500	<0.500	-	-
Mercury	mg/l	<0.010	<0.010	-	-	<0.010	<0.010	-	-
Sulphate	mg/l	44.600	<2.000	-	-	18.700	49.500	-	-
Total Phosphorous	mg/l P	0.195	3.020	-	-	0.193	0.198	-	-

## DUST & NOISE MONITORING RESULTS

### DUST MONITORING RESULTS

LOCATION	Units	Jun-11	01-Sep-11	01-Dec-11
D1	mg/m <sup>2</sup> /day	14.90	28.60	171.00
D3	mg/m <sup>2</sup> /day	16.10	18.70	205.00
D6	mg/m <sup>2</sup> /day	36.80	9.50	200.00
D8	mg/m <sup>2</sup> /day	78.70	68.20	220.00

### NOISE MONITORING RESULTS - DECEMBER 2011

LOCATION	Units	L <sub>Aeq</sub> 30 mins	L <sub>A90</sub> 30 mins	L <sub>A10</sub> 30 mins
N1	dB(A)	39.00	25.70	39.40
N6	dB(A)	35.70	26.40	38.10
N7	dB(A)	54.10	36.40	48.90
N10	dB(A)	42.70	30.60	46.40
N12	dB(A)	49.50	35.20	53.50

## **APPENDIX 2**

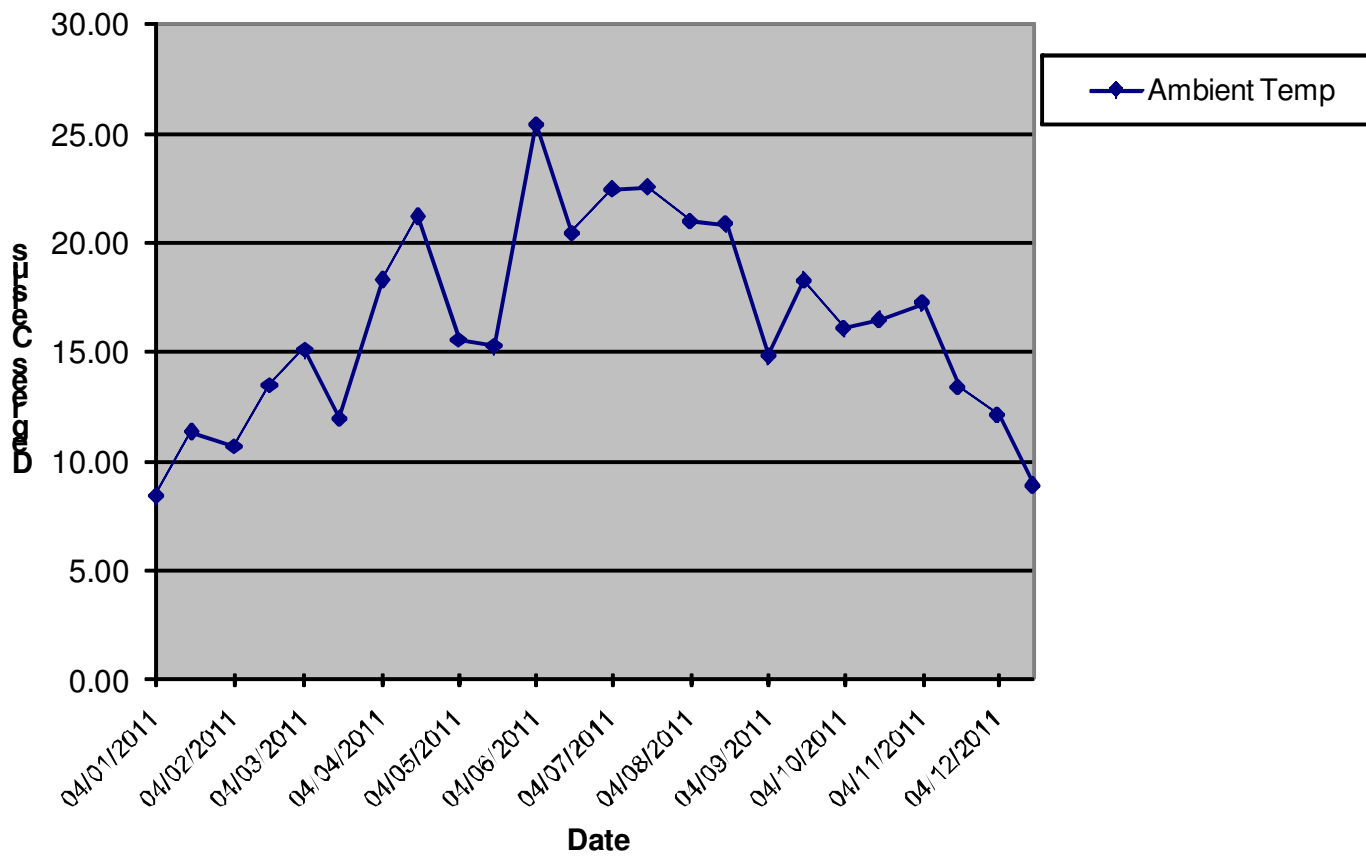
### **FLARE EMISSIONS MONITORING RESULTS & GRAPHS**

Biannual Flare Emissions Monitoring was carried out Axis Environmental Services, 40 Coolraine Heights, Old Cratloe Road, Limerick.

## GAS FLARE DATA

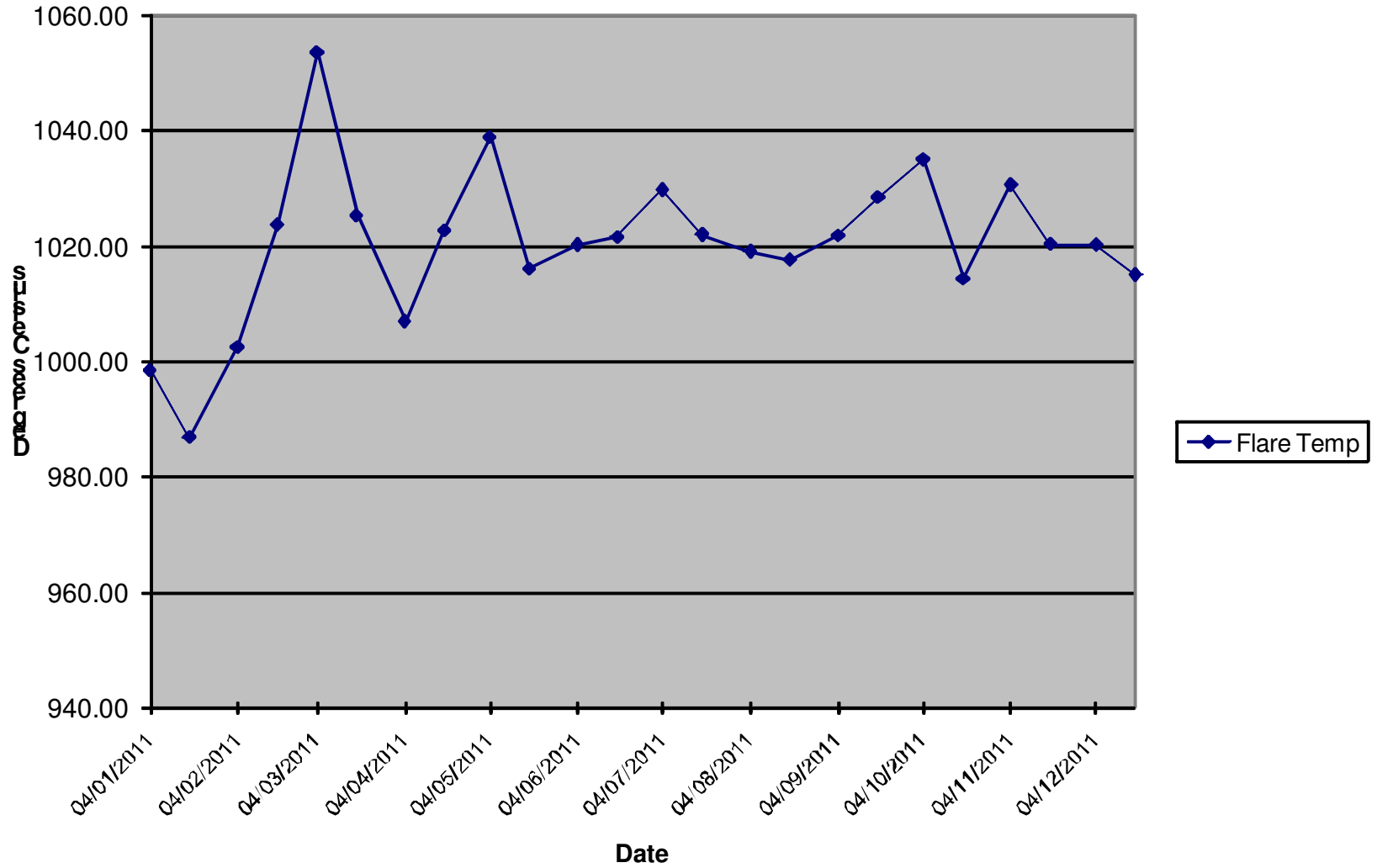
Date	Ambient Temp	Atm Pressure	CO <sub>2</sub>	CO	Flow	CH <sub>4</sub>	O <sub>2</sub>	Flare Pressure	Flare Temp
04/01/2011	8.42	1006.25	30.45	15.78	350.43	49.25	1.32	26.56	998.49
18/01/2011	11.36	1010.61	31.87	10.59	352.47	46.17	2.87	24.37	986.87
04/02/2011	10.69	999.78	26.59	18.63	296.41	53.22	2.47	31.54	1002.45
18/02/2011	13.47	998.81	34.74	21.06	331.56	43.89	1.75	28.96	1023.69
04/03/2011	15.08	1018.48	39.83	10.62	360.34	61.14	1.50	27.65	1053.59
18/03/2011	11.97	1009.31	26.60	11.97	331.73	31.83	3.09	26.49	1025.26
04/04/2011	18.30	1004.55	39.38	9.50	336.20	62.51	1.45	25.13	1006.98
18/04/2011	21.18	1030.41	26.23	19.36	340.06	38.06	1.83	27.97	1022.71
04/05/2011	15.55	1003.21	33.23	22.22	349.78	62.47	1.28	44.43	1038.85
18/05/2011	15.26	1026.92	31.86	12.25	359.61	55.04	1.34	46.70	1016.04
04/06/2011	25.37	1039.34	28.25	11.89	361.56	43.01	1.37	47.08	1020.26
18/06/2011	20.41	1015.53	27.73	16.47	367.17	39.62	1.11	49.41	1021.56
04/07/2011	22.42	1021.94	27.02	23.80	368.80	36.39	1.27	50.61	1029.74
18/07/2011	22.52	1014.39	25.17	10.41	360.09	36.10	1.35	46.97	1022.03
04/08/2011	20.96	1011.31	27.12	24.78	346.64	37.74	1.23	46.19	1019.06
18/08/2011	20.84	1021.41	31.84	13.81	345.93	47.95	1.21	44.64	1017.66
04/09/2011	14.81	999.79	29.21	6.25	347.53	43.78	1.14	45.35	1021.77
18/09/2011	18.27	1000.88	26.68	14.84	355.14	34.52	1.21	46.93	1028.38
04/10/2011	16.07	1018.20	27.78	12.70	274.50	41.09	1.38	29.08	1035.00
18/10/2011	16.47	1027.58	26.71	11.16	277.05	36.22	1.38	30.28	1014.38
04/11/2011	17.24	997.44	38.19	13.13	263.20	48.98	1.18	26.51	1030.62
18/11/2011	13.39	1001.56	40.81	12.13	264.15	54.09	1.12	26.98	1020.31
04/12/2011	12.12	1004.28	37.45	11.50	259.29	49.88	1.21	24.77	1020.26
18/12/2011	8.92	1018.27	30.70	11.70	283.75	35.86	1.30	29.36	1015.05

### Ambient Temperature

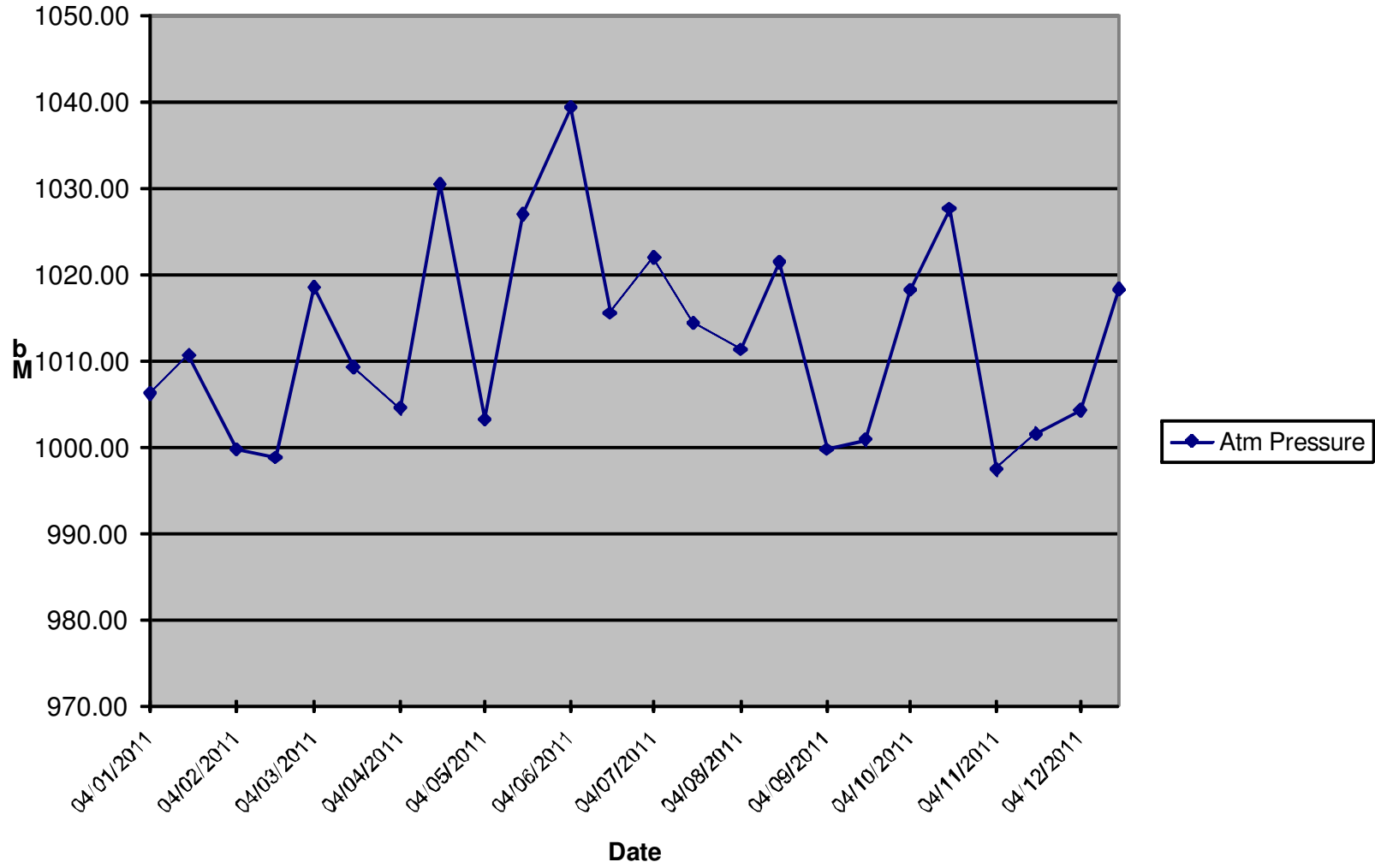




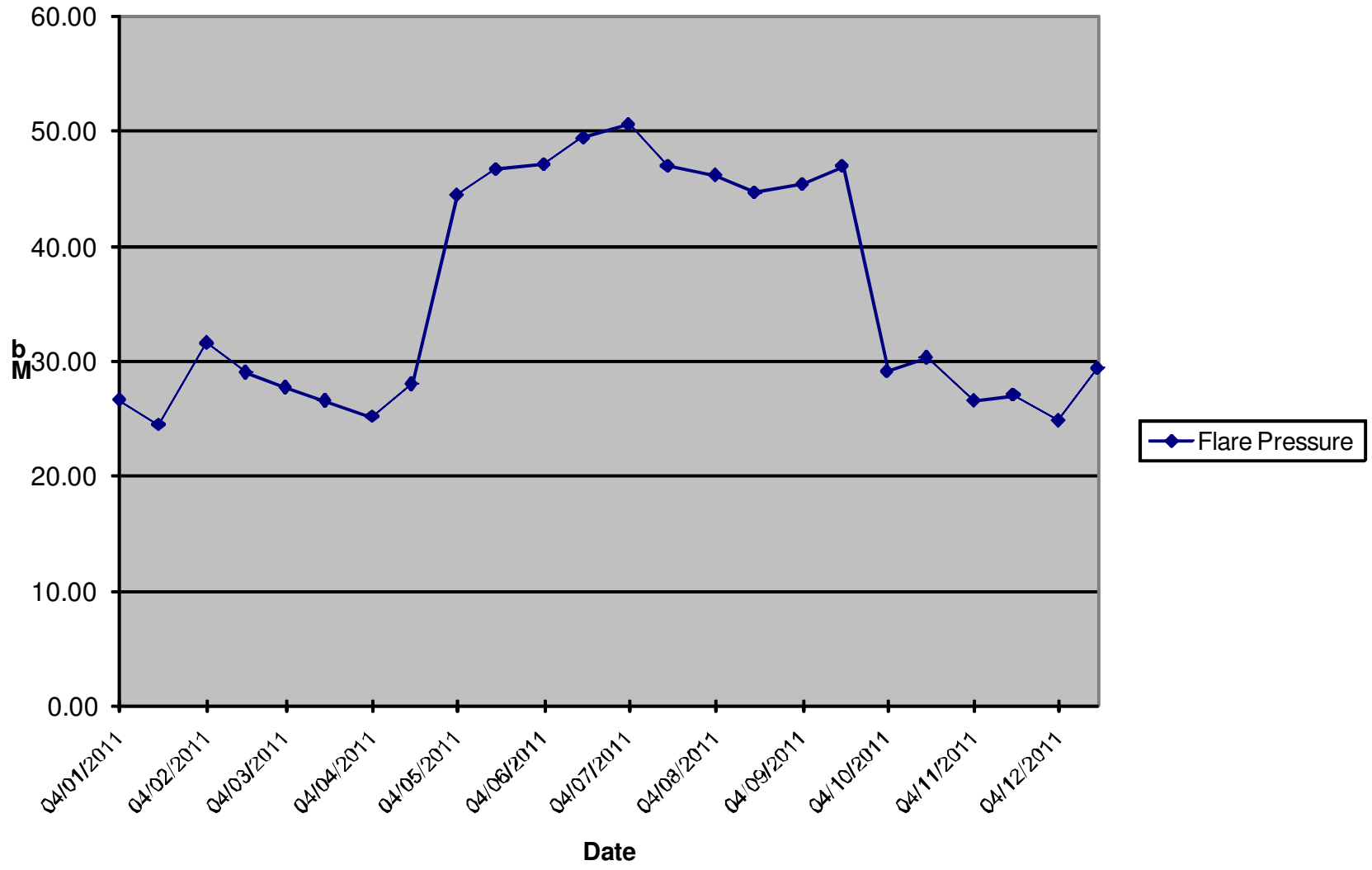
### Flare Operating Temperature



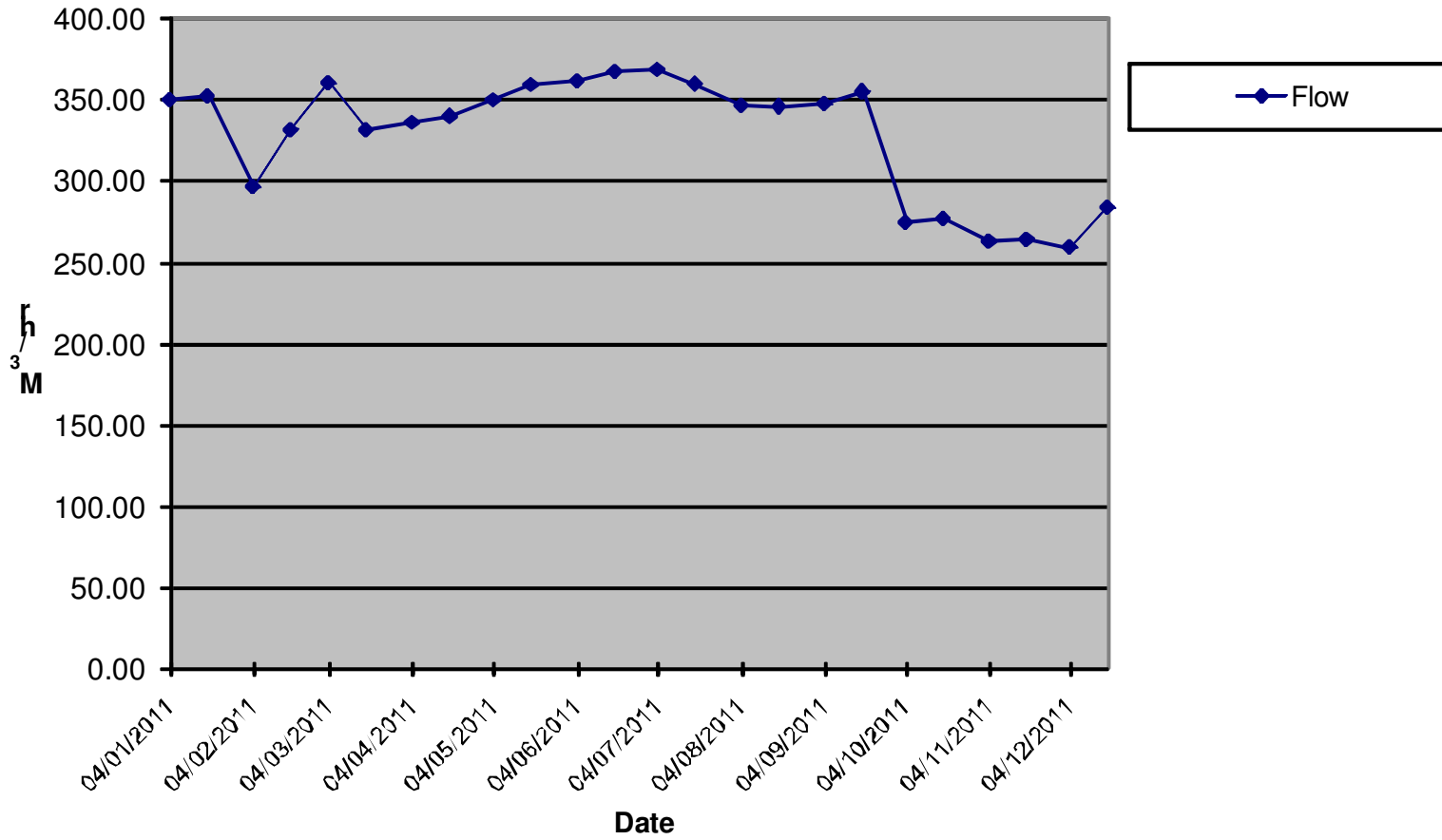
### Atmospheric Pressure



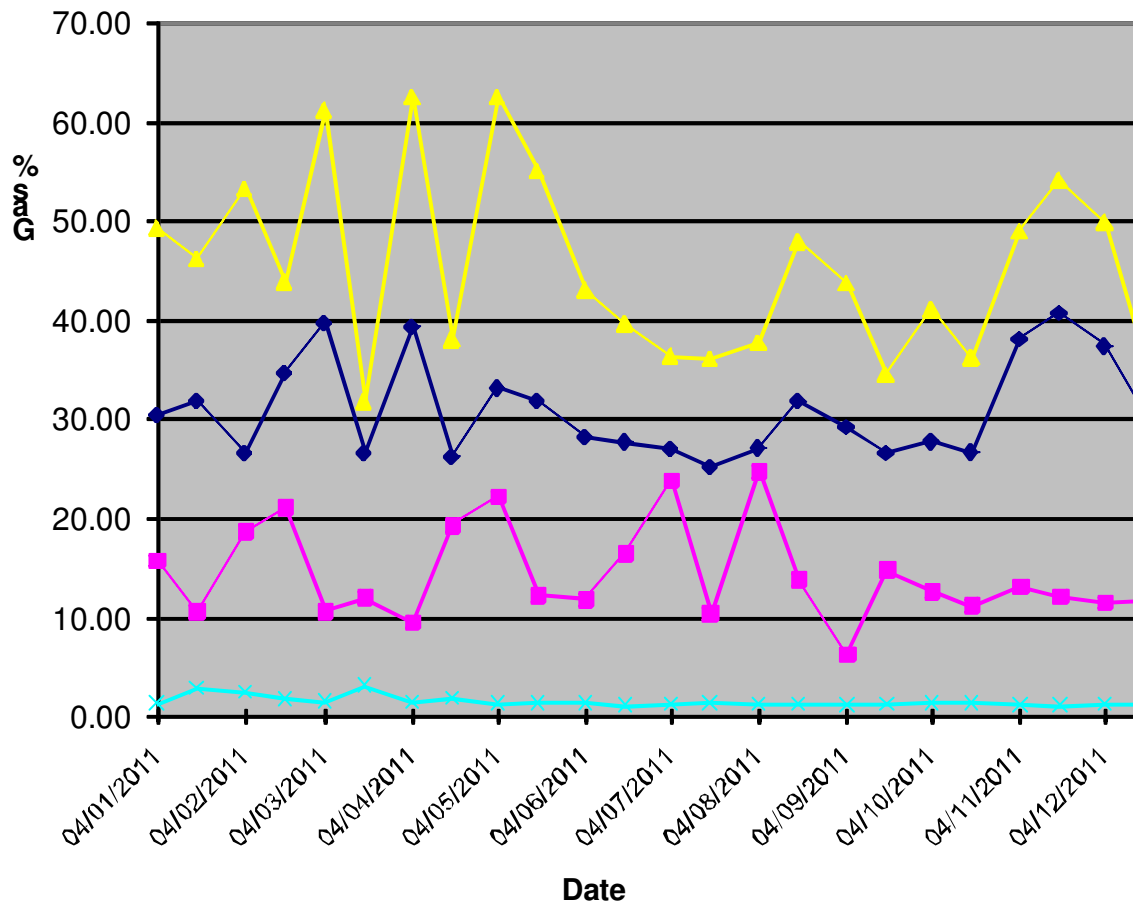
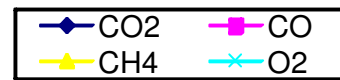
### Flare Operating Pressure



### Flare Operating Flow



### Flare Operating Gas Composition



## Biannual Flare Emissions Monitoring

### FLARE EMISSIONS MONITORING

FLARE STACK	Units	05-Aug-11	14-Dec-11	Emission Limit
Residence Time	S	1.66	0.90	>0.30
Nitrogen Oxides (NO <sub>x</sub> )	Mg/Nm <sup>3</sup>	29.00	56.00	150.00
Sulphur Dioxide (SO <sub>2</sub> )	Mg/Nm <sup>3</sup>	53.00	9.70	N/A
Carbon Monoxide (CO)	Mg/Nm <sup>3</sup>	53.00	343.00	N/A
Temperature	°C	907	869	>1000

**APPENDIX 3**

**2011 PRTR EMISSIONS DATA**

# AER Returns Workbook

Version 1.1.13

<b>REFERENCE YEAR</b>	2011
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## 1. FACILITY IDENTIFICATION

Parent Company Name	Cork County Council Western Division
Facility Name	Derryconnell Landfill
PRTR Identification Number	W0089
Licence Number	W0089-02

### Waste or IPPC Classes of Activity

N	class_name
3.12	Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.
3.1	Deposit on, in or under land (including landfill).
3.13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.
3.4	Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
3.5	Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment.
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.
Address 1	Derryconnell
Address 2	Schull
Address 3	County Cork
Address 4	
	Cork
Country	Ireland
Coordinates of Location	-7.46596 53.2762
River Basin District	IESW
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
<b>AER Returns Contact Name</b>	Mairead Hales
<b>AER Returns Contact Email Address</b>	mairead.hales@corkcoco.ie
<b>AER Returns Contact Position</b>	Executive Engineer
<b>AER Returns Contact Telephone Number</b>	028 37742
<b>AER Returns Contact Mobile Phone Number</b>	086 6018493
<b>AER Returns Contact Fax Number</b>	
<b>Production Volume</b>	0.0
<b>Production Volume Units</b>	
<b>Number of Installations</b>	0
<b>Number of Operating Hours in Year</b>	0
<b>Number of Employees</b>	0
<b>User Feedback/Comments</b>	
<b>Web Address</b>	

## 2. PRTR CLASS ACTIVITIES

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



**SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS**

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KGs			
POLLUTANT		Method Used			ADD EMISSION POINT	QUANTITY		
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	LandGEM Modelling	0.0	362222.4	0.0	362222.4

ADD NEW ROW | DELETE ROW \* | \* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

**SECTION B : REMAINING PRTR POLLUTANTS**

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

ADD NEW ROW | DELETE ROW \* | \* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

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

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KGs			
POLLUTANT		Method Used			ADD EMISSION POINT	QUANTITY		
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

ADD NEW ROW | DELETE ROW \* | \* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

**Additional Data Requested from Landfill operators**

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

**Landfill:**  
Please enter summary data on the quantities of methane flared and / or utilised

Derryconnell Landfill

T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour	
		Method Code	Designation or Description		
Total estimated methane generation (as per site model)	464630.4	C	OTH	LandGem Modelling	N/A
Methane flared	102408.0	C	OTH	Landfill Gas Survey	500.0 (Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0 (Total Utilising Capacity)
Net methane emission (as reported in Section A above)	362222.4	C	OTH	LandGem Modelling	N/A

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0089 | Facility Name : Derryconnell Landfill | Filename : PRTR Derryconnell 2011.xls | Return Year : 2011 |

30/03/2012 15:04

Please enter all quantities on this sheet in Tonnes

7

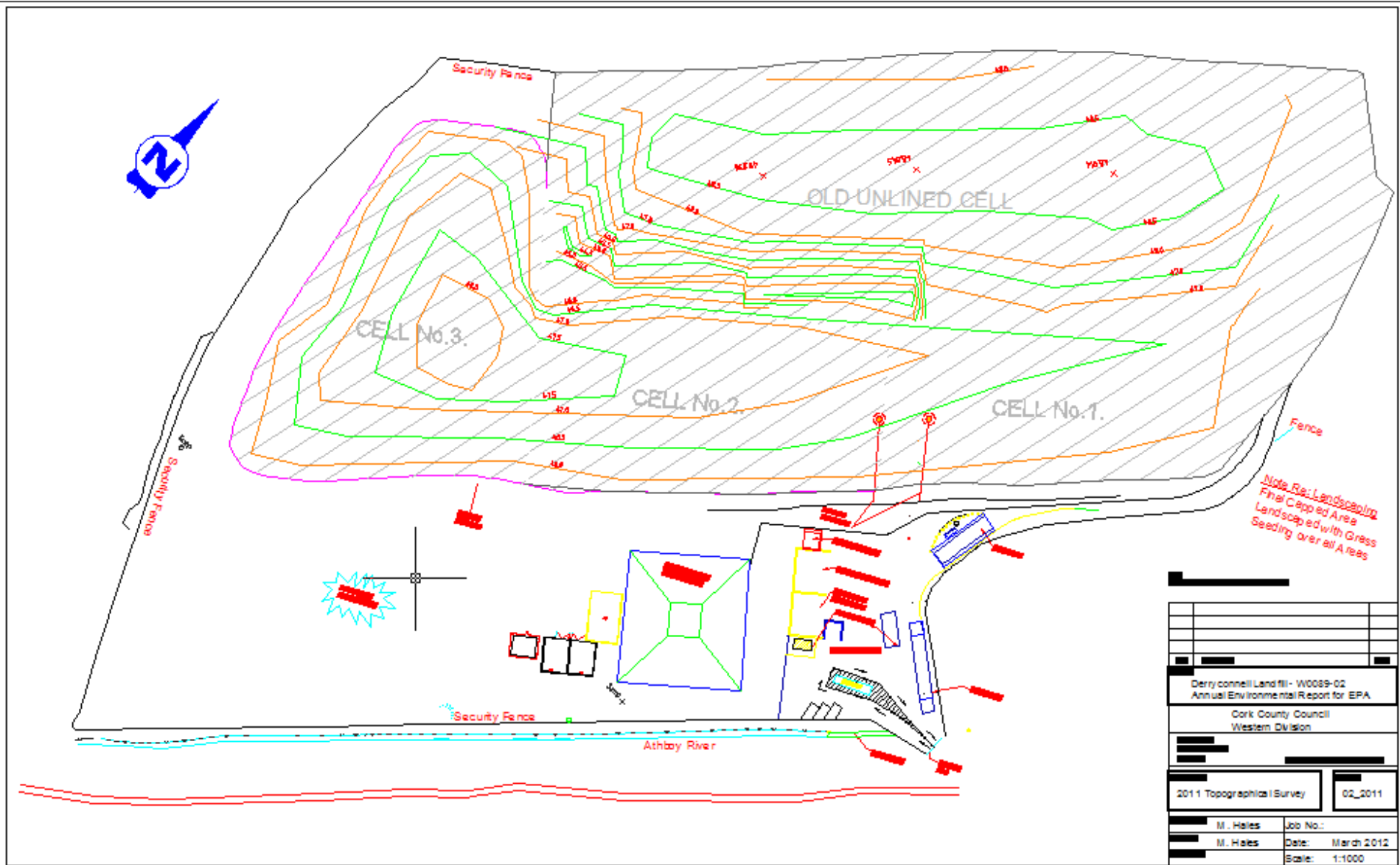
Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility	Haz Waste : Address of Next Destination Facility	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used		Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Non Haz Waste: Address of Recover/Disposer		
Within the Country	15 01 06	No	147.02	mixed packaging	R13	M	Weighed	Offsite in Ireland	Bantry Skip Hire,WFP-CK-08-0002-01	Dunbitten East,Bantry,..Co. Cork,Ireland		
Within the Country	15 01 07	No	60.48	glass packaging	R13	M	Weighed	Offsite in Ireland	Mr. Binman Ltd.,W0061-02	Luddenmore,Grange,Kilmallock,Co. Limerick,Ireland		
<b>Within the Country</b>	<b>15 01 04</b>	<b>No</b>	6.42	metallic packaging	R13	M	Weighed	Offsite in Ireland	Greendragon Recycling Ltd.,WFP-CK-10-0060-02	Corbally,..Glanmire,Co. Cork,Ireland		
Within the Country	20 01 40	No	56.14	metals	R13	M	Weighed	Offsite in Ireland	Pouladuff Dismatlers Cork Ltd,WFP-CK-10-0070-02	Forge Hill,Airport Road,Cork,..Ireland		
To Other Countries	20 01 11	No	7.64	textiles	R13	M	Weighed	Abroad	All-Tex Recyclers Ltd,WME05/24	Antrim,BT44 9LB,United Kingdom		
Within the Country	20 01 38	No	42.42	wood other than that mentioned in 20 01 37	R13	M	Weighed	Offsite in Ireland	Bantry Skip Hire,WFP-CK-08-0002-01	Dunbitten East,Bantry,..Co. Cork,Ireland		
Within the Country	16 06 05	No	5.86	other batteries and accumulators	R13	M	Weighed	Offsite in Ireland	KMK Metals Recycling,W0113-02	Cappincur Industrial Estate,Duingean Road,Tullamore,Co. Offaly,Ireland		Clonminam Industrial Estate,Portlaoise,Co. Laoise,..Ireland
Within the Country	13 02 08	Yes	3.5	other engine, gear and lubricating oils	R13	M	Weighed	Offsite in Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Co. Laoise,..Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Co. Laoise,..Ireland
Within the Country	16 05 04	Yes	1.5	gases in pressure containers (including halons) containing dangerous substances	R13	M	Weighed	Offsite in Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Co. Laoise,..Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Co. Laoise,..Ireland
Within the Country	16 02 14	No	59.56	discarded equipment other than those mentioned in 16 02 09 to 16 02 13	R13	M	Weighed	Offsite in Ireland	KMK Metals Recycling,W0113-02	Offaly,Ireland		
Within the Country	19 07 03	No	5917.76	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighed	Offsite in Ireland	Cork County Council - Bandon WWTP,..	Glaslin Road,Bandon,..Co. Cork,Ireland		
Within the Country	20 03 01	No	250.1	mixed municipal waste	D15	M	Weighed	Offsite in Ireland	Greenstar Recycling,W0136-02	Sarsfield Industrial Estate,..Glanmire,Co. Cork,Ireland		
Within the Country	20 03 07	No	36.0	bulky waste	D15	M	Weighed	Offsite in Ireland	Bantry Skip Hire,WFP-CK-08-0002-01	Dunbitten East,Bantry,..Co. Cork,Ireland		
Within the Country	20 01 27	Yes	3.84	paint, inks, adhesives and resins containing dangerous substances	R13	M	Weighed	Offsite in Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Co. Laoise,..Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Co. Laoise,..Ireland

## **DRAWINGS**



DRAWING 02\_2011

2011 TOPOGRAPHICAL SURVEY



Derryconnell Landfill - W0089-02 Annual Environmental Report for EPA	
Cork County Council Western Division	
2011 Topographical Survey	02_2011
M. Hales	Job No.:
M. Hales	Date: March 2012
	Scale: 1:1000