



OXIGEN ENVIRONMENTAL LTD.

**CORRANURE LANDFILL
WASTE LICENCE
W077-02**

**ANNUAL ENVIRONMENTAL REPORT
(AER) 2008**

TABLE OF CONTENTS

1	INTRODUCTION	1
2	SITE DESCRIPTION	1
3	QUANTITY AND COMPOSITION OF WASTE	2
3.1	Waste Quantities Received at Landfill for Disposal	2
3.2	Waste Quantities Received at Civic Amenity Facility	3
3.3	Remaining cell 3 Capacity.....	4
3.4	Methods of Deposition of Waste	4
4	ENVIRONMENTAL MONITORING	5
4.1	Groundwater	6
4.2	Leachate.....	7
4.3	Surface Water	8
4.4	Dust Monitoring	11
4.5	Landfill Gas	12
4.6	Noise	13
4.7	Meteorological Data	15
5	MASS BALANCE OF SPECIFIED SUBSTANCES	15
5.1	Resource and Energy Consumption Summary.....	15
5.2	Emissions to Groundwater	15
5.3	Leachate Volume	16
5.4	Gas Volumes.....	16
6	SITE DEVELOPMENT WORKS	17
6.1	Development Works During the Reporting Period.....	17
6.2	Proposed Development Works in 2008	18
7	STAFFING AT CORRANURE LANDFILL	19
8	ENVIRONMENTAL MANAGEMENT	20
8.1	Environmental Management System	20
8.2	Review of Objectives and Targets for 2008	20
8.3	Schedule of Environmental Objectives and Targets for 2009.....	21
8.4	Review of Nuisance Controls	23
9	REPORTS ON FINANCIAL PROVISIONS	25
10	STATEMENT OF CHARGES AND COSTS AT LANDFILL	25
11	REPORTED INCIDENTS AND COMPLAINTS SUMMARY	25
11.1	Reported Incidents	25
11.2	Complaints Received	25
11.3	Action Taken	25
12	TOPOGRAPHICAL SURVEY	26
13	SLOPE STABILITY	26

LIST OF FIGURES

Figure 4.1: Dust Monitoring Results 2008.....	12
Figure 4.2: Summary of Mean Concentrations of Main Components of Landfill Gas Within the Waste Body.....	13
Figure 4.3: Summary of Noise Monitoring Results for 2008	14

LIST OF TABLES

Table 2.1 Waste Categories and Quantities accepted under Waste Licence WL0077-02	2
Table 3.1: Quantity and Composition of Waste Landfilled in 2008	2
Table 3.2: Quantity of Waste Landfilled pre-2008	3
Table 3.3: Quantity and Composition of Waste Received for Recovery at CA site in 2008...	3
Table 3.4: C & D Waste Used on Site for Internal Roads, Landfill Cover and Landscaping..	4
Table 4.1: Comparison of Typical Leachate Composition Values and Values at Corranure Landfill	8
Table 4.6: Frequency Analysis, 2008.....	8
Table 7.1 Site Management Structure at Corranure Landfill year end 2008.....	19
Table 8.1 Status of Objectives and Targets for 2008	20
Table 8.2 Schedule of Environmental Objectives and Targets for 2009	21

LIST OF APPENDICES

APPENDIX A	MONTHLY BREAKDOWN OF LANDFILLED WASTE
APPENDIX B	LOCATION MAP OF MONITORING POINTS No.102
APPENDIX C	METEOROLOGICAL DATA
APPENDIX D	TOPOGRAPHICAL SURVEY
APPENDIX E	PRTR Emissions Data

1 INTRODUCTION

Cavan County Council are the licensed operators of Corranure Landfill under EPA Waste Licence Register No. WL0077-02. In October 2007, Oxigen Environmental Ltd. commenced operation of the landfill under a contractual operational agreement with Cavan County Council who remain as the licensee.

This AER has been prepared in accordance with the conditions of the Waste Licence and the EPA "Draft Guidance on Environmental Management Systems and Reporting to the Agency, 1999".

2 SITE DESCRIPTION

Corranure Landfill is located within the townlands of Corranure and Lismagratty adjacent to the Cavan-Cootehill Rd (R188) approximately 3 kilometres North-East of Cavan Town. The total landfilling footprint covers an area of 11 hectares.

Waste Licence 77-1 was granted by the EPA in June 2001 allowing an annual waste intake of 30,050 tonnes. An application for a review of Waste Licence 77-1 for Corranure Landfill was submitted to the EPA in April 2003 by Cavan County Council. A revised Waste Licence 77-2 was issued by the EPA on the 10th May 2005. Under this revised licence, the facility boundary was extended to allow for two new lined cells to be constructed (Phase 3 including Cells 3 and 4) and the waste intake increased to 90,000 tonnes per annum.

The Civic Amenity Facility opened in February 2002 and is used by the general public for recycling. Domestic waste is also accepted for disposal at this facility. At present the Civic Amenity Facility accepts the following waste types: segregated recyclables from householders, newspapers and magazines, cardboard, tetra pak, glass bottles and jars, aluminium and steel cans, plastic containers and plastic shrink wrap, wood, textiles/footwear, electrical goods, fluorescent tubes, batteries wet and household, scrap steel, waste engine oil and oil filters, vegetable oil, C& D waste, gypsum material and green waste.

Table 2.1 below shows the waste categories which the facility is licensed to accept under Waste Licence WL0077-02:

Table 2.1 Waste Categories and Quantities accepted under Waste Licence WL0077-02

Waste Type	Maximum Tonnes per Annum
Household Waste	50,000
Commercial Waste	32,000
Construction and Demolition Waste	5,000
Green Waste	2,000
Street Cleaning Residues	900
Hazardous Waste	100
TOTAL	90,000

Licensed waste disposal and recovery activities are carried out in accordance with the 3rd and 4th Schedule of the Waste Management Act as per Part 1 of Waste Licence WL0077-02.

3 QUANTITY AND COMPOSITION OF WASTE

3.1 WASTE QUANTITIES RECEIVED AT LANDFILL FOR DISPOSAL

Table 3.1 below shows the quantity and composition of waste landfilled in Corranure Landfill in 2008. A monthly breakdown for waste landfilled is included in Appendix A.

Table 3.1: Quantity and Composition of Waste Landfilled in 2008

Waste Acceptance	EWC Code	Disposal
Hse/general	20 03 01	747.44
Ash	10 01 01	1659.14
Municipal waste	20 03 01	80014.02
Paint Filters	08 01 18	34.34
paint sludge	08 01 14	266.42
Sweepers	20 03 03	515.98
Toner	08 03 18	101.06
Council Clean up	20 03 03	56.62
Non-rec waste	20 03 99	3135.02
Insulation Material	17 06 04	754.72
Waste animal feed	18 02 06	17.22
Total		87301.98

Table 3.2 provides figures for the total tonnage of waste accepted for disposal at Corranure Landfill in previous years.

Table 3.2: Quantity of Waste Landfilled pre-2008

Period	Quantity (Tonnes)
11 th March 2002 – 31 st June 2002	4,469.25
1 st July 2002 – 31 st June 2003	36,206.21
1 st July 2003 – 31 st December 2003	19,911.21
1 st January 2004 – 31 st December 2004	53,813.44
1 st January 2005 – 31 st December 2005	45,889.47
1 st January 2006 – 31 st December 2006	85,869.00
1 st January 2007 - 31 st December 2007	83,262.91

3.2 WASTE QUANTITIES RECEIVED AT CIVIC AMENITY FACILITY

The quantities of recyclables accepted at the Civic Amenity Facility from 1st January 2008 to 31st December 2008 are shown in Table 3.3. The majority of Construction and Demolition (C&D) waste accepted at the Civic Amenity Facility was used on site for internal roads, landfill cover and landscaping. Quantities of these materials are shown in Table 3.4.

Table 3.3: Quantity and Composition of Waste Received for Recovery in the Civic Amenity Site in 2008

Waste Type	EWC Code	Total (Tonnes)
AL Packaging	150104	7.2
Green Waste	200201	287.58
Metals	200140	121.04
Mixed Glass	150107	148.88
Newspapers	200101	326
Plastic Packaging	150102	53.5
Steel Packaging	150104	30.54
Tetra Pak	150105	14.02
Batteries	160601	10.52
Wood	150103	212.34
CA C&D waste	170107	1.6
Cardboard	150101	258.42
Textiles	200110	55.28
WEEE	200136 /200135	187.14
Fluorescent tubes	200121	0.98
Waste Oil/filters	80318 /160107	3.18
Gypsum	170802	6.56
Total		1724.78

Table 3.4: C&D Waste Used on Site for Internal Roads, Landfill Cover and Landscaping

Waste Acceptance	EWC Code	Recovered
Mxd C&D	17 09 04	22407.56
Wood chip cover	20 01 38	2000.46
Fine material	19 12 12	21931.14
Cover material	17 01 07	10390.59
CA C&D waste	17 01 07	100.06
Ash	10 01 01	69.9
Total		56899.71

3.3 REMAINING CELL 3 CAPACITY

Filling of waste in Cell 2 commenced in October 2005. A total of 14,990 tonnes of waste was landfilled between October 2005 and December 2005. From 1st January 2006 to 31st December 2006, 85,869 tonnes of waste were landfilled in Cell 2. Filling continued in Cell 2 in 2007 with a total of 30,846 tonnes landfilled during the period January – June 2007. By this time Cell 2 had reached full capacity and the cell capping works commenced post filling.

Filling in Cell 3 commenced in June 2007. Cell 3 has an overall capacity of 239,000 tonnes approximately. During the period June - December 2007, 50,416 tonnes of waste were placed in Cell 3. During January to December 2008, 87,238 tonnes was placed also in Cell 3. The remaining capacity in Cell 3 from January 2008 onwards is estimated at approximately 101,346 tonnes.

3.4 METHODS OF DEPOSITION OF WASTE

Waste disposal trucks enter the site via the main entrance gate and proceed onto the weighbridge where the trucks are weighed. The truck then proceeds to the active cell. A tipface supervisor is employed on site to direct trucks to the operational area of cell where the waste is tipped. Waste is checked at the working face. Any waste not suitable for acceptance is removed for recovery or disposal to an appropriate alternative licensed facility. The truck then leaves the cell and passes through an automated wheel wash which removes debris from wheels and undercarriage of truck. The truck then proceeds to the weighbridge. The truck is again weighed and the duplicate weight docket produced is signed by both the truck driver and weighbridge operator. Oxygen Environmental operate the Precia Molen GeneSYS PC based Weighbridge

Management System. Both hardcopies and electronic copies of the following records are maintained for all transactions:

- Time/date of arrival/departure,
- Unique identification number of each load,
- Carrier details,
- Vehicle registration number,
- Waste producer,
- Waste description (EWC Code)
- Quantity of waste disposed, and
- Signed By Driver/Weighbridge Operator.

Condition 5.4.1 of Waste Licence WL0077-02 allows for a maximum working face of 25 metres in width and 2.5 metres in height with a slope no greater than 1:3. Once tipped the waste is pushed out over the working face by a steel-wheeled compactor. Large hollow objects in the waste tipped are crushed to avoid the creation of void spaces. At the end of each working day the face is covered with inert material.

When landfilling operations move to another part of cell the previous area is covered by temporary capping consisting of 0.5 metres of soil. Waste acceptance procedures are in place at Corranure Landfill, which detail the procedures used when dealing with waste which has been accepted or rejected from the site.

4 ENVIRONMENTAL MONITORING

The required monitoring programme at Corranure Landfill is specified in Schedule D of Waste Licence 77-02. The Emission Limit Values (ELV) are specified in Schedule C of the Waste Licence. The environmental monitoring period for this AER is 1st January 2008 to 31st December 2008.

The following sections summarise the environmental monitoring undertaken at Corranure Landfill during the reporting period. During 2008 all environmental monitoring was carried out by BHP Laboratories, New Road, Thomondgate, Limerick.

4.1 GROUNDWATER

The locations of the various groundwater monitoring locations are shown in Appendix B Map of Monitoring Locations No.102. The results of the chemical and microbiological analysis conducted on the groundwaters are presented in detail in the quarterly and annual monitoring reports which were submitted to the Agency during the reporting period.

GW01 is located at the south-eastern corner of the remediated landfill and at the entrance to the facility. The groundwater was coloured and turbid on all sampling occasions but the level of iron again was much lower than that recorded in previous years (0.097 mg/l in April '08). Levels of chloride were recorded between 13mg/l and 31mg/l during Quarterly monitoring (31.2mg/l recorded in Q4). During annual sampling, no Faecal Coliforms and 22 no. T. Coliforms were detected in this borehole which is a significant improvement to sampling in 2007 (20 no. Faecal Coliforms detected in 2007).

GW04 is located on the north western corner of the site. This location exhibited further evidence of microbiological contamination with 579 no. Total Coliforms and 112 no. Faecal Coliforms recorded during annual sampling. Chloride levels for Quarter 2 at 121.4 mg/l was above the recommended standard of 30mg/l with the remaining Quarters (24.5 mg/l, 14.8mg/l and 14.4 mg/l respectively). Groundwater samples were turbid and coloured on all sampling occasions.

GW05 is located to the north of the site. A total of 1 no. Total Coliforms and no Faecal Coliform were recorded during annual sampling. Chloride levels were all within the recommended limits (8.6mg/l to 29mg/l). Groundwater samples were turbid and brown in the 1st quarter and turbid and straw for 2nd and 4th quarter, while clear in Quarter 3.

Groundwater levels remained fairly constant throughout the year, with depths varying in wells from 2.04m in GW01, to GW05 recorded as being consistently full for the year.

In summary, all groundwater monitoring locations recorded non-compliances in relation to Coliforms and Chloride, a significant improvement was recorded in GW05 results in comparison to 2007.

Access was obtained to the private well locations PW02, PW05BT, PW8, PW9, PW10, PW11, PW13, PW15, and PW16. PW07 was sampled during quarter 3 but was not accessible for the remainder of the year. Quarterly monitoring involved sampling for levels of Dissolved Oxygen

and Chloride, as well as visual and olfactory inspection. Annual sampling of various other parameters was carried out on the 9th April '08.

During the year all waters were clear and odourless. Two well locations, PW13 and PW02, exhibited elevated levels of Chloride in the 3rd Quarter (38.7 mg/l and 47.8 mg/l). Wells PW02, PW05BT, PW09, PW13 exhibited evidence of microbiological contamination, with 42 no. Total Coliforms and 3 no. Faecal Coliforms in PW02, 5 no. Total Coliforms recorded at PW05BT and PW13 and 3 no. Total Coliforms at PW09.

With the exception of elevated levels of coliforms at some of the locations and some locally high concentrations in Chloride, the quality of the water met the criteria as outlined in the European Communities (Drinking Water) (No. 2) Regulations, 2007.

4.2 LEACHATE

Samples of leachate were taken from the leachate storage tank on two occasions during February and October and analysed for a suite of parameters (as set out in the Waste Licence for Corranure). Overall the values for the various parameters are at the lower end of the expected range of values for leachate as per the EPA Landfill Site Design Manual, 2000 (see Table 4.1).

Table 4.1: Comparison of Typical Leachate Composition Values and Values at Corranure Landfill

Parameter	Unit	Overall Range of Values for Young Landfill	Overall Range of Values for Old Landfill	Values at Corranure Landfill
pH	-	5.12 – 7.8	6.8 – 8.2	7.47
Conductivity	µS/cm	5,800 – 52,000	5,990 – 19,300	6040
COD	mg/l	2,740 – 152,000	622 – 8,000	1080
BOD ₅	mg/l	2,000 – 68,000	97 – 1,770	467
Chloride	mg/l	659 – 4,670	570 – 4,710	607.5
Magnesium	mg/l	25 – 820	40 – 1,580	85.12
Potassium	mg/l	350 – 3,100	100 – 1,580	248.6
Chromium	mg/l	0.03 – 0.3	<0.03 – 0.56	0.032
Manganese	mg/l	1.40 – 164.0	0.04 – 3.59	1.486
Iron	mg/l	48.3 – 2,300	1.6 – 160	8.279
Copper	mg/l	0.02 – 1.1	<0.02 – 0.62	0.239
Zinc	mg/l	0.09 – 140.0	0.03 – 6.7	0.067
Cadmium	mg/l	<0.01 – 0.1	<0.01 – 0.08	0.043
Mercury	mg/l	<0.0001 – 0.0015	<0.0001 – 0.0008	<0.0005
Lead	mg/l	<0.04 – 0.65	<0.04 – 1.9	0.025
Ammoniacal Nitrogen NH ₃ -N	mg/l	194 – 3,610	283 – 2,040	354
Boron	mg/l	-	-	1.998
Calcium	mg/l	270 – 6,240	23 -501	295
Sodium	mg/l	474 – 2,400	474 – 3,650	476.25
Cyanide	mg/l	-	-	0.131
Fluoride	mg/l	-	-	45.19
List I/II Organics	mg/l	-	-	0.157
Sulphate	mg/l	<5 – 1,560	<5 - 322	129
Total Phosphorus	mg/l	-	-	9.5
Total Oxidised Nitrogen	mg/l	-	-	0.14

Source: EPA Site Design Manual, 2000

Leachate wells L/G4, L/G11, L/G13, L/G20, L/G24 are on the Scada System. This system digitally records the leachate levels and the levels controlled by automatic pumping system.

4.3 SURFACE WATER

The Surface Water Monitoring Maps No.100 Corranure Stream and No. 101 Lismagratty Stream in Appendix B show the locations of the 3 no. surface water sampling locations (SW3, SW4 and SW5) and 2 no. surface water discharge monitoring points, SW1 and SW2. SW1, SW4 and SW5 are located on the Corranure Stream and SW2 and SW3 on the Lismagratty Stream. These samples were analysed in each of the four quarters of 2008. SW1 and SW2 monitoring are completed monthly.

Annual monitoring was completed in April '08 to include additional parameters to the Quarterly monitoring. In addition, a biological assessment of 10 no. stream locations (A1 – A5 and B1 – B5) was carried out by Ecofact in June 2008.

The following interpretation summarises the overall surface water quality as per the Quarterly monitoring reports. More detailed interpretations can be found within the monthly and annual monitoring reports which were submitted to the Agency.

4.3.1 Physico / Chemical Monitoring

The results of analysis carried out were then compared with the following:

- The EC Quality of Surface Water intended for Abstraction of Drinking Water Regulations, 1989,
- The EPA's Environmental Quality Objectives and Environmental Quality Standards discussion document (1997),
- The Fresh Water (FW) Fish Directive 78/659/EEC, and
- European Communities (Drinking Water) (No. 2) Regulations, 2007.

pH levels were all within the limits recommended (between 6 and 9 in the Freshwater Fish Directive 78/659/EEC). There was little overall variation between the results with a maximum of 8.3 at SW2 in the 1st Quarter and a minimum of 6.78 at SW5 in the 4th Quarter.

One exceedence of the recommended limit of **BOD** (5 mg/l as per the 1989 Surface Water Regulations) was recorded in the 3rd quarter at SW4 on the Corranure stream (6mg/l).

All sampling locations were below the recommended standard (0.2 mg/l) for **Ammonia** concentrations for Quarterly monitoring, with .02 mg/l recorded at SW2 in Quarter 4.

Levels of **COD** in excess of the recommended limit (40 mg/l as per the 1989 Surface Water Regulations) occurred at one sample location SW5 on Quarter 4 (44 mg/l). Levels remained under the relevant standard on all sampling occasions at the remainder of the sampling locations.

Elevated levels of **Suspended Solids** were recorded at SW1, SW2 and SW4 in the 1st Quarter. The highest recorded level (166 mg/l) was noted at SW4 in the 1st Quarter and 85 mg/l in Quarter 2. These were above the Licence limits of 35mg/l. The remainder of the sampling results was well with the licence limits.

Chloride: The 1989 Regulations set a limit of 250 mg/l for chloride in surface water, all monitoring results were within this limit value on both the Corranure and Lismagrattey Streams.

The highest level was recorded for **Electrical Conductivity** was 1175 $\mu\text{S}/\text{cm}$ at SW1 in the 4th Quarter. This exceeded the required limit of 1,000 $\mu\text{S}/\text{cm}$. Values ranged from 101 $\mu\text{S}/\text{cm}$ to 804 $\mu\text{S}/\text{cm}$ in all other monitoring locations over the sampling period

All of the sampling points were within the recommended standards for **Dissolved Oxygen** throughout the reporting period of the A3 standard for surface water of >30%. **Temperature** was only monitored during annual sampling and was under the recommended limit of 25°C at all monitoring locations.

An olfactory inspection of the water quality showed there was no odour evident at any time. Water quality at SW1, SW2 and SW4 was observed to be turbid and coloured during the sample period, with SW3 and SW5 clear to a straw colour.

Annual sampling of a broad range of other parameters, carried out in April 2008, showed no exceeded limits for **Calcium, Cadmium, Chromium, Copper, Lead, Manganese, Sodium, Zinc and Mercury**.

In general the results indicate a significant improvement in the water quality from the previous year, with improvement evident in BOD levels, Ammonia readings and Suspended Solid levels.

4.3.2 Biological Monitoring

In June 2008 a detailed biological assessment was undertaken on watercourses in the vicinity of Corranure Landfill. Macroinvertebrate surveys were carried out at 10 no. sites; 5 no. (A1 – A5) on the Corranure Stream and 5 no. (B1 – B5) on the Lismagrattey Stream. Drawing No. 102 Monitoring Points shows the locations of these sites (included in Appendix B).

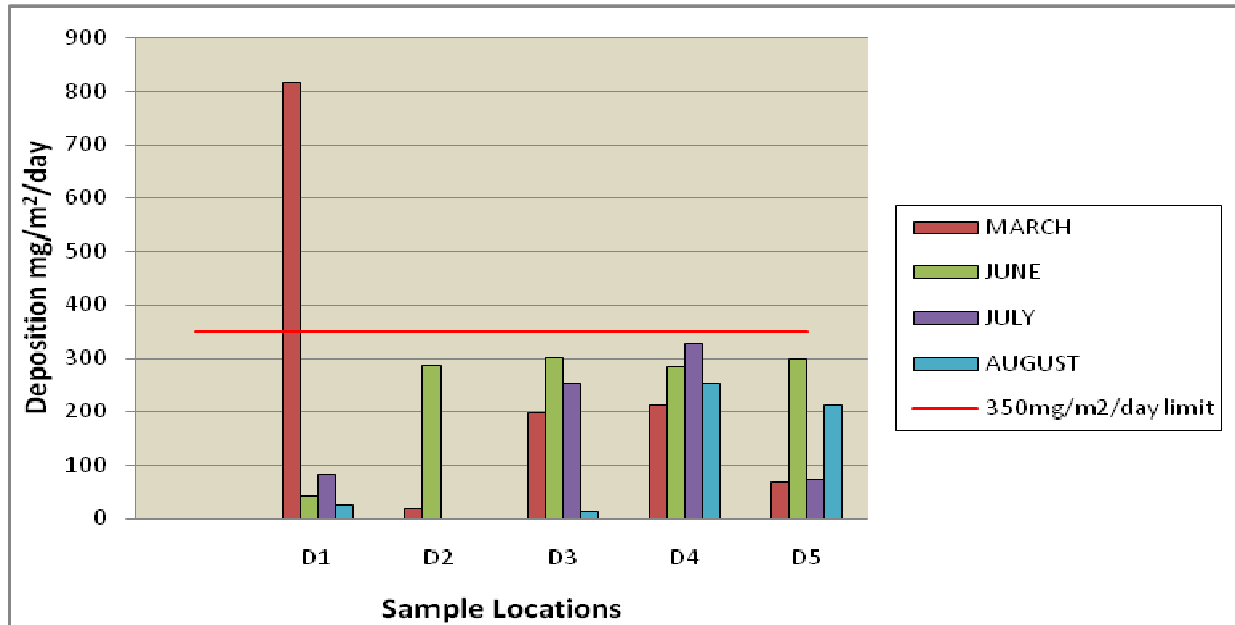
The monitoring sites A1 and B1 could not be sampled as these locations were dry. Sampling was last undertaken in 2006 at both these locations, Site A1 had a Q2 rating and a Q3 rating for site B1. Overall in comparison with the biological assessment carried out in 2007 there has been no change on the Lismagrattey stream with a Q3 rating at monitoring sites B2, B3, B4, B5. These remain a Class 3 rating (Moderately polluted).

On the Corranure stream there was an improvement at monitoring site A2 and A4 (Q2 rating in 2007) to rating of Q3 in 2008. Site A3 and A5 remained consistent to the previous year rating of Q3 and Q2 respectively.

4.4 DUST MONITORING

Dust monitoring was carried out at the landfill three times during the period June-September and once in March at the locations shown in Monitoring Points No. 102. Monitoring stations are labelled D1-D5. (An additional monitoring period was completed, with the licence requiring three times periods per year). Figure 4.2 provides a summary of dust monitoring results for 2008. The results were as follows:

- D1 is located at Cell 0 towards the Southwest corner of the site. Levels of deposition in excess of the 350 mg/m²/day limit was experienced in March (816 mg/m²/day), this was possibly due to works ongoing on the R188 roadway at this time.
- D2 is located close to the active part of the landfill. Results were not obtained for July or August sampling periods due to damage to the sample container. The results for March and June were within the licence limits of 350 mg/m²/day.
- D3 is located adjacent the site access road and wheel wash. The highest dust levels experienced at this location was 301 mg/m²/day and within the stated licence limits.
- D4 is located close to the entrance of the landfill and all results were within the licence limits.
- D5 (new sample location in 2008) is located towards the back of the site, beyond Cell 4 construction and experienced no dust results above the recommended licence limits.

Figure: 4.1 Dust Monitoring Results 2008

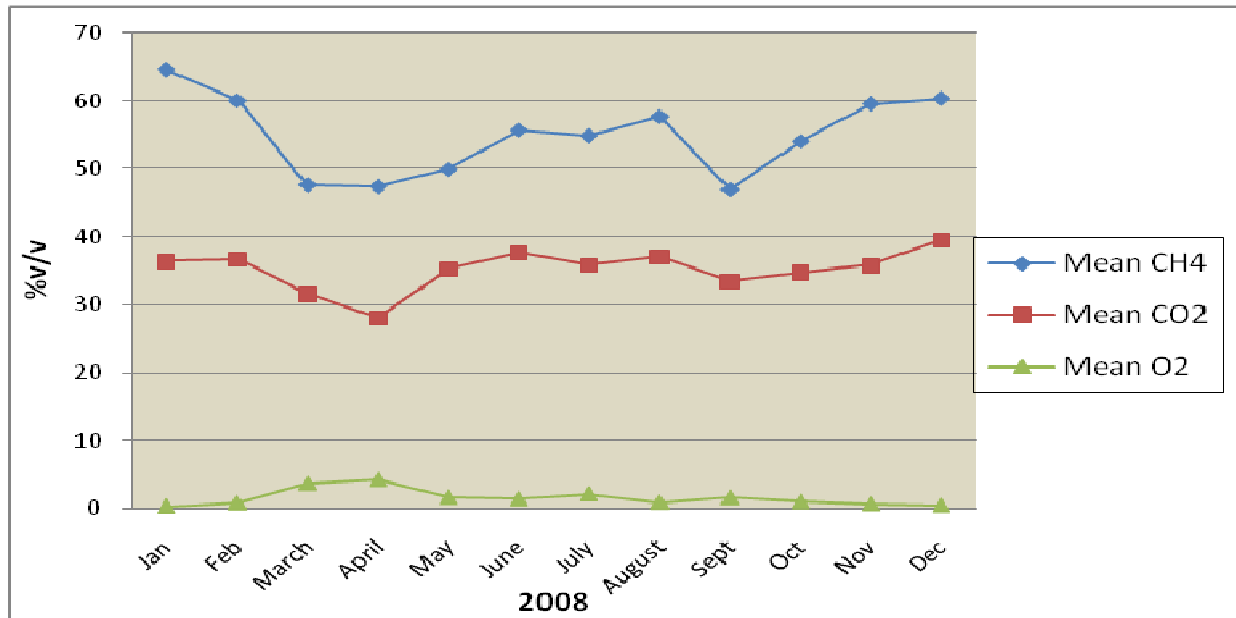
4.5 LANDFILL GAS

4.5.1 Landfill Gas

Landfill Gas monitoring was undertaken on a monthly basis at 4 no. gas extraction boreholes located within the waste body as shown on Drawing No. DG0007-01 in Appendix B. These locations are L/G01, L/G09, L/G16, L/G19. Analyses were performed on each sample for methane (CH₄), carbon dioxide (CO₂), oxygen (O₂), temperature and pressure. The quality of landfill gas varies, with methane concentrations ranging from 47%v/v to 65%v/v over the entire year. The concentration of methane is generally an improvement on the previous year, with mean methane volumes as low as 25% in 2007.

Figure 4.3 provides a summary of landfill gas monitoring from boreholes within the waste body during the reporting period.

Figure: 4.2 Summary of Mean Concentrations of Main Components of Landfill Gas Within the Waste Body



Appendix B shows the locations of perimeter boreholes used to monitor off-site gas migration. The emission limit values for off-site gas migration in the Waste Licence are 1%v/v for methane and 1.5%v/v for carbon dioxide. The monitoring locations include G01, G02, G05 and G06. Methane levels obtained during the reporting period were within the 1%v/v limit at all locations. However, carbon dioxide levels were exceeded during the reporting period on a number of occasions, at locations G01, G05 and G06 with values of up to 6.3%v/v recorded.

4.6 NOISE

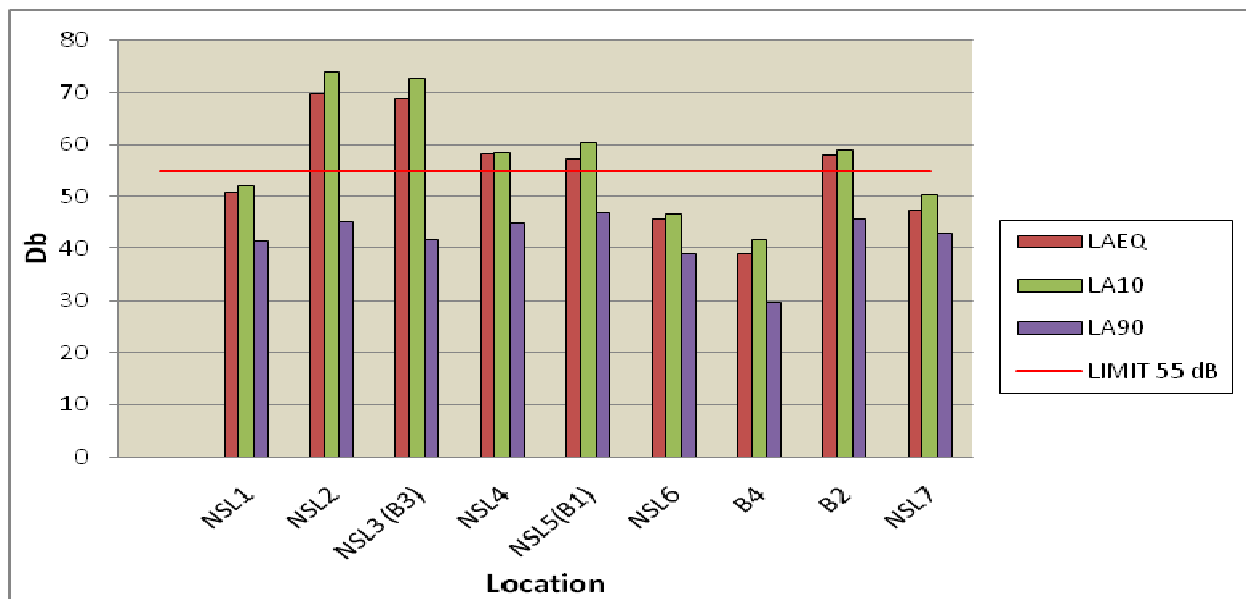
Noise monitoring was carried out at the landfill on 8th of April 2008. This monitoring consisted of 30 minute daytime levels measured at 9 no. noise monitoring points: NSL1, NSL2, NSL3 (B3), NSL4, NSL5 (B1), NSL6, NSL7, B4 and B2. The locations of these monitoring points are included in Appendix B.

The daytime limit for noise sensitive locations near Corranure Landfill, Co. Cavan is $L_{Aeq} < 55$ dB(A). L_{Aeq} noise levels at locations NSL2, NSL3, NSL4, NSL5 and B2 exceeded the daytime limit of 55 dB(A). Noise monitoring points at both NSL2 and NSL3 are located adjacent to the R188 which has significant volumes of traffic. As such, the L_{A90} values at these locations are more representative of the noise emanating from the landfill. The L_{A90} values recorded at both of

these locations were below the daytime noise limit of 55 dB(A). Figure 4.4 shows a summary of the noise monitoring results.

Monitoring Locations NSL4 and B2 are located inside the boundary of the landfill and noise emissions are from general operations on site which include internal traffic and machinery operating at the working face. NSL5 (B1) is located in the CA site and representative of internal traffic movements and site operations.

Figure 4.3: Summary of Noise Monitoring Results for 2008



Frequency Analysis (1/3 Octave band analysis) was also completed and reported in the following table. There was no evidence of any tonal or impulsive component to the noise recorded.

Table 4.6 Frequency Analysis (1/3 Octave band analysis) for 2008

Octave Band	NSL1	NSL2	NSL3 (B3)	NSL4	NSL5 (B1)	NSL6	B4	B2	NSL7
31.5	51.2	57.7	54	63.7	56.1	47.8	45.5	57.1	47
63	51.8	43.4	58.5	64.3	54.1	42	40.5	58.1	49.5
125	61.9	34.4	61.4	45.8	45.6	38.8	28.8	54.6	43
250	31	57.3	31.3	53.7	53.5	36.1	16.3	36.4	34.8
500	37.4	34.9	53.6	35.4	42.5	29.4	24.9	38.6	33.9
1K	44.9	58.5	51.1	40.4	38.8	37	31.6	38	45.3
2K	30.1	23.5	31.7	34.8	52.6	32.5	27.7	34.8	37
4K	17.4	49.2	51.4	28.9	30.4	21	19.8	26.9	32.7
8K	9.7	18.5	9.7	9.7	17.8	9.7	23.6	9.7	16.4

4.7 METEOROLOGICAL DATA

A “Davis Weather Station II” is used to record the following meteorological data at the Corranure Landfill.

- Temperature,
- Precipitation, and
- Wind speed and direction.

The following additional data is recorded at Clones Weather Station as per Schedule D of the Waste licence:

- Humidity,
- Atmospheric Pressure, and
- Evapotranspiration.

An annual summary of all meteorological data for 2008 is contained in Appendix C, this includes the monthly reports showing daily weather conditions.

5 MASS BALANCE OF SPECIFIED SUBSTANCES

5.1 RESOURCE AND ENERGY CONSUMPTION SUMMARY

A total of 251,442 kWh of electricity were used at the facility throughout the year.

Fuel usage for the year amounted to 155,832 litres.

5.2 EMISSIONS TO GROUNDWATER

There are currently no direct emissions to groundwater. The old landfill (Cell 0) is underlain by stiff clays and was designed as a dilute and disperse landfill. Cells 1 to 3 are fully lined cells with separate leachate and surface water management systems. Monitoring of groundwater and leachate showed the levels of List I and List II compounds to be within the allowable limits.

5.3 LEACHATE VOLUME

A glass-lined steel leachate tank was installed at the facility in 2006 with a capacity of 1,531 m³ and replacing the leachate lagoon as the primary leachate storage unit at the facility. Leachate is pumped via a 110mm rising main from the leachate storage tank at the facility to the current discharge point at the entrance to the Rocklands Estate and from here it flows to the Cavan WWTP. Works were ongoing in 2008 on extending the rising main to pump the leachate directly to the WWTP in Cavan Town.

In 2008 a total of 48,002 m³ of leachate was produced from Corranure Landfill. A total of 37,883 m³ was pumped directly from the landfill to Cavan WWTP. With an additional 10,119 m³ of leachate tankered by a contractor between the months of April and December 2008.

5.4 GAS VOLUMES

The rate of gas generation at a landfill site varies throughout the life of a landfill and is dependent on a number of factors including:

- The physical dimensions of the landfill site
- The types of waste deposited and the associated input rate
- The age of the waste
- Moisture content, pH, temperature and density of waste deposited and
- The application of cover, compaction and capping

Under optimum conditions one tonne of degradable waste can theoretically produce 400-500m³ of landfill gas (including moisture content). In practical terms the rate at which landfill gas may be collected for utilisation purpose may be much lower.

Currently at Corranure Landfill two 1500m³/hr enclosed landfill gas flares are operating at the site. Flare No.1 is treating ~700m³/hr of bulk landfill gas which is generated from the old landfill (Cell 0), Cell 1 and Cell 2. The 2nd Flare (Flare No.2) was commissioned in early December 2008 treating ~900m³/hr from Cell 3, prior to this a 500m³/hr flare was operating from June to December 2008. The temporary “open flare” was operational from January to June treating landfill gas generated within the active cell (Cell 3), at a rate of 300m³/hr.

It is estimated that the volume of gas treated during the year is ~10,591,935 m³/a

6 SITE DEVELOPMENT WORKS

6.1 DEVELOPMENT WORKS DURING THE REPORTING PERIOD

6.1.1 Landfill Gas Management System

- Placement of temporary capping (clay and Geo Hess lining) for Cell 3A,
- Installation of 18 no. new gas abstraction wells in Cell 3A,
- Provision of new gas management pipework from Cell 3A to the enclosed flare, 500m³/hr and subsequent 1500m³/hr flare,
- Provision of condensate management infrastructure including isolation control valves, 1 no. knock-out pot and driplegs on the main gas line.
- Repair and replace works to gas abstraction wells and pipework in the older part of the landfill,
- Installation and commissioning of new 1500m³/hr flare by Biogas to replace the 500m³/hr flare unit,
- Maintenance and upgrade works to the existing enclosed flare (Flare No.1) by Biogas,
- Training landfill management staff on the control and operation of landfill gas systems,
- Regular monitoring and dewatering of the gas collection system,
- Continual site attendance by specialist firms (Biogas, Egeplast, Hibernia Plas-fuse services),
- Installation of 17 no. additional gas extraction wells, 3 no. in Cell 0, 10 no. in Cell 1 and an additional 4 no. in Cell 2.
- Sealing /reworking of clay around gas and leachate well in both Cell 0 and Cell 1.

6.1.2 Odour Control

- Daily Odour Patrol of site and surrounds by personnel
- FID gas analyser purchased by Oxigen for daily odour detection
- Adherence to the Odour Management Plan, and

- Commissioning of independent odour monitoring reports by Odour Monitoring Ireland.

6.1.3 Leachate Management System

- Installation and maintenance of new leachate extraction pumps,
- Ongoing works to extend leachate rising main (leachate pipeline installation and commissioning) to Cavan WWTP,
- Installation of additional pump at leachate storage tank,
- Installation of dual function wellheads to facilitate gas and leachate extraction from boreholes,
- Continuous monitoring of leachate levels

6.1.4 Active Cell 3

- Installation of sacrificial horizontal gas extraction pipework,
- Temporarily capping of Cell 3A,
- Installation of 18 no. gas extraction wells,
- Development of detailed operation plan.

6.1.5 Infrastructure Works

- Construction and maintenance of access route across Cell 2 to Cell 3A,
- Installation of new 1500m³/hr flare
- Maintenance of site roads and security fencing
- Construction of Cell 4

6.2 PROPOSED DEVELOPMENT WORKS IN 2009

- Construction of Cell 4
- Extension of existing pipe work for gas extraction in Cell 3B
- Continued upgrading and modification works to gas collection pipe work

- Continued remedial and resealing works to the temporary capping system and wells in Cell 3A.
- Continual training for landfill management staff
- Continued improvements in landfill management structure to include additional staff
- Installation based on risk assessment of new perimeter Gas and Groundwater monitoring locations
- Surface water attenuation to both Corranure and Lismagratty stream.
- Installation of additional groundwater and perimeter landfill gas boreholes.
- Upgrading of site access road from weighbridge to wheel wash and maintenance of new and existing roadways

7 STAFFING AT CORRANURE LANDFILL

Table 7.1 shows the site management structure at Corranure Landfill.

Table 7.1 Site Management Structure at Corranure Landfill year end 2008

Name	Position	Date of Appointment
Paul Williams	Landfill Manager	October 2007 – October 2008
Joan Harrington	Compliance Landfill Manager	October 2007 November 2008 - present
Ludmila Klauane	Weighbridge Operator	November 2007 - present
Frank Smyth	Landfill Engineer	March 2008 - present
Dave O Malley	Site Supervisor	April 2008 - present
Karl Smith	Site Supervisor	August 2008- present

8 ENVIRONMENTAL MANAGEMENT

8.1 ENVIRONMENTAL MANAGEMENT SYSTEM

The Environmental Management System/Operations Plan for the landfill was updated in July 2007. A review has been completed of site procedures to include Waste Acceptance and Odour Patrol.

8.2 REVIEW OF OBJECTIVES AND TARGETS FOR 2008

A number of objectives and targets were outlined for 2008. Table 8.1 shows the progress made on these objectives.

Table 8.1 Status of Objectives and Targets for 2008

Objective	Target date	Status
Increase Recycling Figures - The CA site will be further upgraded to improve accessibility for the public, improved labelling and painting of containers. Additional recycling containers will be added to increase storage and provide a highly efficient recycling service.	August 2008	Completed
Provide Staff Training - Training will be provided to all Oxigen Environmental staff onsite. This will include details of the current Waste Licence and site safety and daily duties as they arise.	Continuous	Ongoing/ Completed
Increase Landfill Gas Extraction - To monitor landfill gas from Cell 3 and to combine the gas pipe network so all gas extraction is to the enclosed gas flare. This will be continuously monitored and recorded to ensure efficient gas extraction.	July 2008	Completed
To Improve Facility Infrastructure <ul style="list-style-type: none"> • To construct a tarmacadam roadway from the CA site to the wheel wash area. This will help prevent surface water runoff from the site and reduce the potential for dust emissions during the summer months. • Construct a new roadway across Cell 2 to gain access to Cell 3 for cell completion, this Cell will then be capped to the standards as specified in the EPA guidelines. 	Summer 2008	To be completed in 2009 Completed

8.3 SCHEDULE OF ENVIRONMENTAL OBJECTIVES AND TARGETS FOR 2009

Table 8.2 Schedule of Environmental Objectives and Targets for 2009

Objective	Target date
<p>Improvements to the degassing system – This will be based on odour control and quality monitoring.</p> <ul style="list-style-type: none"> • Continuing the gas monitoring in short intervals (daily, until conditions in the gas flow and quality are reached). • A flare maintenance programme be operational • Commence degassing in the open cell (Cell 3B) as soon as possible with horizontal degassing pipes connected to the extraction system. • Compiling an as build design of the degassing system (P1-Scheme) • Evaluation of the gas flow captured in relation to the theoretical gas production on basis of a specific calculation model, completion of monthly reports to the EPA. • Procedure for the active landfill gas management 	Dec '09
<p>Capping of Cell 3A</p> <ul style="list-style-type: none"> • Capping works to Cell 3A will be carefully monitored • Surveys conducted of Cell 3A for landfill settlement 	Continuous
<p>Complete the construction of Cell 4</p> <ul style="list-style-type: none"> • Completion of dig and preparation of the cell • Completion of CQA report • Monitoring of SW2 for Suspended Solids 	Dec'09
<p>Gas usage possibilities</p> <ul style="list-style-type: none"> • Complete feasibility study on utilisation of landfill gas as an energy resource • Potential for power generation as soon as practical from the site 	September 2009
<p>Provide Staff Training</p> <ul style="list-style-type: none"> • Training will be provided to all Oxigen Environmental staff onsite. This will include details of the current Waste Licence, Landfill gas management, site safety and daily duties as they arise. 	Continuous

<p>Maintenance Programmes</p> <ul style="list-style-type: none"> • Wheel wash operation, cleaning, calibration • Weighbridge operation, cleaning • Pumps maintenance-log of replacement • Flare-Operation, cleaning • Interceptor-cleaning 	On going
<p>Stock Control</p> <ul style="list-style-type: none"> • Maintain stock of all materials including geohess, pipes etc in order to carry out immediate repairs in all areas. Manage stock control and ordering of same. 	On going
<p>Site Infrastructure</p> <ul style="list-style-type: none"> • Improve site infrastructure including roadway to wheelwash, Signage at CA centre 	September '09
<p>Interaction with Public</p> <ul style="list-style-type: none"> • Programme of interaction with Local Community to include meetings (at least three per year) and letters of information 	Continuous/ on going
<p>Brown Bin Rollout</p> <ul style="list-style-type: none"> • Pre-treatment of material prior to acceptance – introduction of Brown bin locally in Cavan 	Nov '09
<p>Proposals</p> <ul style="list-style-type: none"> • Permanent Capping in Cell 3A • Surface water management for Cell 4 	Dec '09

8.4 REVIEW OF NUISANCE CONTROLS

Environmental nuisances are monitored on site inspection and recorded on either daily or weekly site inspection forms.

8.4.1 Vermin

The objective of the vermin control programme at Corranure Landfill is to make 'food' sources inaccessible and living conditions as unattractive as possible. The following landfill procedures are implemented as mitigating measures against vermin and pests:

- The tipping face is kept as small as possible,
- Waste is compacted with a high tonnage steel wheel compactor,
- The tipping area is covered every evening with inert cover material,
- All other areas except the tipping area are covered with 300mm of soil, and
- Contracted rodent control programme by Rentokil, which service the baits every six weeks.

8.4.2 Birds

As for vermin and fly control the objective of the bird control programme at Corranure Landfill is to make 'food' sources inaccessible and living conditions as unattractive as possible. The following landfill procedures are implemented as mitigating measures against birds:

- The tipping face is kept as small as possible,
- The waste is compacted with a high tonnage steel wheel compactor, and
- The tipping area is covered every evening with inert cover material

Bird Control Ireland (BCI) Ltd. and Avian Bird Control (December) was appointed to operate a bird control programme at Corranure, this is completed in conjunction with site personnel, bangers, squawkers and helium balloons.

8.4.3 Flies

The following landfill procedures are implemented as mitigating measures against flies and insects:

- The tipping face is kept as small as possible,
- Waste is compacted with a high tonnage steel wheel compactor,
- The tipping area is covered every evening with Clay cover material,
- Appropriately covered waste lorries on site, and

- Application of insecticide on tipping area, offices, machinery and residents' houses as appropriate during fly season.

8.4.4 Dust

The following landfill procedures are implemented as mitigating measures against dust:

- Prevention of dust nuisance in dry weather by spraying site roads and other areas used by site vehicles with water, and
- Prevention of dust nuisance by appropriate maintenance of clay stock pile on site

8.4.5 Mud

The following landfill procedures are implemented as mitigating measures against mud:

- All lorries / tractors must use the wheelwash facilities on leaving the tipface.

8.4.6 Odours

The following landfill procedures are implemented as mitigating measures against odours:

- The tipping face is kept as small as possible,
- The waste is compacted with a high tonnage steel wheel compactor,
- The tipping area is covered every evening with inert cover material,
- Appropriately covered waste lorries on site, and
- Landfill gas is captured where possible and all flares are permanently monitored..

8.4.7 Litter

On a day to day basis litter management on site includes the following:

- The working face is enclosed by 6-metre high litter fencing,
- Litter trapped in the netting is removed as soon as practicable,
- Litter on or in the vicinity of the facility is removed, subject to the agreement of the landowners, immediately and in any event by 10.00am of the next working day after such waste is discovered or reported,
- A Landfill Operative carries out the active management of litter on site,
- All waste deposited at the working face is compacted using a steel wheeled compactor, and
- The working face is covered with suitable material at the end of the day.

9 REPORTS ON FINANCIAL PROVISIONS

Oxigen Environmental Ltd. Official Estimates make an annual allowance for financial provision as required under Condition 13.2 of the Waste Licence Ref. WL0077-02.

10 STATEMENT OF CHARGES AND COSTS OF LANDFILL

The Landfill fee in January to July 2008 was €115 per tonne including a €15 levy, the levy was increased to €20 per tonne in August 2008.

11 REPORTED INCIDENTS AND COMPLAINTS SUMMARY

11.1 REPORTED INCIDENTS

There were 69 incidents reported by Oxigen between January and December 2008 in relation to odour. In addition a total of 39 odour incidents were recorded by Joe Hunter of the EPA in December. A dust incident was recorded in March, and the auger broke in December on drilling of a well and this was recorded an incident. Also a surface water incident was reported in December for ammonia levels in SW1. In total, 111 incidents are on record for 2008.

11.2 COMPLAINTS RECEIVED

A total of 64 complaints were received to Corranure landfill in 2008. Most complaints received relate to odour at the landfill. Some were for odour from the sewer system. Six complaints, from one complainant, were in relation to odour as well as birds and litter. 18 additional odour complaints were recorded by Joe Hunter of the EPA in December and 12 of these were reported as non-compliances with the licence. Additional complaints were made to the EPA offices and these are recorded and filed at the site also.

11.3 ACTION TAKEN

Complaints received to Corranure Landfill and incidents were recorded, EPA complaints received are also recorded and kept on file, the complainants were contacted and remedial measures put in place (refer to Section 6.1 for details of measures put in place to combat odour problems).

12 TOPOGRAPHICAL SURVEY

A topographical survey was completed in May 2008. This is included in Appendix D.

13 SLOPE STABILITY

An assessment was completed in February 2008. In general the side slopes of the existing landfill are in good condition and well vegetated. However, some localised over-steeping of the northwest slope of Cell 2 and parts of Cell 3. The slopes are checked periodically for leachate seepage and/or slope movement.

APPENDIX A

Monthly Breakdown of Landfilled waste

APPENDIX B

Location Map of Monitoring Points

No.102

APPENDIX C
METEOROLOGICAL DATA

APPENDIX D
TOPOGRAPHICAL SURVEY

APPENDIX E

PRTR Emissions Data