



**RAFFEEN CIVIC SITE AND LANDFILL  
CORK COUNTY COUNCIL,  
RAFFEEN,  
MONKSTOWN,  
CO. CORK**

**ANNUAL ENVIRONMENTAL REPORT  
2010**

**WASTE LICENCE NO. W0023-1**

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### APPENDIX-

#### ➤ NOISE SURVEY 2010

#### Attachments – Maps Drawings 1-3 of Raffeen CA Site and Landfill

- Drawing 01 - Location Plan Showing Environmental Monitoring Points 2010
- Drawing 02 – Location Plan Showing Gas & Leachate Extraction Points 2010
- Drawing 03 – Site Plan Showing Final Capping Levels and Details 2010

## **ANNUAL ENVIRONMENTAL REPORT & ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

### **1.0 INTRODUCTION**

#### **1.1 Background**

Raffeen Landfill site is operated by Cork County Council under Waste Licence W0023-01. This waste licence register number was assigned by the Agency in July 2006 and replaces the old numbering format (23-1). The landfill is situated approximately 10 km south east of Cork City and approximately 2km south west of Monkstown. (National Grid Reference 1751E 0654N). The site is located adjacent to Monkstown Creek and the southern boundary of the site is located 100m to the north of the edge of the Cork Harbour Estuary. The landfilling of waste at the site took place between 1979 and October, 2001. The civic amenity centre has been open to the public for recycling and disposal since late January 2005. This report covers the period from 1<sup>st</sup> January, 2010 to 31<sup>st</sup> of December, 2010.

The site occupies an area of 7.25 hectares and is located in the centre of a narrow, steep sided valley to the west of a quarry. It is estimated that in the region of 580,300 tonnes of waste has been landfilled at the site. Quarrying was carried out prior to the commencement of landfilling operations at the site. The landfilling of waste has taken place and resulted in the formation of a steep sided valley. The existing contours at the site range in height from 10mOD in the south eastern corner of the site to 72.5mOD in the north western corner. The contract for final restoration of the site commenced in March 2005 and was completed in 2007. The new civic amenity centre has been open to the public since late January 2005.

The Waste Licence (Register Number W0023-1) for the site was issued on 24<sup>th</sup> May 2001. The purpose of this Annual Environmental Report (AER) and Environmental Management Programme Report (EMP) is to summarise the interaction of the Raffeen Landfill Facility with the local environment during the monitoring period.

Due to the considerable overlap between the required content of both the AER and the EMP reports, as outlined by the Agency in the "Draft Guidance On Environmental Management Systems & Reporting to the Agency" and the content specified in Schedule A and B of the Waste Licence, the two reports have been combined to form this (one) submission. The guidance notes indicate that the Environmental Management Programme Report is a sub section of the Annual Environmental Report.

## 1.2 Management and Staffing Structure of the Facility

The site is operated by Cork County Council, County Hall, Cork and is under the overall operational control of Mr. Liam Singleton, Senior Engineer, Cork County Council. Mr. Jerome O'Brien, Senior Executive Engineer is responsible for landfill operation and aftercare in South Cork, while Mr. Enda Kiernan, Executive Engineer is responsible for the management of the civic amenity centre.

Ms. Lisa Collins is Manager of Raffeen Civic Amenity Site and is responsible for the day to day supervision and management. Mr. Jerome O'Brien and Mr. Enda Kiernan act as Assistant Facility Managers and provide holiday, sick cover, etc., in Ms. Collins' absence. Table 1.1 shows the management structure at Raffeen Landfill during 2010. Table 1.1: Management Structure

Position	Employee Contact Details
Senior Engineer Mr. Liam Singleton  Executive Engineer – Civic Amenity Site Mr. Enda Kiernan  Deputy Managers:  Mr. Jerome O'Brien Mr. Enda Kiernan	Cork County Council, County Hall, Carrigrohane, Cork.  Telephone No: 021 4276891 Fax No: 021 4859786/7
Manager Raffeen CA Site, Ms. Lisa Collins  Manager Raffeen Landfill, Mr. Jerome O'Brien	Cork County Council, Raffeen Recycling Centre & Landfill Site, Raffeen, Kerrycurrihy, Monkstown, Co. Cork  Tel No: 021 4842082 / 4859350 Fax No: 021 4859787  Out of Hours Emergency Contact Tel No.: 021 4271551

Three General Operatives are employed at the civic amenity centre: Mr. John Hallihan, Mr. William McCormack and Mr. Conor Galvin. The General Operatives are responsible for the implementation of the waste acceptance procedures at the site, inspection of all loads arriving at the civic amenity centre and ensuring materials are placed in the correct receptacles. One general operative is based in the reception building/weighbridge adjacent to the site entrance during site opening hours.

Table 1.2 shows the operational staff currently employed at Raffeen Civic Amenity Centre. Any changes to this structure will be submitted by the Facility Manager for agreement to the EPA as per Condition 2.6.1 of Waste Licence Reg. No. W0023-01.

**Table 1.2: Operational Staff (Currently on Site)**

<b>Employee</b>	<b>Position</b>	<b>Duties and Responsibilities</b>
Mr. John Hallihan	General Operative	Inspect all loads arriving at civic amenity centre.
Mr. William Mc Cormack	General Operative	Ensure materials are placed in correct receptacles.
Mr. Conor Galvin	General Operative	One General Operative is based in the reception building/weighbridge adjacent to the site entrance during site opening hours.

## 2.0 WASTE MANAGEMENT ACTIVITIES AT THE FACILITY

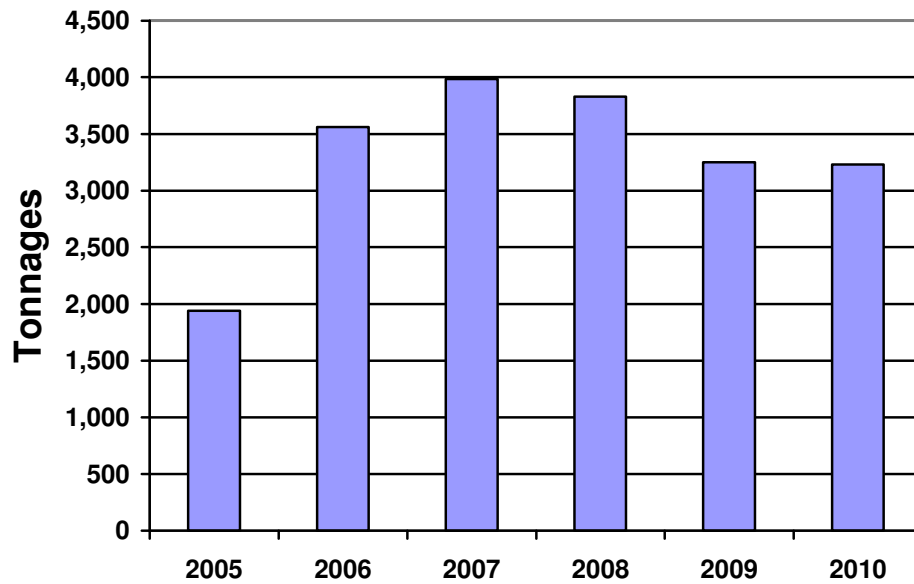
### 2.1 Waste Quantities and Composition

The landfilling of waste is reported to have taken place at Raffeen Landfill site since circa 1979. It is estimated that a total of 580,300 tones of waste has been landfilled at the site to date. No municipal waste has been accepted for landfilling at the site since 1<sup>st</sup> October, 2001. Final capping at Raffeen Landfill was completed in 2007.

The civic amenity centre has been open to the public since late January 2005. The civic amenity centre accepts:-

- Paper, newsprint, magazines
- Cardboard and Tetra Paks
- Glass bottles and flat glass
- Food tins
- Beverage/drink cans
- Plastic bottles
- Polystyrene
- Timber
- Green waste
- Scrap metal
- Aerosols
- Paint
- Textiles/reusable clothes
- Waste cooking oil
- Waste engine oil
- Empty gas bottles
- Lead acid, fence, and household batteries
- Fluorescent tubes and energy saving light bulbs and filament bulbs
- Waste electrical and electronic items including fridges and freezers
- Mobile phones
- Household construction and demolition waste (from April 2007 only rubble and ceramics are accepted).
- Printer cartridges

The quantities of materials (tonnes) collected for recycling during 2010 are outlined in Table 2.2. A total of 3,230.66 tonnes of materials were collected for recycling during 2010. Figure 2.1 compares previous years.



**Figure 2.1: Tonnages of Recyclables Accepted at Raffeen CAS**

Residual waste from domestic sources is also collected at the Raffeen Civic Amenity Centre. A total of 1580.36 tonnes of residual domestic waste was collected and disposed of in 2010. This compares with:

- 1,709.36 tonnes in 2009
- 2,036 tonnes in 2008
- 2,154 tonnes in 2007
- 1,573 tonnes in 2006
- 1,717 tonnes in 2005

For the majority of the year all this material was disposed of at Youghal Landfill. In July 2010, as part of the implementation of the EU Landfill Directive, bagged waste from the facility was sent to the Greenstar facility in Glanmire in order to pre-treat the waste prior to disposal at landfill. A total of 300.04 tonnes were sent to this facility. Street sweepings from litter bin collections, fly tipping and other works carried out by the Carrigaline and Ballincollig Area Office amounted to a further 302.28 tonnes.

Mobile phones are recycled by the Jack and Jill Foundation Charity. Stamps are given to the Guide Dogs for the Blind Charity. Re-saleable books, videos and DVDs are collected by Oxfam.

2010	January	February	March	April	May	June	July	August	September	October	November	December
Aerosol Containers	0	0	0	0	0	0	0	0	0	0	0	0
Beverage Cans	0.28	0.3	0.04	0.6	0.4	0.44	0.2	0.26	0.26	0.1	0.24	0.26
Cardboard	13.86	7.8	10.78	11.12	7.1	12.74	11.54	4.24	12.98	8.72	9.6	6.84
DIY Waste	25.94	24.8	61.72	76.24	59.82	88.96	66.12	59.76	79.86	50.58	59.86	25.92
Fluorescent Tubes	0	0	0	0	0	0	0	0	0	0	0	0
Food Tins	0.6	0.72	0.78	0.6	0.66	0.66	0.7	0.38	0.7	0.46	0.64	0.28
Glass Bottles	16.06	5.88	7.22	7.52	7.26	6.04	9.14	10.48	6.76	7.72	3.62	8.26
Green Waste	22.6	42.96	64.22	101.54	105.14	141.92	119.26	104.8	94.54	75.5	56.48	13.32
Household Batteries	0	0.32	0.12	0.18	0	0	0	0.08	0.2	0	0.12	0
Lead Acid Batteries	0.76	1.32	0.8	0.88	0	0	0.88	0.92	0.12	0	0.88	0
Magazines & Paper	11.2	14	15.4	13.66	23	14.6	14.16	13.56	16.38	13.08	6.6	12.88
Paint	0.78	1.4	0.94	1.96	0.98	1.9	2.06	2.64	1.58	2.36	0.42	1
Plastic Bottles	2.98	2.46	3.28	3.28	3.62	3.12	3.38	3.24	2.72	2.4	3.04	2.36
Plate Glass	1.24	3.46	1.62	3.88	0	4.42	3.16	3.86	5.62	0	4.56	0
Plaster Board	0	0	0	5.5	2.74	1.4	3.9	3.9	5.1	2.88	0	6
Polystyrene	0.58	0.38	0.46	0.4	0.38	0.34	0.52	0.22	0.44	0.36	0.48	0.34
Scrap Metal	12.62	18.32	21.38	24.64	22.86	19.68	20.38	16.78	16.84	18.1	9.74	8.14
Textiles	2.82	2.04	3.12	2.82	2.84	3.34	3.04	3.1	2.72	2.14	2.12	0.7
Timber	32.88	44.16	0	51.08	63.38	51.02	59.4	45.84	53.32	43.06	45.53	25.8
Waste Cooking Oil	0.38	0.22	0	0.54	0	0	0	0	0	0	0	0
Waste Engine Oil	0	0.96	0	0	1.3	0	0	1.06	0	0.92	0	0
Totals	171.38	193.46	216.56	348.74	330.9	375.37	355.12	300.4	332.48	255	227.19	124.06

**Table 2.2:  
Raffeen Civic  
Amenity Centre  
Recycling  
Records 2010**



### 3.0 SITE DEVELOPMENT WORKS

The following subsections describe the current and proposed future works at the site. The contract for the final restoration of the site commenced in May 2005 and is now complete. This contract involved the installation of the final capping, the gas abstraction system and the leachate abstraction system.

The works completed during 2010 include the completion of the:-

- Landscaping planting was undertaken to replant some species
- Re-design of site traffic markings as a result of installing entry and exit barriers

#### 3.1 Final Capping

The final capping comprises of a five layer composite system as detailed in Table 3.1 and as shown on Drawing No. 03. There are three versions of capping detail placed, two in areas of native tree planting (a version for flat and sloped areas) and one to be used in all other areas. Re grading works were required in most areas prior to the placement of the final capping in order to achieve the required slopes/gradients. The installation of the final capping works commenced in May 2005 and was completed summer 2007. The final capping levels are shown on Drawing No. 03.

**Table 3.1: Final Capping Composition**

Component	Flat Areas with Native Tree Planting	Sloping Areas with Native Tree Planting	All Other Areas
1. Topsoil	300 mm	300 mm	150 mm
2. Subsoil	700 mm silty sandy gravel	300 mm silty sandy gravel	300mm silty sandy gravel
3. Drainage Layer	500 mm coarse gravel	300 mm coarse gravel	Geosynthetic
4. Barrier Layer	GCL Geotextile Protection Layer	GCL Geotextile Protection Layer	GCL Geotextile Protection Layer.
5. Gas Collection Layer	Geosynthetic	Geosynthetic	Geosynthetic
Thickness	1.5m	0.90m	0.45m

### 3.2 Leachate Management Infrastructure

The leachate management infrastructure is 100% installed. All the pipe work, level sensors and compressor are installed. The power supply was installed by the ESB in December 2007. During 2010 leachate was tankered from Raffeen Landfill to Carrigtwohill Waste Water Treatment Plant. The total quantities removed from site were 707.04 tons. The table below shows the tonnage per month of leachate tankered from the site in 2010.

Month	Tonnage
Jan	52.84
Feb	248.42
May	106.06
Jun	15.34
Jul	10.04
Aug	136.54
Nov	137.8
Total	707.04

### 3.3 Landfill Gas Management Infrastructure

The installation of the active gas abstraction system is completed. This is part of the Final Restoration Contract. The system comprises of gas abstraction wells within the waste body, condensate removal traps, gas abstraction wellheads and gas collection pipework. The permanent gas collection pipework is located within the subsoil layer of the final capping. The gas abstraction wells are composed of 300mm diameter boreholes. The installation of the gas abstraction wells was undertaken by a specialist sub contractor.

All gas abstraction boreholes (50 No. in total of which 10 No. are combined leachate and gas abstraction boreholes, and as shown on Drawing No. 02) were in place by late August 2006 with additional boreholes requested by the EPA in the central area of the landfill.

The flare compound was completed in June 2007 and is located in the area to the north of the Civic Amenity Centre west of the Loftus Quarry. This location was selected in order to locate the flare compound as far as possible from existing houses in the area and in as low-lying an area of the site as possible to facilitate condensate removal. Within the Flare Compound, a partial vacuum shall induce a pressure gradient towards the abstraction wells and control the lateral movement of gas. An electrically driven centrifugal blower shall induce this vacuum. The extracted gas is flared to control emissions to atmosphere of methane and volatile organic compounds.

Gas pumping trials were carried out during the summer of 2007. The outcome of the trials determined that a 150cum/hr enclosed flare would be required for the site. The flare was delivered to site in April 2008 and commissioned by July 1st 2008. AFS serviced the flare and carried out maintenance throughout 2010.

### **3.4 Landscaping**

The Final Restoration Contract included a programme of landscaping. The planting includes the development of areas of native woodland (30,935m<sup>2</sup>), native scrub (27,125m<sup>2</sup>), wildflower meadow (1,345m<sup>2</sup>) and native hedgerow (1,000 m<sup>2</sup>) planting. Existing hedgerows were maintained where possible. The planting of trees took place on the flatter portions of the site to create areas of native woodland. On the sloping sections of the site scrub areas were developed. A wildflower meadow was created on the existing haul road, along the eastern side of the site north of the existing site entrance. It is considered that the planting scheme will re-establish native woodlands and scrub habitats that reflect the character of existing habitats and provide a wildlife corridor between existing fragmented habitats. The planting has taken into account the provision of a diverse range of habitats, which include aquatic, marsh, meadow, hedgerow, scrub and woodland. The landscaping provides an attractive backdrop to the civic amenity centre. The landscaping works commenced following the completion of the final capping, and installation of pipe-work for the leachate abstraction system and gas abstraction system. The landscaping contract was completed by mid April 2008.

### **3.5 Access Roads and Paths**

The gas flare compound is located on the northern boundary of the civic amenity centre. Access to the gas flare compound will be from the civic amenity centre. As part of the Final Restoration Contract, pedestrian pathways have been incorporated to provide access around the site to the environmental monitoring points.

### **3.6 Road Resurfacing**

The road outside the facility was resurfaced during mid May 2008. Site traffic markings were re-lined in early 2010. This ensured that the public and collection vehicles are not using the same exit.

### **3.7 Slides on the Compost Skip Railings**

'Slides' were re-ordered in late 2010 to replace original one that have become worn on the compost skip railings to facilitate easier emptying of green waste bags into the skip for the public.

### **3.8 Stream Diversion**

Surface water from a quarry immediately to the east of the landfill had been entering the site. The quarry owner diverted this discharge to prevent it entering the landfill site during January 2008. Within the site the upper end of the stream diversion was relined to prevent surface water entering the body of the landfill.

### **3.9 Environmental Monitoring Locations**

Drawing 01 shows an updated environmental monitoring locations map. Due to access difficulties SW1 has always been and continues to be monitored downstream of the Kennels while GW1 is located within the Kennels boundary. GW1 is monitored when access is permitted by the owners.

For clarity, all monitoring results labelled as SW2 submitted to the EPA as part of quarterly monitoring requirements since early 2004, when the stream diversion was completed, have been taken at SW2A. SW2A is located at the discharge point from the 'new culvert' that was constructed to pipe the stream through the site. SW2 is located at the discharge point from the 'old culvert'. Both SW2 and SW2A continue to be monitored (as requested by the EPA since 2006). In addition to these monitoring points at the estuary, a further monitoring point, also in the estuary, SW2B was added at the request of the EPA during 2007. SW2A and SW2B also take runoff from the surface water drain from Loftus and discharges from a number of houses close by.

SW5 collects surface water runoff from the capping, which is discharged into the new culvert (SW2A), which in turn discharges into the estuary. SW5 has been monitored since 13th December 2006.

Groundwater monitoring location GW7 to the north of the existing landfill was covered during September 2005. However GW1 to the north of the site is a good indication of groundwater quality up-gradient of the site.

GW8 was installed on 11 May 2007 to provide a groundwater monitoring locations down gradient of the landfill and monitoring of this groundwater well has been carried out since June 2007.

G & L11 (GW4) and G & L12 (GW6) have replaced G & L2 and G & L5 as leachate monitoring boreholes. These monitoring boreholes were drilled originally as groundwater monitoring boreholes but were re-classed as leachate monitoring boreholes on the instruction of the EPA.

The gas collection system with permanent flare has been commissioned since July 2008.

Three temporary modified boreholes (GM11, GM12 and GM13) were installed early in June 2006 at the closest location to the nearest private dwelling to the south of the landfill. They were placed at a depth of 1.8 m from the surface in a private field between the landfill and the dwelling. This is located in the same enclosure as GM10 but along the opposite fence. Due to the fact that GM10 is at a depth of 6.66 m it was deemed necessary to install deeper permanent gas migration monitoring boreholes. These were drilled in July 2006 within 1.5 m of the temporary modified boreholes. Approximate depths are given in the table below:

Gas Migration Borehole	Location	Depth (m)
GM11(A)	Top of field, furthest from road	9.0
GM12(A)	Middle of field	9.0
GM13(A)	Bottom of field, closest to road	4.5

Table 3.2: Approximate Depth of Permanent Gas Migration Monitoring Boreholes

These permanent gas migration monitoring boreholes were installed to replace the temporary modified boreholes GM11, GM12 and GM13. The new wells are labelled GM11A, GM12A, and GM13A and were placed within 1.5 m of the temporary boreholes. Caps and valves were fitted and monitoring of these boreholes has been carried out on a weekly basis since the end of April 2007 to June 2009. Monitoring continued on a daily basis at GM10 until October 2007 when it was necessary to replace the monitoring of this borehole with the three other permanent wells in the same enclosure.

## 4.0 EMISSIONS

### 4.1 Management of Emissions

Cork County Council is committed to ensuring that any emissions from the previous deposition of waste at Raffeen Landfill Site, and related activities will not result in the contravention of any relevant standard, including any standard for an environmental medium or any relevant emission limit value, prescribed under any other enactment.

Cork County Council is committed that the restoration of Raffeen Landfill and the operation of the civic amenity centre shall be carried on in accordance with such conditions as may be attached to the licence and will not cause environmental pollution.

Cork County Council shall use the best available technology to prevent or eliminate or, where that is not practicable, to limit, abate or reduce an emission from the activity concerned.

The environmental monitoring programme at the facility during the reporting period included monitoring of landfill gas, leachate levels and composition, groundwater, and surface water. The monitoring frequencies required by the Waste Licence and subsequent correspondence with the EPA are outlined in Table 4.1. The potential emissions from the site include dust, leachate and landfill gas are discussed in the following sections.

**Table 4.1: Summary of Required Monitoring Frequencies**

Parameter	No. of Locations	Monitoring Frequency
Groundwater Quality	6	Monthly, Quarterly & Annual
Surface Water Quality	5	Quarterly & Annual
Surface Water Inspection	4	Weekly
Leachate Composition	5	Quarterly & Annual
Landfill Gas Composition	6	Monthly
Landfill Gas Site Office	1	Continuously
Gas Monitoring Points	4	Weekly
Leachate Levels	5	Weekly
Groundwater Levels	7	Monthly
Dust Monitoring	3	3 times a year
Noise Monitoring	7	Annual

An Oliver IGD Tocsin 700 Gas Monitor was installed in the offices to continually monitor levels of methane, carbon dioxide and oxygen. This is serviced by CEMS 6

## 4.2 Dust

Raffeen Landfill site is no longer accepting waste for landfilling. Landfilling ceased in October, 2001. Construction activities were not undertaken at the site during this reporting period.

Potential dust generating activities at Raffeen are:-

- Vehicle movements on the un-surfaced haul roads within the landfill site.

The dust deposition limit is 350 mg/m<sup>2</sup>/day for a 30 day composite sample. Dust monitoring was carried out at three locations points (D1 – D3) at the site boundaries of the landfill site during 2010. The monitoring results were well within the emission limits value of 350mg/m<sup>2</sup>/day permitted in the waste licence for the facility.

Monitoring Location	Date	No. Of Days Collecting	Total Dust Mass** (mg)	mg/m <sup>2</sup> /day*
<b>Event 1</b>	June 2010			
D1	09/06/2010	35	38.9	187.0
D2	09/06/2010	35	6.4	30.8
D3	09/06/2010	35	1.9	9.1
<b>Event 2</b>	Jul 2010			
D1	July	31	20.7	112.3
D2	July	31	23.3	126.4
D3	July	31	15.6	84.7
<b>Event 3</b>	Sept 2010			
D1	28/09/2010	35	26.4	126.9
D2	28/09/2010	35	19.4	93.2
D3	28/09/2010	35	59.7	286.9

**Table 4.2.1 – Dust Results Record at Raffeen CA Site 2010**

A wheelwash was installed in the Civic amenity centre to reduce the quantity of mud and debris taken off site and therefore reducing the generation of dust emissions on the adjacent public road. During 2010 the facility manager organised for road sweeping to be undertaken as necessary by Cork County Council personnel for the machinery yard. Due to the final restoration of the site being completed, it is not anticipated that there will be any further movement of heavy vehicles within the landfill site

## 4.3 Noise

A noise survey was carried at the landfill in accordance with the requirements of Schedule E and Table E.3.2, Schedule F.1 on the of June 2010. All locations were within the limits as set out in the Waste Licence. Three monitoring points recorded figures a little in excess of the waste licence limits but not as a results of noise from the site but from other external elements. N2 & N5 showed a result of 58dBA due to the traffic from the nearby road and also a house alarm that that was going off at the time. N3 showed a result of 57dBA due to an aircraft flying over head during the survey and also traffic from the nearby road. All other recordings were lower than the limit of 55dBA as directed by of the Waste Licence. The report by the DixonBrosnan Ltd is contained in the appendices.

## **4.4 Odour and Aerosols**

### **4.4.1 Odour**

Potential for odour emissions has significantly reduced since municipal waste is no longer landfilled at the site. It is still accepted but placed in either a closed container (hopper with compactor attached), or in an open skip. There is potential for odours arising from this open skip, but this has not occurred as the open skips containing municipal waste are removed for landfilling almost every day.

The installation of an active gas abstraction system and flare controls the volume of gas being produced at the site and reduces the potential for malodours occurring from gas venting. The gas flare was installed in April 2008 and commissioned by July 2008. The permanent flare was in operation during 2010.

A weekly inspection of the Civic Amenity Centre is conducted. Odours were not found to be a nuisance during any of the site inspections of the civic amenity centre during the reporting period. Collection bins and skips in the civic amenity centre will be washed to prevent the generation of malodours should it be required.

### **4.4.2 Aerosols**

Aerosols are defined as fine particulate material water droplets and microbial emissions from activities carried out at the landfill. Within landfill sites sources typically include re-suspension of fine material by wheel action of vehicles and fugitive emissions from tipping and distribution of waste. Monitoring for the presence of aerosols has not been undertaken at the site as it is not required by the Waste Licence and landfilling activities have ceased at the site. There is very little potential for aerosol generation from tipping of waste within the civic amenity centre.

## **4.5 Landfill Gas**

### **4.5.1 Landfill Gas Monitoring**

Monitoring of the composition of landfill gas was undertaken at eleven gas monitoring locations within and in the vicinity of the landfill site during the reporting period. The current monitoring points are G & L1, G & L3, G & L4, GM 6, GM 7, GM 9, G & L11, G & L12, GM11A, GM12A and GM13A and the site office. Temporary monitoring points GM11, GM12 and GM13 were replaced by monitoring points GM11A, GM12A and GM13A, respectively in April 2007. Monitoring points GM11A, GM12A and GM13A comply with EPA requirements for monitoring well construction specifications.

During 2010 it has not been possible to access all of the monitoring points as monitoring points G & L2, G & L5 and G & L8 were damaged as a result of construction activities taking place at the site in 2005. It should not be necessary to replace G& L2 or G& L5 as monitoring locations G & L11 (GW4) and G & L12 (GW6) will monitor the gas composition within the waste body. G & L8 is replaced by the newly installed gas extraction boreholes. Monitoring was discontinued at GM10 on the 22nd of October 2007 as the three monitoring points GM11A, GM12A and GM13A installed in April 2007 are sufficient to monitor gas migration to the south of the landfill. The results from the 2008 monitoring have been compared to the results for 2000, 2001, 2002, 2003, 2004, 2005, 2006 and 2007 to determine if there are any trends.

Monitoring is undertaken on a monthly frequency at six of the monitoring boreholes; G & L1, G & L3, G & L4, GM6 (G & L6), G & L11 (GW4) and G & L12 (GW6). At the request of the EPA monitoring is undertaken on a weekly frequency at the site office and at monitoring locations GM7 (G & L7), GM9, (G & L9), GM 11A, GM12A and GM13A. Monitoring was discontinued at GM10 on the 22nd of October 2007 as the three monitoring points GM11A, GM12A and GM13A installed in April 2007 are sufficient to monitor gas migration to the south of the landfill.

An Oliver IGD Tocsin 700 Gas Monitor continually monitors gas levels in the site office. In the event of monitoring indicating that the concentration of methane exceeds 1% v/v or the concentration of carbon dioxide exceeds 1.5%. The Facility Manager will inform the licensing authority immediately. No methane has been detected within the site office to date and carbon dioxide levels are well within acceptable levels.

### **Landfill Gas Flare**

The permanent gas flare was in operation during 2010. The average percentage for methane, oxygen and carbon dioxide gas burned on the site were in the region of 29.3%, 1.8% and 21.9% respectively. Gas field balancing is carried out on site when required. The results are relayed to a PC in the main office building. The total landfill gas results Raffeen Landfill for 2010 were 254,500cu.m.

## **4.6.0 Groundwater Monitoring**

### **4.6.1 Scope of works**

During 2005 the EPA requested that any groundwater monitoring locations within the waste body (GW4-now G & L11 and GW6- now G & L12) be classed as leachate monitoring locations. As a result there are now six groundwater monitoring boreholes at Raffeen Landfill Site to date (GW1, GW2, GW3, GW5, GW7 and GW8) of which two are damaged and no longer in use (GW3 and GW7).

Monitoring boreholes GW1, GW2 and GW5 are located outside the landfill boundary. Monitoring boreholes GW3 and GW7 were located within the landfill boundary. GW8 was installed in May 2007 in order to monitor the groundwater down gradient of the site, outside of the waste body. During 2010 groundwater quality was monitored as per the EPA monitoring requirements at monitoring locations GW1, GW2, GW5 and GW8. Groundwater quality within and in the vicinity of the landfill site is monitored for various parameters on a monthly, quarterly and annual basis. Groundwater levels are monitored on a monthly basis.

Results are compared with the Interim Guideline Values (IGV's). It should be observed that it has been noted that recorded concentrations for certain parameters are lower than the method detection limit. Where this is the case the concentration is illustrated as the detection limit on the corresponding tables.



#### 4.6.2 Groundwater metal concentrations monitoring

Monitoring of the ground water at the various locations indicates that the level of metals tends to be within the IGV for groundwater. Historically iron and manganese concentrations have been above the IGV, results from 2010 annual monitoring schedule indicate that they are within the limits.

There are no recorded results for GW 1 due to any access to the bore hole well.

Parameter	Total Chromium (mg/l)	Cadmium (mg/l)	Cyanide (mg/l)	Mercury (mg/l)	Iron (mg/l)	Manganese (mg/l)
IGV limit	0.03mg/l	0.005mg/l	0.01mg/l	0.001mg/l	0.2mg/l	0.05mg/l
Monitoring location						
GW 2	0.02	<0.0035	<0.001	<0.0005	0.179	<0.014
GW 5	0.02	<0.0035	0.004	<0.0005	0.036	<0.014
GW 8	<0.01	<0.0035	<0.001	<0.0005	0.084	0.017

Figure 1: Metal concentrations in tabular format

Total chromium concentrations are illustrated in Fig. 1. The concentrations at GW 8 is lower than the method detection limit of <0.01mg/l. Levels at the other two locations are within the limit of detection and below for interim guideline value.

Cadmium concentrations at all the monitoring locations are within the IGV value of 0.005mg/l, results issued are detection limit values as the concentrations present were lower than the method detection limit.

Cyanide concentrations are tabulated against there corresponding IGV limits. Results indicate that cyanide levels for the site are within limits.

Monitoring from 2010 illustrate that mercury levels are within the target IGV values. Results reported are method detection limit values.

Iron and manganese concentrations are within the IGV values for groundwater. Historically the levels for these metals were elevated due to the topography of the site. GW 2 has the highest concentration of Iron with a recorded result of 0.179mg/l this is still within the IGV. This monitoring location is up gradient of the landfill site.

Results for lead concentrations are not tabulated, the method detection limit for 2010 was <0.049, the IGV value is below the limit of detection for the method used.

#### 4.7.0 Surface water

#### 4.7.1 Scope of work

There are seven surface water monitoring locations for the landfill site at Raffeen, monitoring was carried out all the location as per license requirements. Monitoring locations SW1 and SW4 are located up gradient of the site, while SW2, SW2A, SW3 and SW2B are all located down gradient of the landfill site. SW 5 known as the new culvert collects surface water run off from the capping.

Monitoring of the surface water locations is carried out on a quarterly basis with more detailed analysis carried out annually. Ammoniacal nitrogen is monitored weekly along with the visual and olfactory comments at all seven locations.

Results have been compared to the environmental quality standards (EQS) set for surface water by the EPA in the publication "Towards Setting Guideline Values for "The Protection of Groundwater in Ireland".

The monitoring to date indicates that the landfill site is not significantly impacting on the surface water quality in the vicinity of the site. The water quality data for 2010 is similar to that recorded previously.

The monitoring locations SW2, SW2A, SW2B and SW3 are located down gradient of the site within Monkstown Creek. This is a tidal estuary and for this reason the water chemistry of the samples taken from these locations can be influenced by the incoming sea water.

#### 4.7.2 Surface water analysis results

##### Ammoniacal Nitrogen

SW 1 is considered to represent the background water quality of the catchments. In keeping with licence requirements this location is monitored weekly, quarterly and annually. Review of historical data at this location would suggest that there has been no significant change in the water quality as results are in line with 2009. All analysis results are within the EQS levels for surface water with the exception of ammoniacal nitrogen. The EQS for surface water for this parameter is 0.02mg/l; this was exceeded at on occasions. The highest occurred in October with a recorded result of 11.7mg/l. The visual observations at the time of sampling noted a high degree of suspended matter in the river, nitrogen contained in these solids is the most likely cause of the spike. Downstream from this monitoring location is SW4; results for this monitoring location are within EQS limits for all parameters.

Monitoring at the down gradient locations SW2, SW2A, SW2B and SW3 illustrates variations in the concentration of ammoniacal nitrogen. Locations SW2 and SW2B had the highest concentrations present; this is in keeping with trends from 2009 and 2008.

The annual monitoring results for these locations and their associated EQS limits are outlined in Fig.2.



Figure 1: Annual surface water data in tabular format

Parameter	Ammoniacal nitrogen (mg/l)	Chloride (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Manganese (mg/l)	Mercury (mg/l)	Sulphate (mg/l)	Zinc (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)
EQS limit	0.02 (mg/l)	250 (mg/l)	0.03 (mg/l)	1.0 (mg/l)	0.1 (mg/l)	0.3 (mg/l)	0.001 (mg/l)	200 (mg/l)	1.0 (mg/l)	0.2 (mg/l)	50 (mg/l)
<b>Monitoring location</b>											
SW1	0.02	18.21	<0.015	<0.03	0.009	<0.014	<0.005	24.6	<0.011	<0.10	4.07
SW2	16.7	22.8	0.032	0.286	0.013	0.056	<0.0005	32.17	0.035	<0.10	6.12
SW2A	0.04	16.1	<0.015	0.032	0.007	<0.014	<0.0005	18.09	<0.011	<0.10	8.24
SW2B	18.7	27.84	0.056	0.332	0.002	0.03	<0.005	29.6	<0.011	<0.10	2.19
SW3	0.52	38.1	<0.015	<0.03	0.009	<0.014	<0.0005	14.15	<0.011	<0.10	12.63
SW4	<0.01	17.3	<0.015	<0.03	0.002	<0.014	<0.0005	18.3	<0.011	<0.10	4.96
SW5	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

## Surface water biological oxygen demand

Sampling location	BOD (mg/l)			
	Q1	Q2	Q3	Q4
SW 1	<1	1	2	<2
SW 2	3	3	3	<2
SW 2A	<1	<1	<1	<2
SW 2B	<1	2	2	2.46
SW 3	<1	1	1	<2
SW 4	1	<1	1	<2
SW 5	1	Dry	1	3.63

Results from BOD monitoring indicate similar trends to 2009 and 2008, SW 2 continues to have the greatest concentration of BOD present of all surface water monitoring locations. Levels in SW 3 have decreased from having a peak level in 2009 of 5mg/l to achieving results consistently <2mg/l.

Analysis of COD data indicates a similar trend in levels as BOD. SW 2 and SW 5 had the highest COD concentration with results of 23mg/l and 25mg/l respectively.

## Surface water chloride concentration

Monitoring for chloride concentrations illustrated that analysis from all of the sampling locations with the exception of Q4 was within the EQS limit of 250mg/l. Two locations exceeded this limit in Q4, SW 2 and SW 2B. This is in keeping with previous years, the effect of the tides and the presence of saline water at these locations is the mostly likely cause of the increase.

### 4.8.0 Leachate monitoring

#### 4.8.1 Scope of work

There are three combined leachate monitoring boreholes located within the site these being; G & L1, G & L3 and G & L4. In 2006 the existing monitoring locations G & L11 (GW4) and G & L12 (GW6) were included as leachate monitoring locations.

There was no access to monitoring location G & L2 or G & L5 during the reporting period as these monitoring installations were damaged by construction activities taking place at the site during 2005. It will not be necessary to replace these two leachate monitoring boreholes as monitoring locations G & L11 (GW4) and G & L12 (GW6) monitor the leachate composition within the waste body.

Monitoring of the leachate composition is undertaken on a quarterly and annual basis with weekly monitoring of the leachate levels.

#### 4.8.2 Leachate monitoring

There has been no significant change in the composition of the leachate at the site. The highest strength leachate is seen at monitoring location G & L3 as reflected in the analytical data.

The monitoring of the composition of the leachate at the site indicates that the leachate is of a lower strength than the values typically quoted in the literature. Many of the parameters are within the standards set for drinking water. This is considered to be due to the high proportion of construction and demolition waste which has been landfilled at the site. The leachate composition is not considered to be significantly impacting on the environment in the vicinity of the site. The surface water and groundwater are naturally discharging to the estuary where significant dilution is available. Monitoring of the surface water quality in the vicinity of the site indicates that significant pollution is not occurring at the site.

### Topographical Survey

A topographical survey was carried out in July 2010 by Focus Surveys Ltd, an original and three copies have been sent to the Agency as required under the licence.

### Leachate Generation

Raffeen Landfill is an unlined site. The leachate abstraction system has been installed as part of the Final Restoration Contract. The discharge of leachate from the waste body is taking place to the groundwater and / or the surface water in the vicinity of the site. Both the surface water and groundwater are discharging to the Cork Harbour estuary immediately down gradient of the landfill where significant dilution is available.

The water balance method has been used to predict the likely annual leachate generation rates at the landfill site in order to estimate the potential leachate emissions from the facility. This method is based on the use of a mathematical equation which provides a conservative estimate which caters for worst case scenarios. The method used for the Raffeen Landfill Site is based on the equation developed by Ehrig (Quality and Quantity of Sanitary Landfill Leachate, 1983).

The equation is as follows;  $L_0 = [(ER.a) + LW + IR] - [aW]$

Where:-

$L_0$  : Free Leachate Produced

ER: Effective Rainfall (net precipitation after loss by evaporation).

a: Area of Cell(s)

LW: Liquid Waste

IR: Infiltration from restored areas

aW: Absorptive capacity of waste

$a_R$ : Restored Area

The results of the leachate generation estimates are summarised in Table 4.4 with the calculations provided in Table 4.5. Data from Rossmore CA Site for 2010 has been used in the estimates as this is one of the closest meteorological stations to the site. Effective rainfall corresponds to the amount of total rainfall minus evapotranspiration.

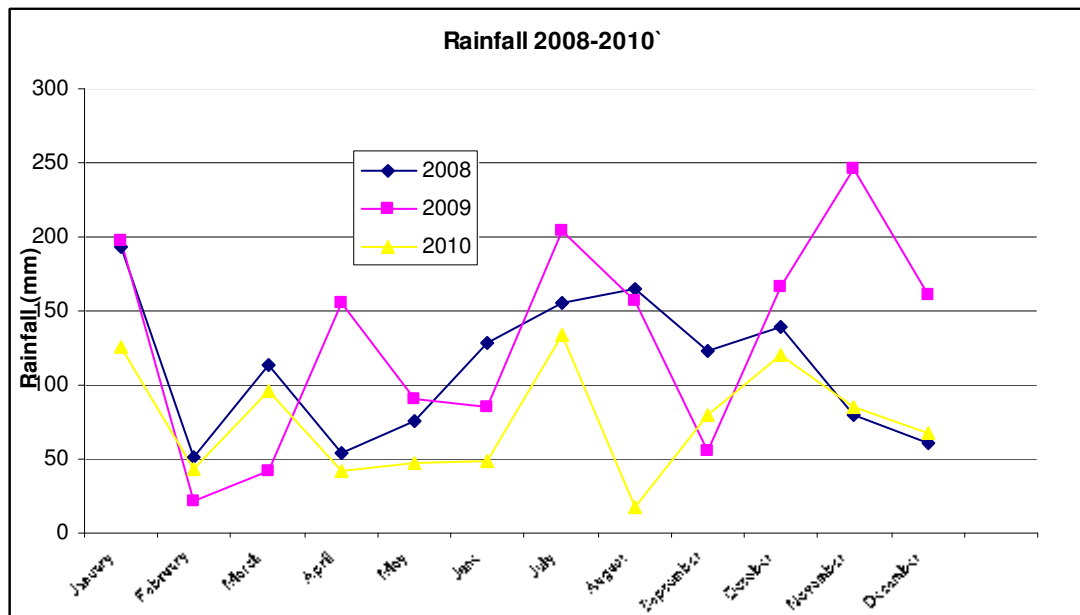
Monthly rainfall figures from the weather station at Rossmore CA Site for 2010 are shown in Table 4.4. Potential evapotranspiration data from Rossmore CA Site for 2010 was obtained (Table 4.4).

The water balance method assumes that the infiltration on an uncapped cell which is open for a full year is taken as being 100% of the effective rainfall on the site. As outlined in the EPA Landfill Site Design Manual in areas that have been temporarily capped / restored an infiltration rate of 25 – 30% of the annual rainfall is recommended while in restored areas infiltration would be between 2 – 10%. Since 100% of the final capping has been installed at the site an infiltration rate of 2% was used for the restored area to provide an estimate of the quantity of the leachate being generated at the site. This method does not take into account the steep nature of the site (up to 1:2.5) in the leachate generation calculations. The water balance for the site has been calculated based on the assumptions outlined below.

**Table 4.4: Water Balance Data 2010**

Month	Average Rainfall cork airport (mm)	2010 Rainfall cork airport (mm)	Potential Evapotranspiration data 2010 (East Cork Landfill)	Effective Rainfall 2010	Leachate generation - 2% final capped area
January	148.3	125.7	17.5	108.2	157
February	115.9	42.7	50.4	0	0
March	97.1	95.5	100.6	0	0
April	70.2	41.3	50.5	0	0
May	84.1	47.5	17.1	30.4	44
June	67.7	48	80.3	0	0
July	65.4	134	76.2	57.8	84
August	89.9	17.1	80.3	0	0
September	97.4	79.1	44.4	34.7	50
October	125.8	120.5	24.7	95.8	139
November	108.7	85.6	9	76.6	111
December	136.5	66.9	15.2	51.7	75
<b>Total</b>	<b>1207</b>	<b>903.9</b>	<b>566.2</b>	<b>455.2</b>	<b>660</b>

The rainfall data during the reporting period has been compared to the monthly average rainfall figures for the period 1961 to 1990. The monthly rainfall figure for Cork Airport for 2010 has been compared to these monthly average figures. These figures have showed that 2010 experienced less rainfall than the average of 1961-1990 and also 2008 -2009. Figure 4.14 shows rainfall over 2008-2010. The highest rainfall for 2010 occurred in January followed by October and March. April had the least amount of rainfall in the 2010.

**Figure 4.12: Rainfall in 2008 - 2010**

### Leachate Emissions

Leachate generation at Raffeen Landfill is estimated at 660m<sup>3</sup>/annum. The maximum monthly leachate generation is estimated to have occurred during October 2010. As indicated by the monitoring of the leachate composition since 2000 the leachate at Raffeen is of low strength when compared to the values typically quoted for leachate composition. The environmental monitoring programme at the site indicated No impact of leachate in the groundwater quality in the vicinity of the landfill.

As discussed in Section 4.1.5 most of the groundwater parameters are within the interim guideline values for groundwater set by the EPA. This indicates that the landfill is not having a significant impact on the groundwater quality in the vicinity of the site. As discussed in Section 4.1.4 no significant impact has been seen in the surface water quality in the vicinity of the site.



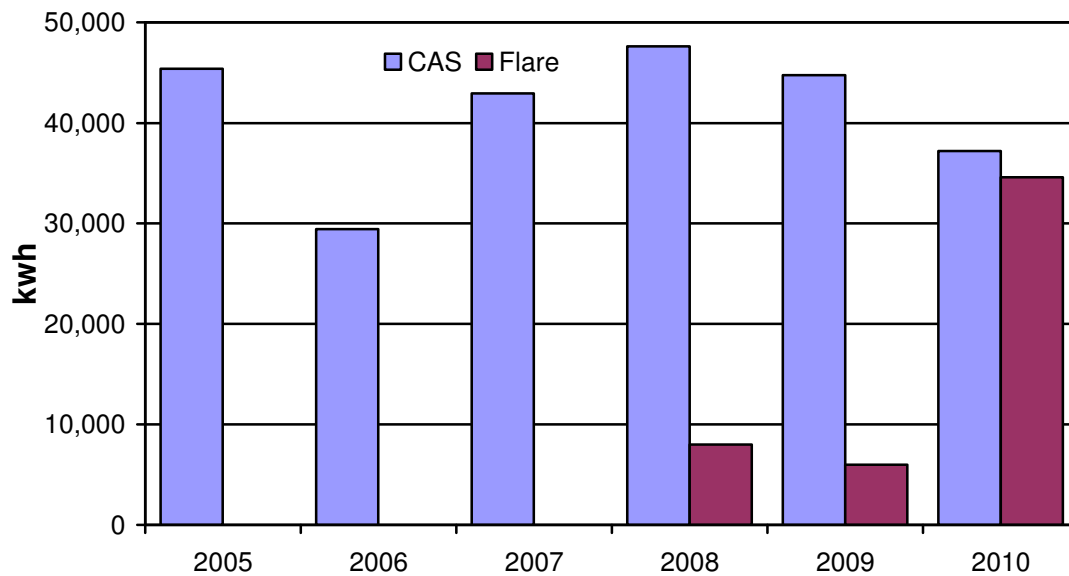


## 5.0 ENERGY CONSUMPTION/GENERATION

### 5.1 Resource and Energy Consumption Summary

The landfilling of waste has ceased at the site and therefore fuel is no longer used by site machinery. Records indicate that the ESB usage at the landfill site office during the year amounted to 71,754 kW hours in 2010. Usage trends are shown in Figure 5.1 below.

Figure 5.1: Energy Usage at Raffeen Landfill & Civic Amenity Site



A permanent flare was also installed in 2008 and was commissioned at the end of June. The energy usage for this is accounted for on a separate connection. In total 34,568 kW hrs were used to run this flare in 2010.

The Contractor had no major works to carry out on site in 2010 and did not use any significant amount of fuel. There was no usage of electricity by the Contractor. The packing of the skips carried out by JCB used an estimated total of 6,000 litres in 2010.

All electricity at Raffeen is provided by Energia and is “green” electricity i.e. it is carbon free and there is no carbon tax payable.

## 6.0 ENVIRONMENTAL INCIDENTS AND COMPLAINTS

Condition 3 of the Waste Licence requires that the licensee shall make written records of environmental incidents and complaints.

### 6.1 Incidents & Complaints

There were no complaints 2010.

#### Incidents for 2010

Date	Incident	Description
03/06/2010	flash back alarm on the flare	The flare was shut down due to a flash back alarm sounding which has incapacitated the appliance. The component is part of a safety barrier. The part has been ordered and we have engaged our maintenance contractors AFS to install the part with the assistance of EPS Ltd electrical contractors.
08/12/2010	flare shut down	Due to depleted methane quality owing to high atmospheric pressure prevailing over this part of the region. Similar depletions were recorded at other sites
08/12/2010	flare shut down	On the 3rd,4th and 5th of Dec. due to the failure of the automatic heat controlling venting louvre actuator.

### 6.2 Review of Nuisance Controls

#### 6.2.1 Litter Abatement Measures

As the landfilling of municipal waste has ceased at the site the potential for the generation of litter has been significantly reduced. The civic amenity centre has been operational since late January 2005. Routine litter patrols are carried out on the instruction of the Facility Manager to ensure that any loose litter is collected. Litter patrols include the area of the civic amenity centre as well as all fences and the public road along the site boundary. The effectiveness of the litter control techniques are assessed weekly and documented in the weekly site inspection record sheet.

All contractors transporting materials offsite for recycling from the civic amenity centre are required to ensure that when transporting and discharging these loads that litter generation is kept to an absolute minimum. All vehicles are required to be totally sealed or covered with a net or tarpaulin to ensure that materials are not blown from the vehicles.

## **6.2.2 Birds**

Municipal waste is no longer accepted for landfilling at the Raffeen waste facility. However, it is accepted into skips at the Civic Amenity Centre for transport to an alternative landfill. Prior to February 2007 this waste was brought to East Cork Landfill. Since their closure, waste is now being transported to Youghal Landfill or to Greenstar for segregation. This has led to an increase in the volume of municipal waste being accepted at Raffeen, as it appears that some customers previously using the East Cork Landfill are now using Raffeen for disposal of their household municipal waste. Waste accepted from street sweepings has decreased.

To mitigate the impact of birds perching on skips when there is no human activity in that area the skips were retrofitted with a roll-over tarpaulin cover in April/May 2008. They are easily used and can be operated by one person. They are opened by Council workers when depositing residual waste and closed immediately afterwards.

## **6.2.3 Vermin and Flying Insects**

As municipal refuse is no longer accepted for landfilling at the site and full cover has been placed over the whole site there is currently no food source for vermin. The situation is continuously monitored by the Facility Manager and preventative baiting is undertaken by a specialist contractor on a regular basis. A comprehensive pest control programme is in place on site and on occasions, particularly coming into the winter, when vermin tend to migrate to warmer locations the pest control company lay extra bait where needed. The completion of the installation of the final capping during 2007 has reduced the potential for vermin. However, extra rat poison put down on occasions in December when rats were spotted around the residual waste bin.

Flies do not pose a problem at the Raffeen Civic Amenity Centre. Residual (municipal) waste bins are emptied frequently at Youghal landfill and the Greenstar facility. Wasps however, do cause problems during the summer, Wasp ‘catchers’ and spray were purchased to minimise the impact on visitors to the site.

## **6.2.4 Fires**

The burning of waste or other material is not permitted at the facility. Municipal refuse is no longer landfilled. In the event that a fire breaks out on the site, it will be treated as an emergency and dealt with immediately, in accordance with the Emergency Response Procedure for dealing with fires.

## **6.2.5 Odour Control**

Municipal waste is no longer landfilled at the site and the final capping of the landfill was completed during summer 2007. The landfilling of waste no longer presents a potential to generate odour.

Other potential odours include odours from gas production from the waste body of the landfill. However, the gas management system and permanent flaring has been installed and commissioned since July 2008, and odours have not been a problem from the waste body.

The operation of the civic amenity centre also has the potential to generate odours. Odours may occur from putrescible waste in skips; however residual (municipal) waste bins are emptied frequently at Youghal and Greenstar Ltd. Should it be required collection bins and skips in the civic amenity centre shall be washed to prevent the generation of malodours. Weekly inspections of the site have shown odour has not been a nuisance. Odour, where detected has been from farming activities in the area.

### **6.2.6 Dust Control**

The Contract for the Final Restoration of the landfill site is complete. The Contractor is required to clean roadways of any dirt, mud or other materials being dropped or spread by traffic associated with this contract. During 2008 the Facility Manager organised for road sweeping to be undertaken as necessary. The Facility Manager ensures that effective dust control measures are implemented on site.

## **6.2 Programme for Public Information**

The Communications Programme has remained unchanged from the previous year's AER. Public information at Raffeen includes laminated signage with updates on:

- Free Household Hazardous Waste Collections by Chemcar (laminated signage)
- A free waste recycling website: [wastematchers.com](http://wastematchers.com) (laminated signage and leaflets)
- Leaflets on Raffeen, the materials accepted and how to present it
- Composting Information Packs (see Section 7 for more information)

A display for leaflets was ordered and will be used to provide easy assessable information for staff to hand to customers. Objective 1 in Section 7 gives further details on the public information programme at Raffeen CAS.

## **7.0 ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

In accordance with Condition 2 (Management of the Facility) of the Waste Licence (68-2), Cork County Council (CCC) is required to establish and maintain a documented Environmental Management System (EMS) for the facility.

### **7.1 Objectives and Targets**

The purpose of this section is to determine what progress has been made towards achieving the objectives and targets proposed during the previous year, and how the objectives will continue to be met and improved upon in the forthcoming year. It also outlines any new objectives proposed for the forthcoming year.

#### **Objective 1: Establish an environmental awareness programme on site targeting the further development of recycling.**

The civic amenity centre opened in late January 2005 and since then has increased recycling awareness in the area to the extent that the number of users at the site has been increasing steadily over the years. User numbers (or vehicles counted entering the site) dropped in 2010 compared to 2009; this may be as a result of the current economic climate and the fact that people are storing their recyclables for longer periods of time resulting in fewer trips to the site.

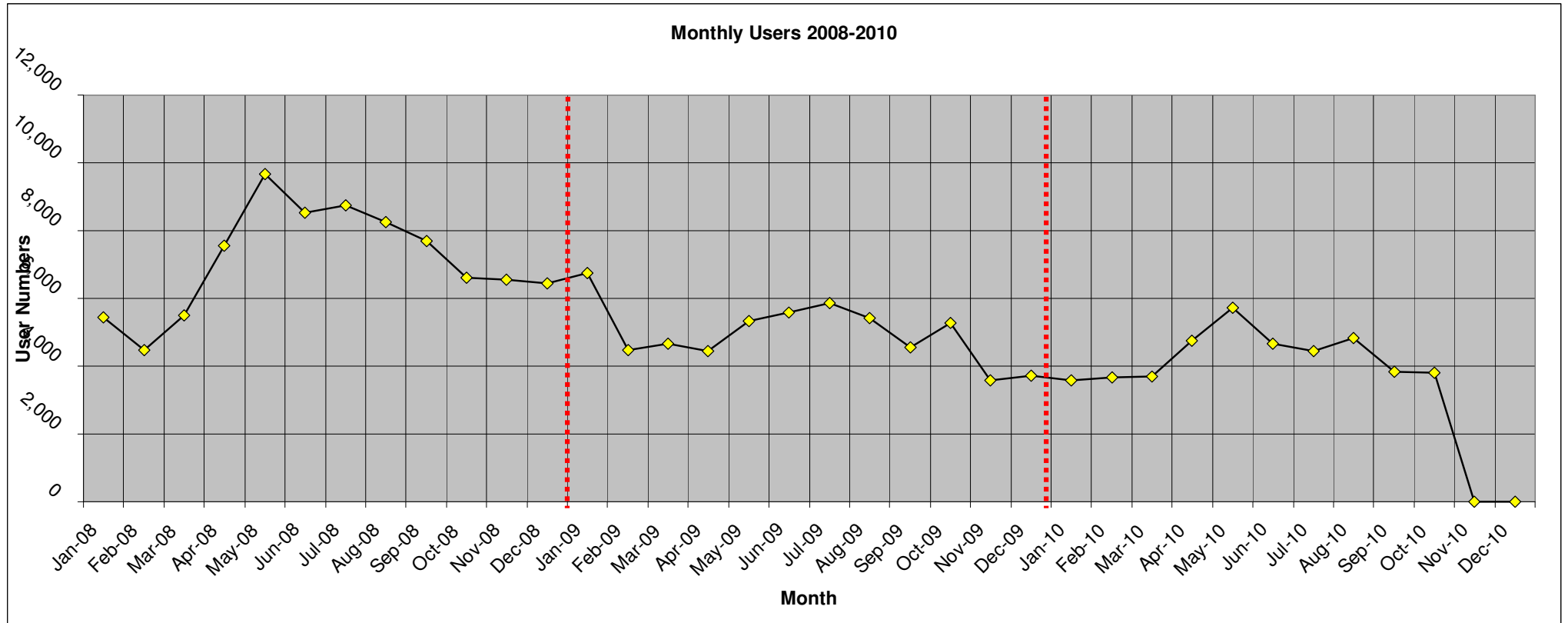
In 2010 over 50,424 vehicles were logged as entering the facility with the intention to recycle or dispose of material. This is a reduction on the numbers for 2009 (60,001 vehicles) and 2008 (85400). Usage has decreased on everyday of the week. Saturdays have also shown a decrease in numbers (based on averages), when compared to previous years. Saturdays still tend to be busier in regards to the number of vehicles compared to week days and the waiting time for customers can be frustrating.

Statistics for 2010 give approximately 164 vehicles per day. However it is more realistic to take Saturday out of this calculation. This gives an average of 146 vehicles excluding Saturdays and an average of 270 vehicles for Saturdays only.

Weekends were busiest from April to September with Saturday 10<sup>th</sup> June being the busiest day of the year (over 390 vehicles registered as entering the facility). These numbers may have been influenced by the bank holiday the previous Monday. People who would normally visit the site on a Saturday may have postponed it until the following week if they went away for the bank holiday weekend. Saturday 17<sup>th</sup> of April and Saturday 5<sup>th</sup> of June were the next busiest of the year. January, February, November and December were the quietest months in 2010; this was mainly due to the extreme weather conditions on site which resulted in the site closing for a number of days as roads became impassable. Tuesday 30<sup>th</sup> November was the quietest of the year, and the second quietest day of the year on Thursday 21<sup>st</sup> January, both with recorded vehicle numbers of 18 and 37 respectively.



Figure 7.1: Monthly User Numbers at Raffeen CA





General Operatives are updated continuously on recycling information relative to the operation of the site. Leaflets on the facility, what it accepts and how to present it at the site and on other recycling and environmental matters are available upon request at the site office. Numerous telephone queries are responded to on a daily basis advising people on the best way to present their materials at the site or sometimes a more suitable location.

The Facility Manager provides information on recycling and has completed the FÁS Waste Management Training Course. Any deputy/assistant Facility manager will also undergo this training. All general operatives have completed the FÁS Waste Operator Training Course.

As in previous years, in the forthcoming year it is proposed to continue to expand the range of information leaflets on various recycling and environmental issues available at the site office. A method of distributing these leaflets to the public was investigated in 2008, as there is no “reception area” as such where a display can be placed.

The responsibility of achieving these targets lie with the Facility Manager, Deputies/ Assistants and the General Operatives employed at the site.

**Objective 2: Cork County Council propose to continue investigating new materials and markets for collected recyclable material at the civic amenity centre.**

Cork County Council provides collection facilities for the recycling of a wide range of goods. Materials currently collected at the civic amenity/ recycling centre are listed in Section 2.1 Waste Quantities and Composition. This includes polystyrene, paint, aerosol cans, and batteries.

This range was expanded in 2008 to include waste oil containers. This was to help prevent containers being emptied of the waste oil from going into the residual waste. The waste oil containers are shredded and recycled.

During 2008 an arrangement was made to collect bicycles that the public are discarding at the Raffeen Recycling Centre and give them to a not-for-profit community group that is run by a group of volunteers called Cork Community Bikes.

Cork Community Bikes work with local schools and youth groups promoting the use of bicycles and sustainable transport. They have developed a do-it-yourself bike workshop for the community to use and have made it a centre of training and a social focus for anybody with an interest in bicycles in Cork City.

This is beneficial on a number of levels:

- it removes unwanted bicycles from the waste stream
- it supports the principles of reduce, re-use, recycle

- it provides support to the local community and in particular the youth

Due to the current economic circumstances in 2010 this objective will have the added caveat that acceptance of all materials will depend on the economic viability of recycling certain materials. All aspects including costs of recycling versus landfilling and the impacts of certain materials in landfill (e.g. paints, aerosols, engine oil, containers, and polystyrene) must be carefully considered for the future operations of the site.

**Objective 3: Cork County Council to examine the viability of inviting local school groups or other interested parties to the site.**

A number of groups and individuals are interested in recycling and seen the activities at a working site. Unfortunately a site visit for local schools groups was not organised for 2010.

It is intended to continue these informative site visits as there has been very good feedback in the past from students and teachers. It is the responsibility of the Facility Manager to ensure this occurs.

**Objective 4: Cork County Council to investigate the possibility of providing nesting boxes and the establishment of bird hides.**

Due to delays with the commencement of the contract for the Final Capping and Gas Abstraction System the landscaping did not commence until September 2007. Grass seeding operations took place between September and October 2007 and tree and shrub planting commenced on February 8<sup>th</sup> 2008. Landscaping planting works were completed by mid April 2008. A suitable amount of time must be given for the establishment of vegetation, after which a suitable programme for the installation of nesting boxes will be investigated.

**Objective 5: Implementation of Landscape Proposal**

The target of final restoration was achieved during 2008. The installation of the final capping was completed during summer 2007. Grass seeding operations took place between September and October 2007 and tree and shrub planting commenced February 2008. Landscaping works were completed by mid April 2008.

The implementation of the landscape proposals satisfies the following objectives:-

- Re-establishes native woodlands and scrub habitats that reflect the character of existing habitats and provides a wildlife corridor between existing fragmented habitats.
- Creates a diverse range of habitats including aquatic, marsh, meadow, hedgerow, scrub and woodland.
- Ensures that all adverse visual impacts affecting local properties and the

landscape in general are effectively mitigated against.

- Provides an attractive setting to the recycling facility.
- Provides a planting specification that shall minimize long-term maintenance.

#### **Objective 6: Maintain monitoring programme**

The environmental monitoring programme has been in operation at the site since before the waste licence was issued. The programme meets the requirements of the waste licence and was expanded in 2006 in response to requests made by the Agency. The monitoring programme continued at current frequencies during 2010. It is proposed that a submission shall be made to the Agency outlining the proposed revised monitoring frequencies during the aftercare period.

#### **Objective 7: Full review of all procedures and forms**

All procedures at the site will be thoroughly reviewed and new ones developed where required, with updates completed by the end of the year for submission in next year's AER. This is the responsibility of the Facility Manager and General Operatives.

### **7.2 Summary of Procedures Associated with the Facility**

There have been no new procedures developed at the site during the reporting period.

### **7.3 Financial Provisions**

Cork County Council is committed to protecting the environment and will ensure the provision of the necessary funds to meet any financial commitments or liabilities incurred by the carrying out of the disposal activities relating to the Raffeen Landfill. These commitments include compliance with the waste management licence (No. W0023-01) 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 the "Book of 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 Raffeen Landfill.

In 2010 budget funding of approximately €220,000 was made available for operational / maintenance costs of the landfill, and approximately €600,000 for the operation and maintenance of the Civic Amenity Site.

## **8.0 ENERGY AUDIT**

In October 2007 an energy audit was carried out by the Energy Section of Cork County Council. A data logger recorded energy usage over a number of weeks. This identified lighting of the site as being the main usage of electricity on site contributing to 73% of energy costs. The audit identified an approximate daytime usage of 1.5 kW/hr compared to 8kW/hr at night. A night meter was installed in early November at Raffeen to bring costs down.

In December 2008 an energy audit was carried out by the Energy Section of Cork County Council. A data logger recorded energy usage over a number of weeks. This identified lighting of the site as being the main usage of electricity on site. Operation of the Civic Amenity Site uses approximately 1.2 kW with occasional jumps of 7 - 12 kW during the day. However at night, with external lighting, usage averages at 8kW.

There is a night meter in use at Raffeen to bring costs down. However, it is recommended that motion sensors for the lighting be introduced to further reduce usage. This is currently under investigation by Cork County Council.

# **Appendices & Attachments**

**AER -2010**

**Appendix 1**

**ANNUAL NOISE SURVEY  
RAFFEEN CA AND LANDFILL SITE  
2010**

**DixonBrosnan**  
 environmental consultants  
 dixonbrosnan.com

<b>Project</b> 2010 annual environmental noise survey at Raffeen Landfill Site, Raffeen, Monkstown, Co. Cork				
<b>Client</b> Cork County Council				
<b>Project no</b>	<b>No pages</b>	<b>Client reference</b>	<small>©DixonBrosnan 2010</small>	
09135	9	W0023-01	<small>v150810</small>	
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<b>Report no</b>	<b>Date</b>	<b>Edit</b>	<b>Prepared by</b>	<b>Chkd</b>
09135.2.1	17.09.10	Release 1	Damian Brosnan	CD
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## 1 Introduction

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1.1 DixonBrosnan Environmental Consultants were instructed by Cork County Council to carry out the 2010 annual environmental noise survey at their Raffeen Landfill Site (RLS) facility at Raffeen, Monkstown, Co. Cork. The facility is regulated by the Environmental Protection Agency (EPA) through waste licence W0023-01. Several noise conditions attached to the licence are presented in **appendix 1**.

1.2 The noise survey was undertaken on Wednesday 01.09.10. Monitoring was conducted at seven offsite stations specified in the licence, and as shown in **appendix 2**. Survey methodology, equipment specifications and weather conditions are outlined in **appendix 3**. Recorded noise data are presented in **appendix 4**, and frequency spectra in **appendix 5**. As the facility operates during daytime hours only, a night-time noise survey was not undertaken.

1.3 The RLS facility was open to users throughout the survey. Noise emissions arose from user waste disposal activities at the civic amenity area near the site entrance, and from vehicle movements through the facility gate. Emissions also arose occasionally from waste management operations undertaken in the vicinity of the civic amenity area. The onsite gas flare plant gave rise to continuous noise emissions at a low level. There were no noise sources deeper within the landfill site, which is no longer in use.

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## 2 Results & analysis

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2.1 No emissions were audible from the RLS facility at six of the seven monitoring stations. Background noise levels (as  $L_{AF90\ 30\ min}$ ) were 46 dB or less at these stations. It follows that RLS emissions were significantly lower than the 55 dB daytime limit specified in licence W0023-01.

2.2 The proximity of N2 to the RLS entrance and onsite gas flare plant resulted in site emissions becoming audible at this station. However, as at all other stations, road traffic noise remained dominant, resulting in an  $L_{Aeq\ 30\ min}$  level of 58 dB. The contribution specifically attributable to the RLS facility at N2 was estimated at 36-40 dB, and thus lower than the 55 dB daytime noise limit. It should be noted that there are no noise sensitive locations in the vicinity of station N2.

2.3 No audible tones were noted at any of the stations. Continuous operation of the gas flare plant generated a slight buzz/whine at N2, although the emissions were audibly insignificant. These emissions were not audible at any sensitive receptor. Site operations did not give rise to impulsive emissions.

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### 3 Conclusions

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3.1 RLS noise emissions were not audible at six of the seven measurement stations. Site emissions were therefore significantly lower than the 55 dB daytime noise limit set out in the licence.

3.2 Vehicle movements through the site entrance, and the onsite gas flare plant, gave rise to an estimated noise contribution of 36-40 dB at N2, the only station where site emissions were audible. This level was lower than the 55 dB daytime noise limit. There are no sensitive receptors in the vicinity of N2.

3.3 No audible tones or impulses were noted in site emissions, apart from a slight buzz/whine noted at N2 arising from the nearby gas flare plant. These emissions were not of audible significance. Overall, measured noise levels were satisfactory.

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**Appendix 1: W0023-01 noise conditions**

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**E.3 Noise**

Noise monitoring locations shall be those as set out in Table E.3.1 and Drawing No. A1/3 Rev. A of the application.

Table E.3.1 Noise Monitoring Locations

STATION	
N1	N5
N2	N6
N3	N7
N4	

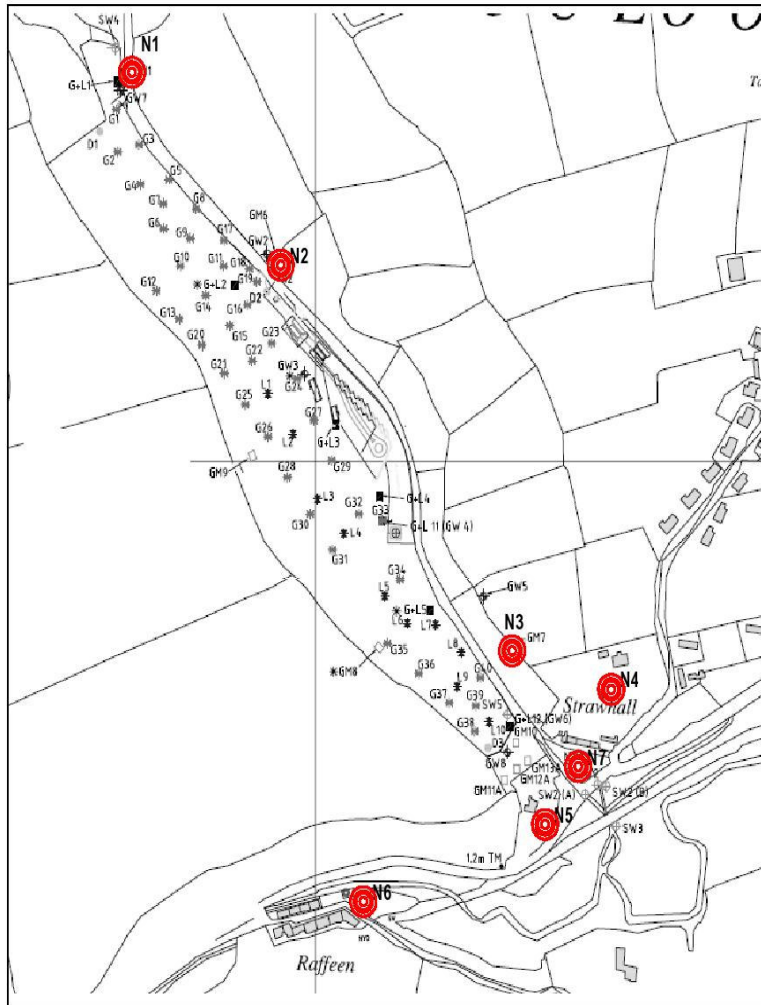
Table E.3.2 Noise Monitoring Frequency and Technique

Parameter	Monitoring Frequency	Analysis Method/Technique
L(A) <sub>Eq</sub> [30 minutes]	Annual	Standard <sup>Note 1</sup>
L(A) <sub>10</sub> [30 minutes]	Annual	Standard <sup>Note 1</sup>
L(A) <sub>90</sub> [30 minutes]	Annual	Standard <sup>Note 1</sup>
Frequency Analysis (1/3 Octave band analysis)	Annual	Standard <sup>Note 1</sup>

Note 1: "International Standards Organisation. ISO 1996. Acoustics - description and Measurement of Environmental noise. Parts 1, 2 and 3."

**F.1 Noise Emissions:** (Measured at the monitoring points indicated in Table E.3.1).

Day dB(A) L <sub>Req</sub> (30 minutes)	Night dB(A) L <sub>Req</sub> (30 minutes)
55	45



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**Appendix 3: Survey details**


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Survey	Project ref.	09135
	Purpose	2010 annual waste licence compliance survey
	Locations	Raffeen landfill N1 N2 N3 N4 N5 N6 N7
	Comment	Civic amenity area open
Event	Date	01.09.10
	Day	Wednesday
	Time	Morning
Operator	On behalf of DixonBrosnan	Damian Brosnan
Conditions	Cloud cover	Varying 10-100 %
	Precipitation	0 mm
	Temperature	15 °C rising to 18 °C
Wind	Direction	SE
	Speed	1-4 m/s
	Measurement	Anemo anemometer 2 m above ground level
Sound level meter	Instrument	Bruel & Kjaer Type 2250
	Instrument serial no.	2506594
	Microphone serial no.	2529531
	Application	BZ7224 Version 2.5
	Bandwidth	Broadband
	Max input level	141.16 dB
	Broadband weightings	Time: Fast    Frequency: AC
	Spectrum weightings	Time: Fast    Frequency: Z
	Windscreen correction	UA-1650
	Sound Field correction	Free-field
	UKAS calibration	09.12.09
	UKAS calibration certificate	Available on request
	Onsite calibration	Time
Calibration type		External
Sensitivity		48.80 mV/Pa
Post measurement check		93.9 dB
Onsite calibrator	Instrument	Bruel & Kjaer Type 4231
	Instrument serial no.	1723667
	UKAS calibration	14.09.09
	UKAS calibration certificate	Available on request
Monitoring methodology	Standard	ISO 1996 Acoustics: Description and measurement of environmental noise - Part 1 (2003) & Part 2 (2007)
	Exceptions	-
	Intervals	30 min

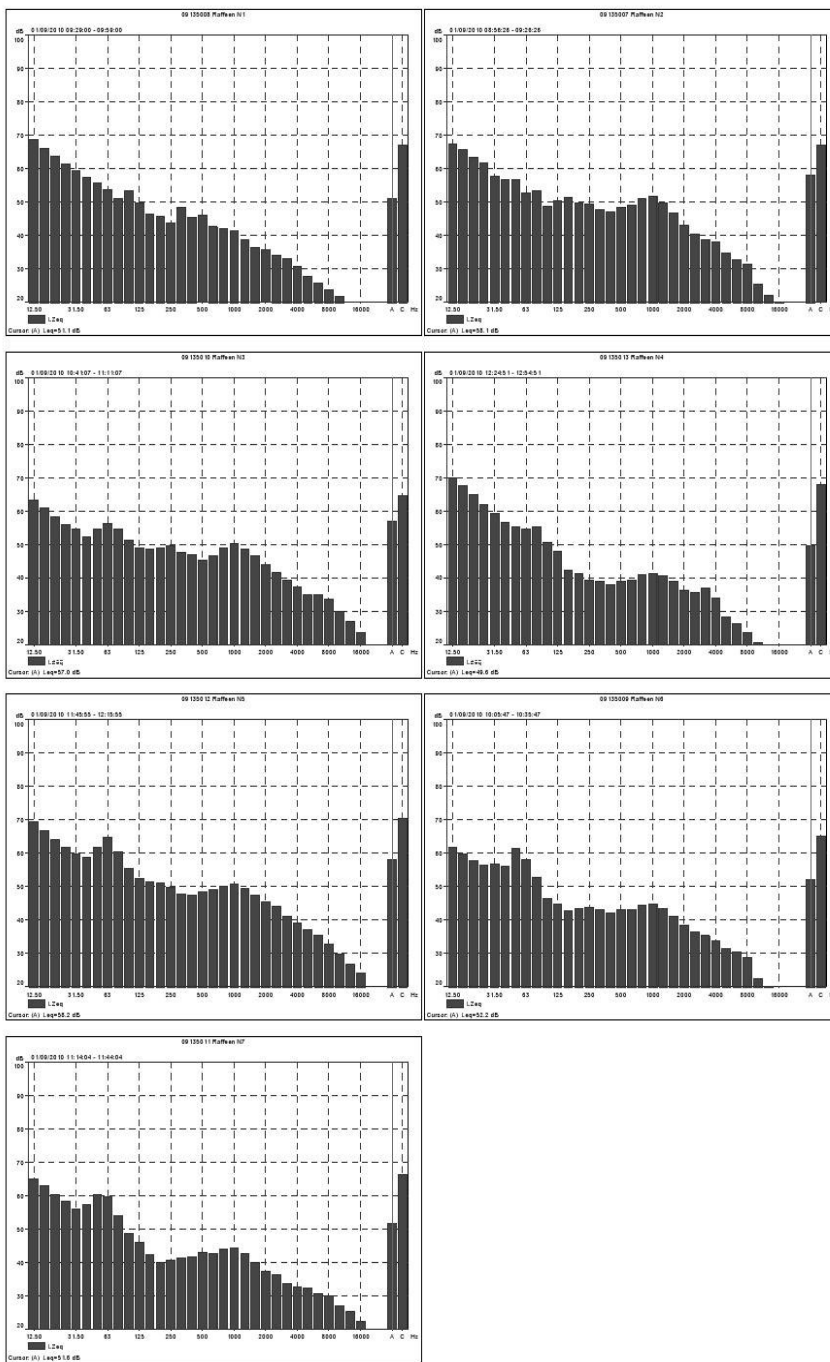
**Appendix 4: Noise data**

Survey date: 01.09.10.

Station	Time	L <sub>Aeq</sub> 30 min dB	L <sub>AF10</sub> 30 min dB	L <sub>AF90</sub> 30 min dB	Specific level* dB	Noise audible
N1	0929-0959	51	49	35	<35	No emissions audible from facility. Intermittent road traffic on public road dominant when present. Rustling vegetation. Bird song/calls. Aircraft.
N2	0856-0926	58	56	36	36-40	Sporadic vehicle movements through facility entrance audible at low level. Continuous buzz/whine from flare plant also slightly audible. Intermittent road traffic on public road dominant when present. Rustling vegetation. Bird song/calls. Aircraft.
N3	1041-1111	57	51	35	<35	No emissions audible from facility. Intermittent local road traffic dominant when present. Traffic on road to S also audible. Rustling vegetation. Bird song/calls. Aircraft.
N4	1224-1254	50	52	45	<45	No emissions audible from facility. Frequent road traffic below monitoring position dominant. Intermittent traffic audible on local road to E. Road traffic also slightly audible on N28 in distance. Lawnmower audible in distance. Clinking metal at boat yard 100 m SE continuously audible. Rustling vegetation. Bird song/calls & aircraft.
N5	1145-1215	58	62	46	<46	No emissions audible from facility. Frequent local road traffic dominant. House burglar alarm at approx 100 m continuously audible until 1210. Rustling vegetation. Bird song/calls. Aircraft.
N6	1005-1035	52	56	41	<41	No emissions audible from facility. Frequent road traffic on public road almost continuously audible on approaches, & dominant. Rustling vegetation. Bird song/calls. Aircraft.
N7	1114-1144	52	55	42	<42	No emissions audible from facility. Frequent local road traffic dominant. Rustling vegetation. Bird song/calls. Aircraft. House burglar alarm at approx 100 m continuously audible from 1129.

\*Specific level: Sound pressure level contribution considered attributable to facility, determined using real time assessment, field notes, time history profiles, statistical analysis, frequency spectra, near field correction if applicable, and other parameters.

Appendix 5: Frequency spectra



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## Appendix 6: Glossary

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Ambient	Total noise environment at a location, including all sounds present.
A-weighting	Weighting or adjustment applied to sound level to approximate non-linear frequency response of human ear. Denoted by suffix A in parameters such as $L_{Aeq T}$ , $L_{AF10 T}$ , etc.
Background level	$L_{AF90 T}$ . A-weighted sound pressure level of residual noise exceeded for 90 % of time interval T.
Decibel	Shortened to dB. Unit of noise measurement scale. Based on logarithmic scale so cannot be simply added or subtracted. 3 dB difference is smallest change perceptible to human ear. 10 dB difference is perceived as doubling or halving of sound level. <b>Throughout this report noise levels are presented as decibels relative to 20 <math>\mu</math>Pa.</b> Examples of decibel levels are as follows: 20 dB: very quiet room; 30-35 dB: night-time rural environment; 55-65 dB: conversation; 80 dB: busy pub; 100 dB: nightclub.
Fast response	0.125 seconds response time of sound level meter to changing noise levels. Denoted by suffix F in parameters such as $L_{AF10 T}$ , $L_{AF90 T}$ , etc.
Free field	Noise environment away from all surfaces other than ground ie. outside near field.
Frequency	Number of cycles per second of a sound or vibration wave. Low frequency noise may be perceived as hum, while whine represents higher frequency. Range of human hearing approaches 20-20,000 Hertz.
Hertz	Shortened to Hz. Unit of frequency measurement.
Impulse	Noise which is of short duration, typically less than one second, sound pressure level of which is significantly higher than background.
Interval	Time period T over which noise monitoring is conducted. Denoted by T in $L_{Aeq T}$ , $L_{AF90 T}$ , etc.
$L_{Aeq T}$	Equivalent continuous sound level during interval T, effectively representing average A-weighted noise level.
$L_{AF}$	Sound pressure level averaged over one second, and changing each second in fluctuating noise environment.
$L_{AF10 T}$	Sound pressure level exceeded for 10% of interval T, usually used to quantify traffic noise.
$L_{AF90 T}$	Sound pressure level exceeded for 90% of interval T, usually used to quantify background noise. May also be used to describe noise level from continuous steady or almost-steady source, particularly where local noise environment fluctuates.
$L_{Req T}$	Rating noise level, derived from $L_{Aeq T}$ plus specified adjustments for tonal and impulsive characteristics.
Near field	Noise levels recorded near walls or other surfaces, artificially increased due to reflections. Levels near walls may be increased by up to 3 dB, and up to 6 dB near corners. Free field conditions may be achieved by maintaining separation distance of at least 3.5 m from walls.
Noise sensitive location	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires absence of noise at nuisance levels.
1/3 octave band	Frequency spectrum may be divided into octave bands. Upper limit of each octave is twice lower limit. Each octave may be subdivided into thirds, allowing greater analysis of tones.
Residual level	Noise level remaining when specific source is absent or does not contribute to ambient.
Specific level	Sound pressure level contribution arising from specific noise source, measured directly or by estimation or calculation.
Tone	Character of noise caused by dominance of one or more frequencies which may result in increased noise nuisance.
Z-weighting	Standard weighting applied by sound level meters to represent linear scale.

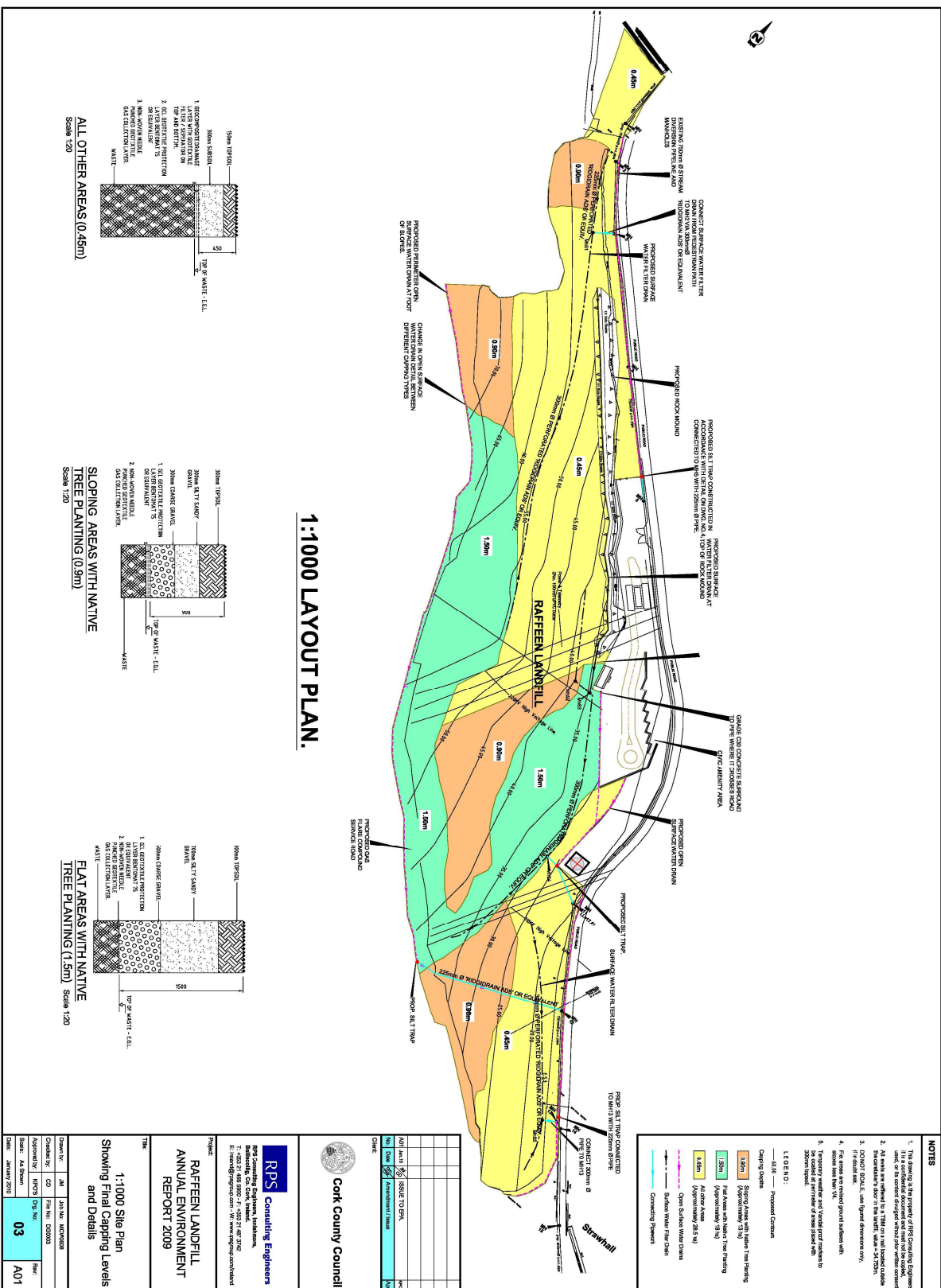


## Attachments

- Drawing 01 - Location Plan Showing Environmental Monitoring Points 2010
- Drawing 02 – Location Plan Showing Gas & Leachate Extraction Points 2010
- Drawing 03 – Site Plan Showing Final Capping Levels and Details 2010







Drawn by:	JM	Job No.:	AD0003
Checked by:	CD	File No.:	030003
Approved by:	AS (Sign)	Proj. No.:	03
Date:	January 2010	Rev.:	A01

Project: **RAFFREEN LANDFILL ANNUAL ENVIRONMENT REPORT 2009**

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Scale: 1:1000

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