Comhairle Contae Fhine Gall
Fingal County Council

BALLEALLY LANDFILL,
BALLEALLY, LUSK,
CO. DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2008

WASTE LICENCE REF. NO. W0009-02

ORIGINAL

January 2009

BALLEALLY LANDFILL,
BALLEALLY, LUSK,
COUNTY DUBLIN

ANNUAL ENVIRONMENTAL REPORT 2008

WASTE LICENCE REF. NO. W0009-02

User is Responsible for Checking the Revision Status of This Document

Rev. Nr.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
1	Original	ML	DH	AM	28/01/08

Keywords: Annual Environmental Report (AER), landfill monitoring

Abstract: This report represents the monitoring results for Balleally landfill, Balleally, Lusk, Co. Dublin. This report covers the annual reporting period of 2008 in accordance with Waste Licence Reg. No. W0009-02.

BALLEALLY LANDFILL,
BALLEALLY, LUSK,
COUNTY DUBLIN

TABLE OF CONTENTS.

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. INTRODUCTION

In 2000 Fingal County Council was granted a Waste Licence (Reg. 9-1) to continue operating Balleally Landfill. In July 2001 Fingal County Council applied for a review of this licence. On the 8th January 2003 the Environmental Protection Agency (EPA) issued Fingal County Council a second waste licence for Balleally Landfill: Waste Licence W0009-02. This licence supersedes the previous licence 9-1 and it permits the operation of a non-hazardous landfill. In accordance with the requirements of Condition 11.6 of the Waste Licence, an Annual Environmental Report (AER) for the facility must be submitted to the EPA.

1.1 Reporting Period

The reporting period for the AER is 1st January to 31st December 2008. This is the 9th AER for the facility as required by the waste licence. This AER applies to the licence W0009-02.

1.2 Facility Location

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

Balleally Landfill,
Balleally Lane,
Lusk,
Co. Dublin
Tel. (01) 8071835 Fax. (01) 8431600

National Grid reference 322500 252200.

Drawing DE07-164-03-001, Appendix I present a map of the facility and the surrounding locations.

1.3 Environmental Policy for Balleally Landfill

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

2. SITE DESCRIPTION

2.1 Licensed Waste Activities at the Facility

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

Condition 4.2 of W0009-02 restricts waste filling activities to meet Figure 2 of the 'Landscape Master Plan'. The final height of the facility shall be as shown in Figure 2 of the 'Landscape Master Plan'. The final height of the facility peak shall not exceed 40 mOD Malin Head.

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

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

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

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

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

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

Class 13 Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.

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

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

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

Class 4: Recycling or reclamation of other inorganic metals.

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

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

Class 13: Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.

2.2 Total Quantity of Waste Accepted and Deposited

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

Table 2.1 Quantity and composition of waste received at the facility 2008

Table does not include materials used in specified engineering works.

Location & Waste Type	Waste Deposited (tonnes) in 2005	Waste Deposited (tonnes) in 2006	Waste Deposited (tonnes) in 2007	Waste Deposited (tonnes) in 2008
Tipface				
Household	66,203	62,056	63,708	50,489
Commercial/Trade	49,195.57	63,819	61,773	46,248
Sewage Sludge	3,402.24	4,623	7,466	5,091
Industrial Non-Hazardous Sludge	6,635	6,825	7,061	6,660
Civic Amenity				
Household	5,801	4,891	4,867	3,959
Local Fly Tipped			62	10
Total	**131,236.81**	**142,214**	**144,937**	**112,457**

2.3 Remaining Landfill Capacity

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

Filling of:

- Cell 1 commenced – 1st April, 2004.
- Cell 2 commenced – 8th June, 2004.

- Cell 3 commenced-22nd June, 2005.
- Cell 4 commenced – 6th October, 2006.
- Cell 5 commenced – 23rd August, 2007.
- Cell 6 commenced – 15th December, 2008.

Table 2.2 Air space reconciliation for the facility for 2008

Table does not include materials used in specified engineering works.

Description	Tonnes	Cubic Metres
Waste Inputs Jan – Mar 2004	48,802	61,003
Landfill Extension	**Tonnes**	**Cubic Metres**
Total Inputs Apr-Dec 2004	145,223.10	
Total Inputs Jan-Dec 2005	131,236.81	
Total Inputs Jan-Dec 2006	142,215.75	
Total Inputs Jan-Dec 2007	144,937.00	
Total Inputs Jan-Dec 2008	112,457.00	
TOTAL	676,069.66	**795,376**
ORIGINAL LICENCE LIMIT WL0009-02	1,040,000	**1,223,529**
Remaining Capacity	363,930	**428,153**

Waste density of 0.85 tonnes/m^3 used for above calculations

Void Space: Total Filled + Total Remaining
795,376m^3 + 428,153m^3 = 1,223,529m^3

2.3.1 Balleally Landfill - Short Term Extension

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

Table 2.3 Void Space at Balleally Landfill Extension,

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

Assumptions:

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

The remaining capacity in the landfill was surveyed in February 2008 (See Table 2.4). Remaining capacity at the end of 2008 is estimated in Table 2.5.

TABLE 2.4: TOTAL VOID SPACE REMAINING AS SURVEYED ON 21/2/2008.

Void Space	Source	Void Space Tonnes
Cells 4-6	RPS	276,250

TABLE 2.5: REMAINING VOID SPACE AT BEGINNING OF JANUARY 2009.

Void Space	Waste Deposited (tonnes) Since March 2008	Remaining Void Space (tonnes) 21-2-2008
		276,250.00
Mar 2008	9,987.98	266,262.02
April 2008	12,014.11	254,247.91
May 2008	10,842.60	243,405.31
June 2008	10,695.76	232,709.55
July 2008	9,704.31	223,005.24
Aug 2008	9,637.27	213,367.97
Sept 2008	11,017.44	202,350.53
Oct 2008	10,535.95	191,811.14
Nov 2008	9,052.95	182,758.19
Dec 2008	7,986.71	174,771.48

A proposal was sent to The Agency (Ref: FCC-W0009-02-020) on 22/9/2008 to provide for a second lift "piggybacking" between "new cells" and Top Lobe of the old landfill. This proposal would give a void space of 176,000 tonnes. This proposal was agreed to, subject to conditions, by *The Agency*, (Ref: W0009-02 / ak61em).

2.4 Local Environmental Conditions

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

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

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

3. ENVIRONMENTAL MONITORING

3.1 Groundwater

There are 20 No. groundwater monitoring points in the waste licence listed in Schedule D of the waste licence. The grid references and borehole I.D for these are shown in Table 3.1 below. These sample locations can also be seen in Figure DE07-164-03-001, Appendix I.

Table 3.1 Groundwater Monitoring Locations

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

3.1.1 Location Description

Borehole MB35

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

Location CD1

The control drain sampling location CD1 is situated 30 m south of Balleally Lane west of the landfill extension. This drain collects freshwater run-off from underneath the newly constructed lined cells.

MB18

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

RC3

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

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

3.1.2 Interpretation of Results

This section presents a summary of the chemical results. The groundwater dataset is included in Appendix II.

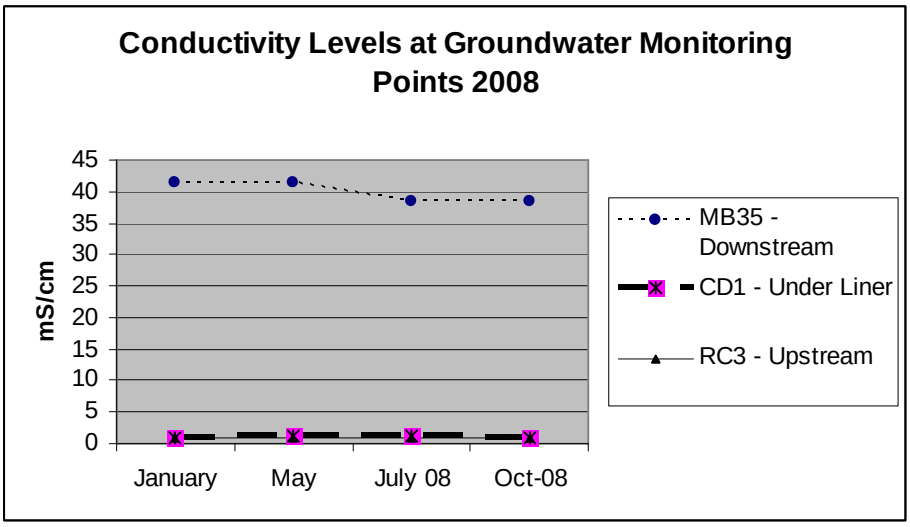


Figure 3.1 Conductivity levels at groundwater monitoring points 2008

At location MB35, chloride and electrical conductivity values are indicative of saline water due to its position in close proximity to the Rogerstown estuary. Results for chloride levels appear stable during quarters 1-3 and increase in quarter 4.

Elevated sulphate, magnesium and manganese levels were recorded at MB35 during quarter 3 (annual sampling round), similar to the elevated results recorded in previous years (2006-2007). Unlike previous years, elevated levels of Orthophosphate, Boron, Calcium and Lead above IGV were recorded at MB35. On the other hand levels of potassium, sodium and chromium have fallen from previous years to under IGV values.

Results upgradient of the landfill, at locations RC3 and CD1, indicate conductivity levels close to the recommended IGV. Results obtained from RC3 exceeded the IGV value of 1000 µS/cm during quarter 2 and quarter 4 of monitoring period. Results obtained from CD1 exceeded the IGV value of 1000 µS/cm during quarter 2 and quarter 3 of the monitoring period. Calcium, Sodium and potassium are trending upward from 2007 and are above IGV at CD1 and RC3.

Chloride values remain above the IGV (30 mg/l) for all locations during the monitoring period except at CD1, during quarter 1. These values are particularly high at MB35 due to saline intrusion. Groundwater quality deteriorated upgradient of the landfill at RC3 when compared to 2007 annual results (Appendix II). Sulphate levels at CD1 and MB35 were elevated over the IGV; however, levels of sulphate were recorded over its IGV value in previous Annual Environmental Reports (2006-2007).

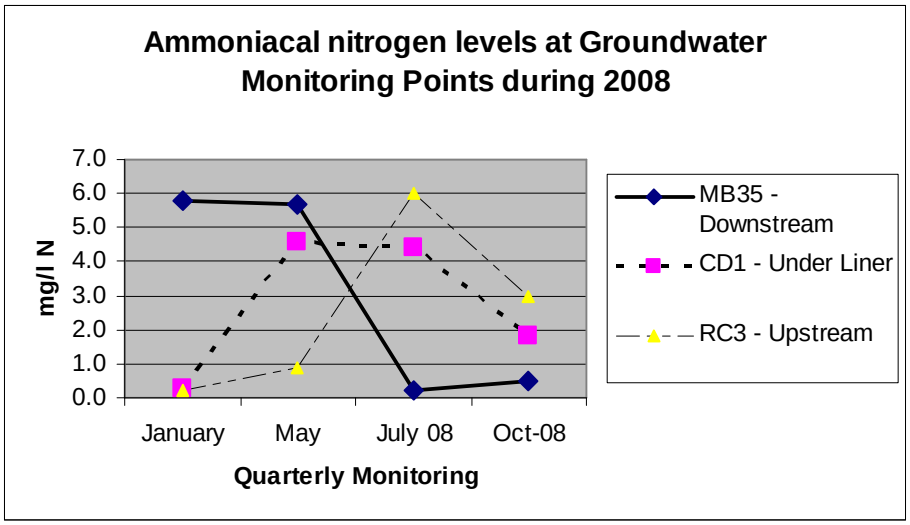


Figure 3.2 Ammoniacal nitrogen levels at groundwater monitoring points 2008

A similar trend to 2007 is evident in Ammoniacal nitrogen levels at groundwater monitoring locations in that they fell in quarter 4. High Ammoniacal Nitrogen levels could be indicative of leachate impact. High levels of Ammoniacal nitrogen were recorded upgradient and downgradient of the facility. Levels of ammoniacal nitrogen at RC3 and CD1 are up whereas levels at MB35 are down on 2007 results (Appendix II).

3.2 Surface Water

3.2.1 Introduction

Schedule D of the waste licence requires the monitoring of surface water at 7 no. locations. The sample locations can be seen in Table 3.2 and Figure DE07-164-03-001, Appendix I.

Table 3.2 Surface water monitoring locations

Station	Easting	3.2.1.1 Northing
SW1* (Renamed SWFD)	322 036	252 412
SWV1	321 980.2	252 187.4
S3*	322 985	252 692
S7	322 646	253 213
SW20a	322 897	252 687

From licence 9-2

The full surface water analysis datasets as issued by Alcontrol are included in Appendix III.

The water quality results have been compared to the Maximum Admissible Concentration (M.A.C.) for surface water (A1) intended for Abstraction for Drinking Water.

Description of Sampling Points:

SWFD: Discharges water from a French Drain receiving surface water shed from the northern slopes of the landfill. It is an open drain located immediately west of the entrance to the wastewater treatment plant.

SWV1: The surface water discharge point at the Western Point of the landfill before discharge to the inner estuary. The samples are collected in the open channel immediately upstream of the discharge pipe/cut-off flap.

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

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

SW20a: This sampling point is located at a drainage ditch to the east of Rogerstown Lane, close to the north-eastern tip of the landfill. The drainage ditch is preceding SW20 which lies to its east.

3.2.2 Interpretation of Results:

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

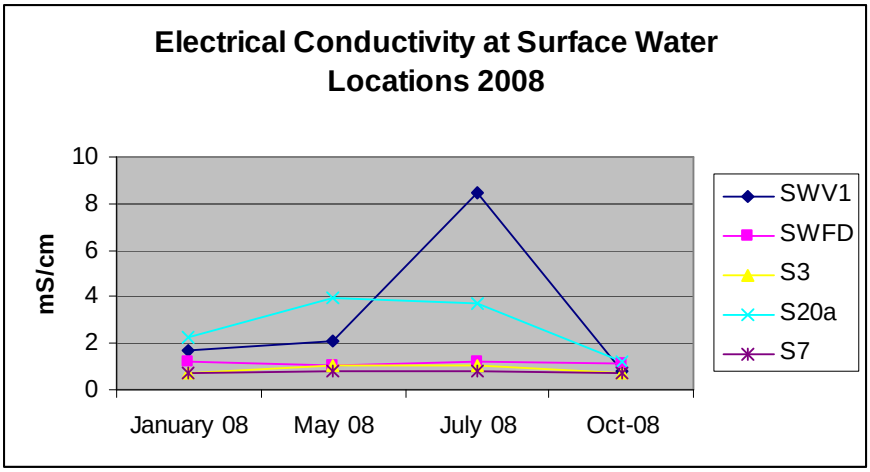


Figure 3.3 Electrical conductivity at surface water monitoring points 2008

Electrical conductivity values tend to be higher in quarters 2 & 3 than quarters 1 & 4. At location SW20a, conductivity values appear to noticeably increase from 2.298 mS/cm in quarter 1 to 3.952 mS/cm in quarter 2. These values are slightly less than the peak conductivity value of 4.330 mS/cm which was achieved during the second quarter of 2006. Conductivity values declined again to 1.2 mS/cm in quarter 4. Conductivity levels reached a high of 8.5mS/cm during Q3 at SWV1; this had reduced to 0.815mS/cm by quarter 4. Conductivity values exceeded the maximum admissible concentration at all locations except upstream of the landfill at S7.

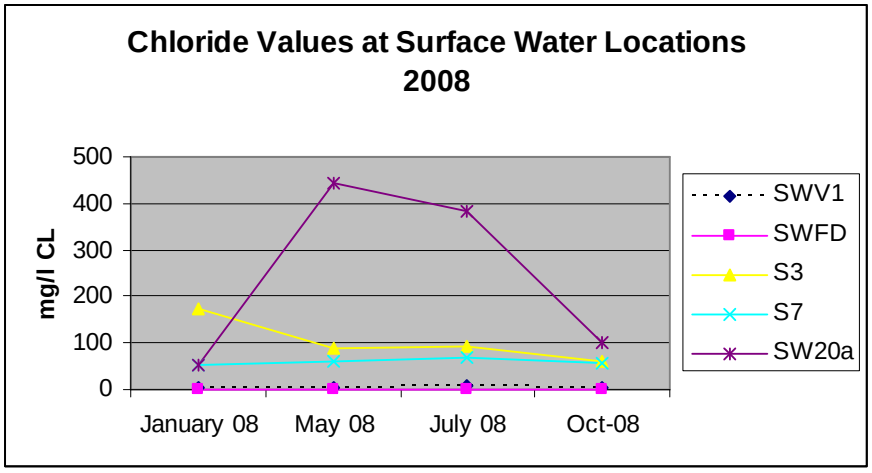


Figure 3.4 Chloride values at surface water monitoring points 2008

Chloride (Cl) values follow a similar pattern to those of conductivity, with quarters 2 and 3 tending to be higher than quarters 1 and 4. Values are below the MAC of 250mg/l Cl for all locations, except at SW20a in quarters 2 and 3. These parameters were chosen because they are indicators of leachate impact, but they also may demonstrate impact by other sources, such as sewage or the nearby estuary.

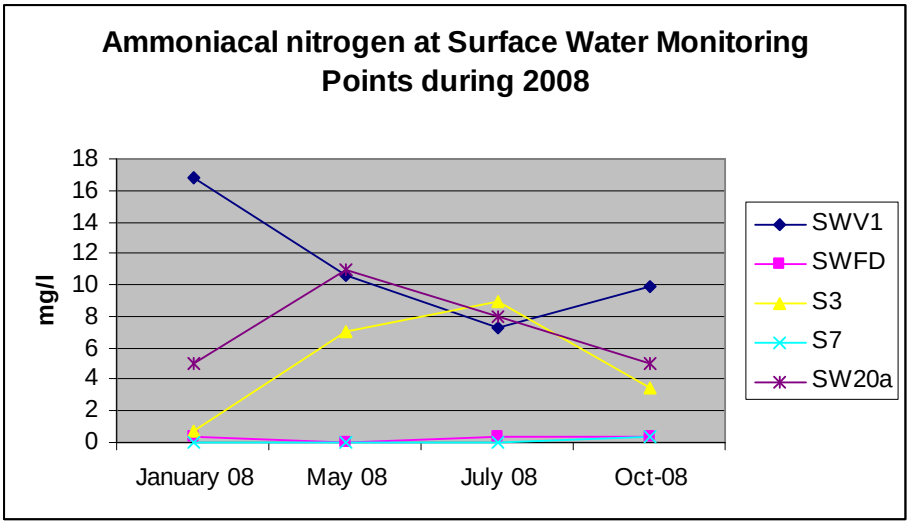


Figure 3.5 Ammoniacal nitrogen at surface water monitoring points 2008

Overall, Ammoniacal Nitrogen levels have been variable during the monitoring period. Elevated levels of Ammoniacal nitrogen have been recorded from all surface water monitoring locations but particularly so at SWV1, SW20a and S3.

From Q3 2007 to Q3 2008, BOD levels have increased beyond IGV at SWV1 (Appendix II). BOD levels are high particularly at SW20a and SWV1. Over the same period BOD levels at SW20a have improved slightly, yet still remaining above its IGV.

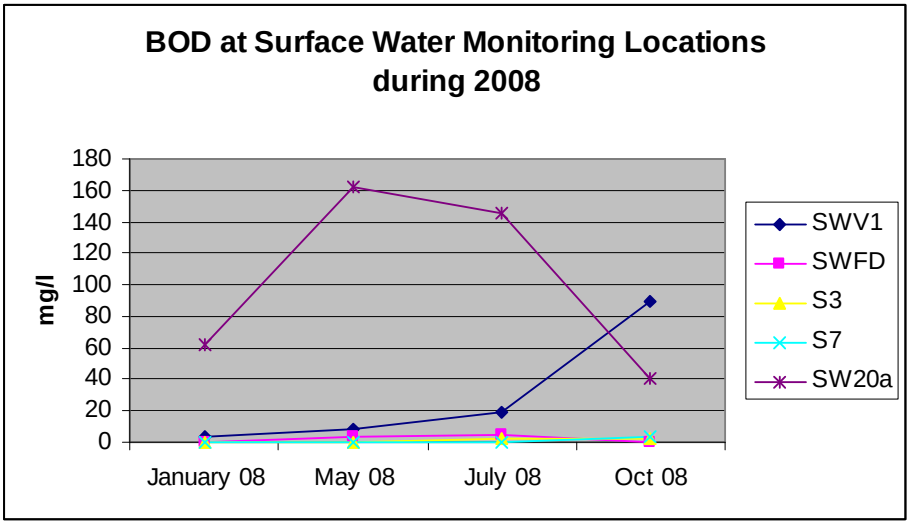


Figure 3.6 BOD at surface water monitoring points 2008

From Q3 2007 to Q3 2008 Sulphate levels have increased beyond IGV at SWV1 and SWFD, while COD and Manganese levels have increased at SWV1. On the other hand between Q3 2007 and Q3 2008 cadmium and lead levels have reduced to comply with their respective IGVs at SWV1 and SWFD.

In general, the analytical results are consistent with previous reported results and indicate that the surface water quality at SWV1, SWFD and SW20a is poor in quality, due to elevated levels of ammoniacal nitrogen, BOD and total suspended solids recorded.

3.2.3 Surface Water Improvements to Contamination at S3 & SWV1.

The Agency's observation (Ref.W0009-02\08\aro8mor) regarding Ammoniacal Nitrogen levels at surface water monitoring points S3, SWV1 and SW20a as reported in Quarterly Monitoring Reports Oct 2007 - Dec 2007 indicating that contamination of surface water is still occurring; is noted. Contamination is identified as ongoing.

Corrective action

(i) CAUSE OF CONTAMINATION AT SWV1

An investigation into the cause of contamination at SWV1 and S3 was undertaken on 4/10/2007 and reported to The Agency, (Our Reference 2007FCC030). This report suggested that the source of the contamination at SWV1 was the water collecting at the entrance to the facility. This water was contaminated with leachate contaminated water running out the entrance onto Balleally Lane. This was being conveyed to the surface water infrastructure through P2 and discharged to the estuary near SWV1. This is a plausible cause of the contamination at SWV1 and no further investigation is required at the moment but to take corrective actions (see below).

CORRECTIVE ACTION AT SWV1

The contaminated surface water interception drain (Hauraton, Category F900) which was proposed by the licensee (FCC-2008-9-2-003) and agreed by The Agency (W009-02/ak57em) was installed WE7/3/2008. This seems to have helped the flooding situation at the entrance. It also intercepts the contaminated surface water before it leaves the facility. The surface water previously collected from the entrance area which was directed to the estuary from P2 is now sent to the treatment plant. It was expected that these measures would reduce contamination at SWV1.

There has not been a consistent improvement in surface water quality since this corrective measure has been taken. However during quarter 4, 2008 an incident was noted whereby leachate was being pumped directly into the inner Rogerstown Estuary at SWV1 from cell 2. This incident occurred due to a plumbing error. This was notified to The Agency on 19/11/2008 and has now been corrected. It is hoped that this discovery and corrective action will yield improvements in surface water quality at SWV1 during 2009.

It is proposed to continue to track these corrective measures during future monitoring. If there is no significant improvement, or deterioration occurs, there will be a review of the situation and of the mitigation measures in place.

(ii) **CAUSE OF CONTAMINATION AT S3**

For reasons discussed during the 2008 annual audit, the contamination at S3 is no longer considered to be the waste water treatment plant located upstream of S3. It is possible that the cause is related to the contamination at SW20a and seepage through the bung at this point which eventually discharges at S3. In this regard, no further investigation is required at the moment but to take corrective actions and monitor results.

CORRECTIVE ACTION AT S3

The bung next to SW20a will be replaced to ensure that there is no seepage through it to cause contamination at S3. Subsequent monitoring at S3 will determine the success of this measure. Further measures will be required if this measure is not successful.

Remediation works are required at SW20a and will be completed as soon as possible. These relate to the excavation and cleaning of the drain/ditch at SW20a. If subsequent monitoring at SW20a indicates continued contamination further mitigation measures will be proposed to *The Agency*.

Remediation works were not completed during 2008. They were not executed as there was significant traffic along the access lane leading to the outer estuary for the first three quarters relating to works on the railway line. Following the completion of the Irish rail works on the Dublin-Belfast line the week ending the 4 July 2008, there were further issues relating to gaining access to the ditch from a private landowner. The access issue was resolved during quarter 4 and it is envisaged that these works will be completed during 2009.

Quarterly monitoring reports from 2009 shall include progress updates resulting from actions (i) and (ii) above.

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

These mitigation measures should yield improvements in water quality at SW20a, S3, SWV1 & SWFD.

3.3 Leachate

Leachate monitoring was carried out at the monitoring locations as defined in Schedule D of Waste Licence W0009-02 and shown on Figure DE07-164-03-001, Appendix I. Additional leachate monitoring wells have been installed, namely L19-L24. During the annual round of monitoring a number of wells were destroyed or inaccessible with the result that no sample was obtained for analysis, namely: - LMW2 (destroyed), LMW3 (blocked), LMW8 (blocked), LMW15 (Missing), LMW16 (Casing too high), L19 - 22 (No Access Safety), MB18 (No access to land granted).

3.3.1 Leachate Level Results

Waste Licence W0009-02 requires that a visual assessment is undertaken and the leachate level in every second well is monitored and recorded monthly and that chemical analysis of leachate samples is undertaken annually.

Results from the 2008 monitoring period are included in Appendix IV.

A trigger level of 5.5 meters above ordnance datum (m AOD) for leachate wells between LMW1 –to- LMW18 has been established, to indicate when leachate levels are approaching the top of the shallow vertical barrier at 6.0m above ordnance datum. Leachate was recorded above the trigger level at a number of leachate locations, particularly LMW3-6.

It is observed by site management that the leachate monitoring wells are set back from the vertical clay barrier by 18-20 m. The hydraulic gradient is likely to fall between the leachate monitoring wells and the vertical clay barrier. Consequently the levels at these wells may not reflect the leachate levels at the vertical clay barrier.

It is further observed by site management that P1a & b are fully open and thus the northern and southern leachate lines are fully open. Therefore leachate should not be building up in the body of the landfill.

Nevertheless, In accordance with the ERP trigger levels visual assessments were conducted on these slopes and there is no evidence of leachate break-out. This would corroborate the comments outlined above.

3.3.2 Leachate Quality Results

This section presents a summary of the chemical results. The full leachate datasets are included in Appendix V.

High levels of Ammoniacal Nitrogen, sodium, chloride and electrical conductivity, dominate the results from all leachate monitoring wells. It is noted that the levels for these parameters tend to be higher along the southern boundary than the eastern boundary.

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

individual grab samples from each of the leachate wells. The pumping chamber collects leachate from:

- Pipe1A – New cells
- Pipe 1B – Old northern boundary
- Pipe 1C – Southern boundary

The results in the pumping chamber reflect the results obtained from the individual wells on the landfill. High sodium and chloride correlate with high readings for electrical conductivity.

High levels of Conductivity, Ammoniacal Nitrogen, COD, Biological Oxygen Demand (BOD), total Phosphorous, ortho Phosphate, Sodium and Potassium, were also recorded in the pumping chamber at P1a, P1b and P1c

Results indicated that the annual composition of leachate at all monitoring locations at Balleally Landfill is those expected from leachate samples in an estuarine setting.

3.3.3 Volume of Leachate transported off-site.

The approximate volume of leachate tankered off-site for treatment in 2008 was 55,000m^3, this compares with 65,000m^3 in 2007 and 51,000m^3 in 2006.

3.3.4 Leachate Treatment Plant

As part of the Waste Licence W0009-02, Fingal County Council have to treat all leachate produced at Balleally Landfill, to levels specified by the Environmental Protection Agency, before it is safely discharged. The Balleally Landfill extension consists of six lined cells, with a network of slotted pipes for the collection of leachate in the base of each cell, connected to a pumping system for transfer to the Leachate Treatment Plant.

In addition to leachate that will arise from the landfill extension, the Leachate Treatment Plant will treat the contaminated surface runoff from the existing landfill and leachate from the southern and northern vertical barriers of the landfill.

Fingal County Council called for tenders for the Design and Construction of Leachate Treatment Plant during mid 2004. After assessment by RPS-MCOS Consulting Engineers, Response Engineering was appointed as successful Design and Construct Contractors for the Leachate Treatment Plant.

The leachate treatment plant is still at the commissioning stage. Treating residual hard COD to the licence Emission Limit Value of 125 mg/l has proved difficult. Fingal County Council will apply for a licence review during 2009 to amend the Emission Limit Values and Interpretations for given parameters in treated leachate before discharge to surface water.

During 2008 leachate was tankered from Balleally directly to Waste Water treatment facilities in Swords and/or via the 9C sewer to the Waste Water treatment facilities Ringsend.

3.4 Noise

Noise surveys were undertaken during every quarter of the monitoring period (2008) in order to assess the existing noise emissions from the site and to establish the existing noise environment at potentially sensitive receptors near the site in accordance with Schedule D of Waste Licence Reference 9-2. The location of noise monitoring points can be seen in Figure DE07-164-03-001, Appendix I.

Table 3.3 Noise Monitoring Locations

MONITORING LOCATION	DESCRIPTION	NORTHINGS	EASTINGS
NM1	Situated adjacent to the north-eastern boundary of the site.	321 919	252 357
NM2	Situated north east of the site boundary adjacent to Balleally Lane.	321 779	252 415
NM3	Situated East of the landfill 120m along Balleally Lane.	321 459	252 383
NM4	Situated north of the landfill along Rogerstown Lane.	322 604	252 962
NM5	Situated north of the landfill along Rogerstown Lane.	322 970	254 004

3.4.1 Equipment and Measurement Conditions

All measurements were taken in accordance with ISO 1996 (Description and Measurement of Environmental Noise) and the EPA Environmental Noise Survey Guidance Document.

The survey was carried out using a Brüel and Kjær 2260 Type 1 Sound Level Meter (SLM) with an outdoor microphone unit Type 4198. The instrument was calibrated prior to commencing each survey using the recommended calibration procedure and a known pure tone noise source. The unit was again calibrated on completion of each survey to record drift during the course of the day. Drift is normally associated with battery fade and temperature. The unit did not drift significantly during any of the surveys.

Good measurements require calm conditions to avoid spurious effects on the microphone, particularly at low frequencies. An average wind speed of less than 5 m/s is the preferred limit when noise measurements are being taken, with an upper

limit of 7 m/s. Weather conditions during all monitoring surveys were dry and calm and wind speed was observed to be less than 7 m/s for the monitoring period.

3.4.2 Measurement Units and Standards

The unit of sound pressure level is the decibel (dB). This is calculated as a logarithm of sound. A change of 10 dB corresponds approximately to halving or doubling the loudness of sound. The use of decibels (A-weighted), dB (A), as the basic unit for general environmental and traffic noise is widely accepted. Decibels measured on a sound level meter incorporating this frequency weighting differentiates between sounds of different frequencies in a manner similar to the human ear. That is, measurements in dB (A) broadly agree with human beings assessment of loudness. It has been demonstrated that noise levels in dB (A) from a wide range of sources adequately represent loudness.

In order to understand the terms used below, some definitions of the terms used are outlined as follows:

L_{AF10} Refers to those noise levels in the top 10 percentile of the sampling period; it is the level which is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of traffic.

L_{AF90} Refers to those noise levels in the lower 90^{th} percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level.

L_{Aeq} The average level recorded over the sampling period. The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

Impulsive noise: a noise of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

Tonal noise: A noise source that is concentrated in a narrow band of the frequency spectrum.

Table 3.4 Noise results 2008

LOCATION	Q1 2008			Q2 2008			Q3 2008			Q4 2008		
	$L(A)_{EQ}$	$L(A)F_{90}$	$L(A)F_{10}$	$L(A)_{EQ}$	$L(A)F_{90}$	$L(A)F_{10}$	$L(A)_{EQ}$	$L(A)F_{90}$	$L(A)F_{10}$	$L(A)_{EQ}$	$L(A)F_{90}$	$L(A)F_{10}$
NM1	53	43	56	**57**	57	56	59	34	62	**65**	43	67
NM2	**58**	39	56	**58**	40	54	**66**	39	64	**67**	46	69
NM3	**63**	41	61	**64**	40	54	**66**	45	69	**62**	46	65
NM4	**59**	45	54	**57**	40	54	**64**	46	66	55	46	54
NM5	50	45	45	45	38	45	63	45	67	52	44	50

3.4.3 NM1

During 2008, the dominant noise sources at this monitoring point were from local traffic on Balleally Lane, particularly passing over the speed ramps. Distant motorway noise, passing trains and birdsong contributed to background noise levels. Site plant associated with the capping programme and noise from bird scare devices on site and on tillage farms.

3.4.4 NM2

During 2008, the dominant noise source at this monitoring point was from local traffic on Balleally Lane and the sound of the traffic passing over speed ramps on the road. Sound from passing aircraft was noted during one of the quarterly rounds. Noise from bird-scare devices from tillage farms in the vicinity of the landfill also contributed to the dominant sound at this point. Birdsong contributed to background noise levels. No sounds from the site could be heard during the monitoring period.

3.4.5 NM3

During 2008 the dominant noise source at this monitoring point was from local traffic on Balleally Lane and the sound of the traffic passing over the speed ramps on the road. Passing aircraft were also sources of noise. Farm machinery in nearby fields, offsite bird-scare devices and a slow moving road sweeper were also noted during quarter 2 monitoring period. Birdsong contributed to background noise levels. Landfill activities were not considered contributory sources of noise during 2008.

3.4.6 NM4

During 2008, the dominant noise source at this monitoring point was from machinery working on-site and from vehicles passing on Rogerstown Lane. Bird-scare devices from local tillage farms in the vicinity of the landfill also contributed to the dominant sound at this point. Passing trains and aircraft contributed to non landfill source background noise levels.

3.4.7 NM5

During 2008, the dominant noise source at this monitoring point was from local traffic on Rogerstown Lane. Persistent noise came from M1 traffic, with intermittent birdsong, bird scarers, trains and aeroplanes contributing to background noise levels. Landfill activity sounds, engines and capping activities, contributed to background noise levels during the monitoring period.

3.4.8 Interpretation of Results

During the 2008 monitoring period, there was only two incidences were the EPA limit of 55 dB (A) for daytime noise was complied with, namely NM1 and NM5 in quarter 1. With the exception of NM4 and NM5, the dominant source of noise at these locations was not caused by activities at the Balleally facility. Local traffic on Balleally and Rogerstown lane are the main contributors to noise levels in the area, along with the noise from waste trucks travelling to and from the site.

3.5 Dust and PM_{10} Monitoring

Dust monitoring was setup out at 4 locations in accordance with Schedule D of the licence. The locations of these monitoring points are shown on Figure DE07-164-03-001, Appendix 1. During 2008 dust monitoring was undertaken in May-June, June-July and July-August.

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

Table 3.5 Dust Monitoring Locations

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

(PM Labels = PM10 monitoring locations)

Some dust stands were knocked over, blown over during June and the round had to be repeated again in July.

3.5.1 Dust Results

The dust monitoring results, as issued by Southern Scientific Services Ltd, for the 2008 monitoring periods are present in Table 3.6.

Table 3.6: Dust Deposition Results (mg/m^2/day) 2008

Sampling Point	May-June 2008			June-July 2008			July-August 2008		
	Organic Dust	Inorganic Dust	Total Dust	Organic Dust	Inorganic Dust	Total Dust	Organic Dust	Inorganic Dust	Total Dust
	mg/m^2/d	mg/m^2/d	mg/m^2/d	mg/m^2/d	mg/m^2/d	mg/m^2/d	mg/m^2/d	mg/m^2/d	mg/m^2/d
D1	25	93	118	54	49	103	55	50	105
D2	48	29	77	95	38	133	70	45	115
D3	29	<10	39	100	40	140	132	20	152
D4	20	24	44	<10	<10	<10	39	41	80

3.5.2 Interpretation of Results

An organic and inorganic analysis of dust was performed in addition to the total dust deposition analysis to give a greater understanding of the results. All dust results were under the trigger level of (350 mg/m^2/day).

Dust deposition monitoring has currently been undertaken 3 times during 2008, in compliance with Schedule D.3. of the waste licence W0009-02.

3.6: PM_{10} Monitoring

FTC carried out monitoring of particulate matter (PM_{10}) levels at locations PM1, PM2 and PM3 in accordance with Schedule D of the Waste Licence W0009-02, in October 2008. The locations of these monitoring points are shown on Figure DE07-164-03-001, Appendix 1.

PM_{10} monitoring was undertaken for a 24 hour sampling period at PM1-PM3. The PM_{10} filter was sent to Southern Scientific Services Ltd to be analysed for the presence of particulate matter in the air by gravimetric analysis.

3.5.3 Interpretation of Results

The PM_{10} monitoring results for the 2008 monitoring period are presented in Table 3.7.

Table 3.7 PM_{10} Monitoring Results

MONITORING PERIOD	MONITORING LOCATION	AVERAGE CONCENTRATION VALUE (µG/M3)
October	PM1	9.7
October	PM2	19.4
October	PM3	12.5

There is no emission limit set for PM_{10} in Schedule C of the licence but Condition 6.7 sets a trigger level of 50 µg/m3 for a daily sample.

The results in Table 3.7 show that during monitoring period the air quality is good at PM1-PM3 and the results are under the trigger level of 50 µg/m3 for a daily sample.

3.7: Landfill Gas

The location of the monitoring positions is shown on Figure DE07-164-03-001, contained in Appendix I. The monitoring results for 2008 are outlined in Appendix VI attached.

The locations are presented in Table 3.8. In addition to the perimeter Landfill Gas Monitoring locations two leachate monitoring wells (chosen at random) from each of the southern and eastern boundaries LMW1-LMW18 and two manholes MHL33 and MHL40 (Table 3.9) along Balleally Lane were also monitored. LMW1 – LMW18 boreholes are located in front of the vertical barrier installed along these boundaries and are in the leachate that is collected at these points. It should be noted that boreholes LMW1-18 are leachate sampling wells and not specifically designed for monitoring landfill gas. See Table 3.10 for grid references.

The boreholes were monitored for Methane (CH_4), Carbon dioxide (CO_2), Oxygen (O^2) and atmospheric pressure. It should be noted that the boreholes along the estuary were designed and constructed to sample leachate and groundwater and not specifically landfill gas.

Table 3.8 Gas Monitoring Locations

Borehole ID	Borehole Description	Easting	Northing	Depth of Borehole (m)	Top of casing level	Ground Level (m O.D.)	Sample
GA1	Northern corner of Cell 1	321 767	252 159	6	4.155	4.0	Perimeter Borehole
GA2	Western corner of Cell 1	321 986	252 383	6	4.314	3.3	Perimeter Borehole
GA3	Northern boundary of Cell 2	322 070	252 414	10	7.076	7.5	Perimeter Borehole
GA4	Northern boundary of Cell 3	322 170	252 415	10	7.370	7.66	Perimeter Borehole
GA5	Northern boundary of Cell 4	322 291	252 440	15	12.287	14.3	Perimeter Borehole
GA6	Northern boundary of Cell 5	322 389	252 467	15	11.864	13.3	Perimeter Borehole
GA7	Northern boundary of Cell 6	322 490	252 498	10	10.749	9.57	Perimeter Borehole
GA8	Northern boundary beside exit to landfill	322 614	252 542	6	5.503	4.981	Perimeter Borehole
GA9	North of cell 1 beside gate	321942	252347				Perimeter Borehole
GA10	Residents land opposite gate	321942	252393				Outside Perimeter Borehole
GA11	Residents land opposite gate	322039	252433				Outside Perimeter Borehole
GA12	Lands opposite entrance/exit between cell 6 and LMW18	322669	252575				Outside Perimeter Borehole
GA13	Field to North East of Site	322848	252666				Outside Perimeter Borehole

Table 3.9 Gas Monitoring Locations (outside waste)

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

Table 3.10 Leachate / Gas monitoring locations

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

3.5.4 Interpretation of Results

The Landfill Gas (LFG) results are included in Appendix VI. The results for perimeter locations are summarised in Figure 3.6 and Figure 3.7.

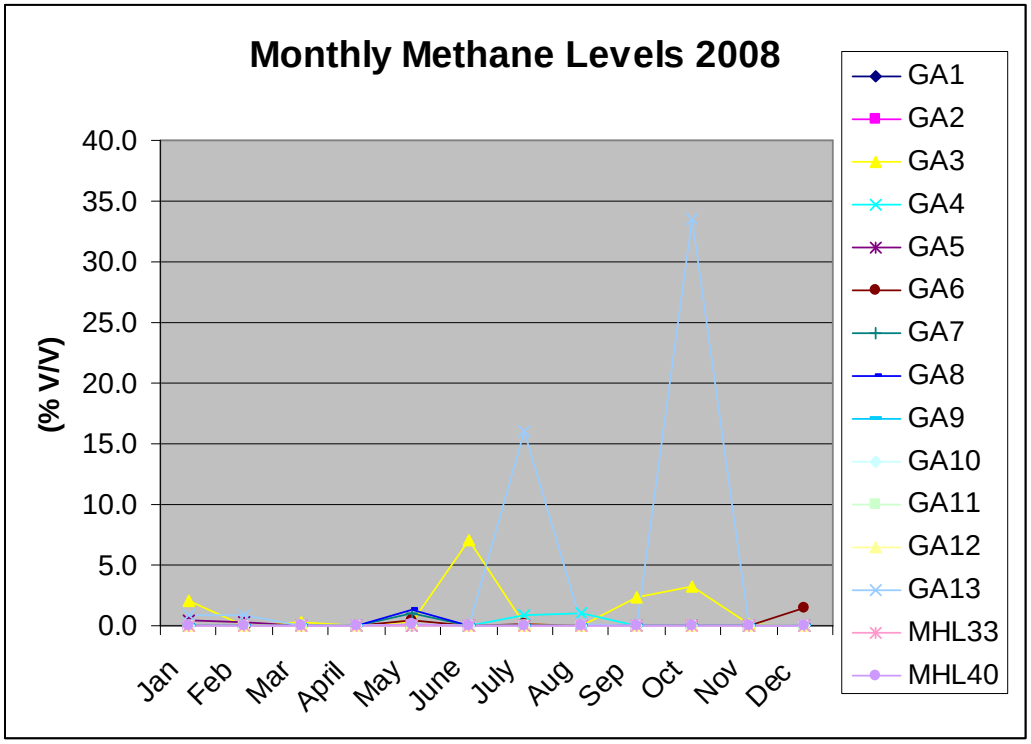


Figure 3.7 Monthly Methane levels 2008

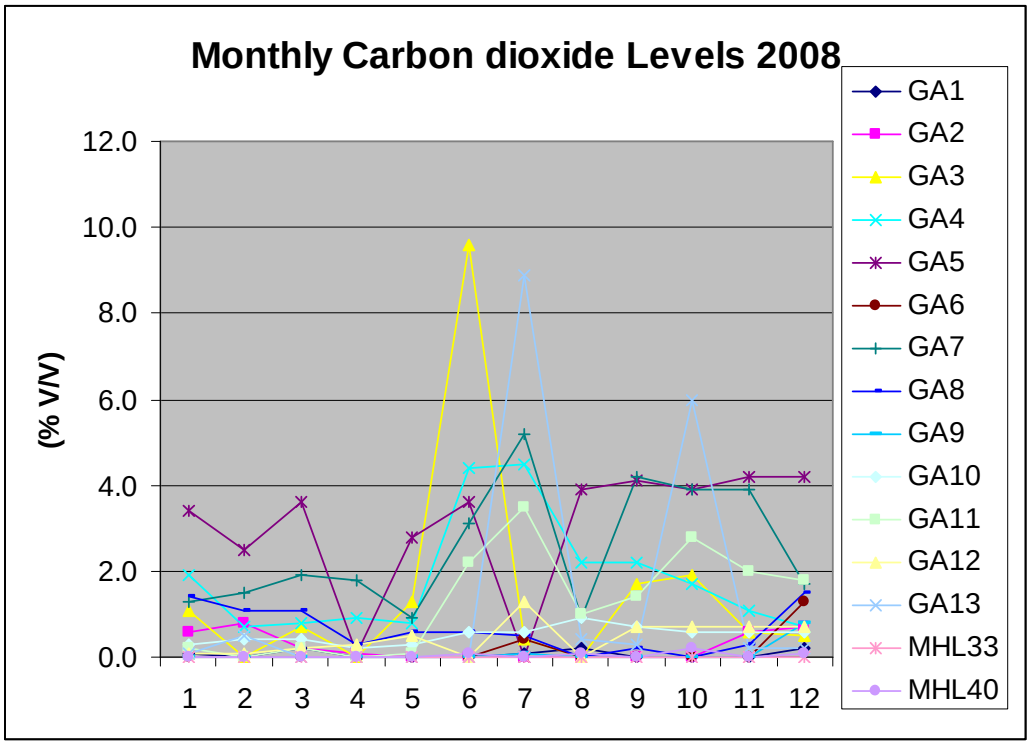


Figure 3.8 Monthly Carbon dioxide levels 2008

Results from monthly monitoring during 2008 are generally below the 1% trigger value for methane gas. However, there are exceedences of this limit at various locations during 2008; GA3 (three times), GA4 (once), GA6-8 (once) and also at GA13 (twice). These are situated along the north and north-eastern corners of the landfill. Sampling at greater distances from the northern perimeter G9 & G10 indicate that sensitive receptors are not at risk from these exceedences. FCC samples these locations weekly (except during the week upon which the monthly sampling occurs) and results are available for inspection at the facility office. The high CH_4 result in GA13 had led to daily monitoring by Fingal County Council (FCC) staff during the elevated period and the commissioning of a trace element analysis study. This report suggested that the source of the Methane at GA13 may not be landfill, but it was not conclusive, (Ref: FCC-W0009-02-2008-029).

Carbon dioxide levels exceeded the 1.5% trigger value at sampling locations GA3 (three times), GA4 (six times), GA5 (10 Times), GA7 (nine times), GA11 (five times) and GA13 (Twice) during monthly monitoring 2008. High concentrations of CO_2 can occur naturally at shallow depths of up to 2 m due to microbial activity associated with the roots of many types of vegetation.

Elevated levels of carbon dioxide were also reported at these locations during 2006 & 2007.

High methane and carbon dioxide values were also obtained at wells LMW1 – LMW18. However, the trigger levels set out in table C.2 of W0009-02 do not apply to LMW4, LMW5, LMW10, LMW14 or LMW18 as these monitoring locations are not located outside the waste body, as per condition 6.3.1 of the W0009-02. It would be expected that the in-waste gas wells have high LFG levels due to the degradation of waste material. The gas results obtained from sampling LMW1-LMW18 are those expected from the old unlined landfill, with mature waste.

In general, gas levels appear to be at their highest values during the third and fourth quarters of the monitoring period. This result is similar to values obtained during the 2006 and 2007 monitoring periods.

3.5.5 Installation of New Landfill Gas Management Infrastructure

10 No. 125mm diameter temporary gas extraction wells were drilled during Q2 2008 across Cell1, Cell 2 & Cell 3. The areas were selected after careful consultation with the staff at Balleally Landfill, in ascertaining the precise locations, which would reap the most gas based on what waste was landfilled. The spacing of the gas extraction system is approximately 45 m between each well on each line. The depth of each of the extraction wells is no deeper that 2 m above the base of the lined landfill at the point of each gas well. The wells were connected to the utilisation plant. Additionally six landfill gas monitoring / extraction wells were placed along the inner lower and upper haul roads and three rising landfill gas extraction wells were emplaced in Cell 5 in the active tipping area. These were installed in response to recommendations made by odour monitoring Ireland on foot of their surface emission survey of Balleally. The CQA document for these wells is available for inspection at the facility offices and was sent to The Agency (Ref: FCC-W0009-02-2008-030).

3.5.6 Summary report on emissions

As per Schedule D.7.1 of Waste Licence W0009-02 the licensee is required to carry out annual environmental monitoring of the Gas Combustion Plant/Enclosed Flare. Odour monitoring Ireland personnel conducted the survey on the 17th and the 18th November 2008.

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

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

Table 3.11 Result of emissions testing of landfill gas plant 2008

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

	TA LUFT CLASS II ORGANICS	COMPLIES
	TA LUFT CLASS III ORGANICS	COMPLIES
	HCl	COMPLIES
	HF	COMPLIES
	PARTICULATES	COMPLIES
FLARE	FLOW	COMPLIES
	CO	COMPLIES
	NOx	COMPLIES
	TA LUFT CLASS I ORGANICS	COMPLIES
	TA LUFT CLASS II ORGANICS	COMPLIES
	TA LUFT CLASS III ORGANICS	COMPLIES
	HCl	COMPLIES
	HF	COMPLIES

NO_x as No2, particulates, Total Non Methane Volatile Organic Compounds, Hydrochloric acid and Hydrogen fluoride were low in the gas utilisation engines and within Emission Limit Values set out in Schedule C.5 of the Waste Licen

CO emission concentration values were above the 650 mg/Nm^3 Emission Limit Value established for Waste Licence W0009-02 at BY02, 03 & 05. These gas utilization engines were below the Emission Limit Value (1400mg/$m^{3)}$ set for Carbon monoxide in other licences, e.g. W0127-01.

3.6 Meteorological Monitoring

Condition 8 and Schedule D.6 of Waste Licence W0009-02 require daily monitoring of precipitation volume, temperature (max. /min.), wind force and direction, and atmospheric pressure.

It has been previously reported (AER, 2007), that there were a series of ongoing problems with the operation of the meteorological instrumentation and equipment on site and the retrieval of recorded information. Attempts to resolve the issues with the company have proved difficult. A consultant was engaged with a view to commissioning a new system. They recommended relocating the weather station approximately 200 m SW of existing station. The weather recording equipment has been ordered and procured. The civil engineering works have commenced. It is anticipated that the weather station will be assembled in 2009.

As a result of the problems encountered a summary of the meteorological data recorded at Dublin Airport is included for the period. Dublin Airport is situated 10 km southwest of Balleally landfill and the weather station is used by Met Éireann for official statistics. The package used by them was developed in-house and maintained by their own staff.

July had the highest maximum mean monthly temperatures. Rainfall was most intense during the summer and early autumn with July, August and September registering the highest volumes of rainfall. The site was predominantly affected by south westerly winds.

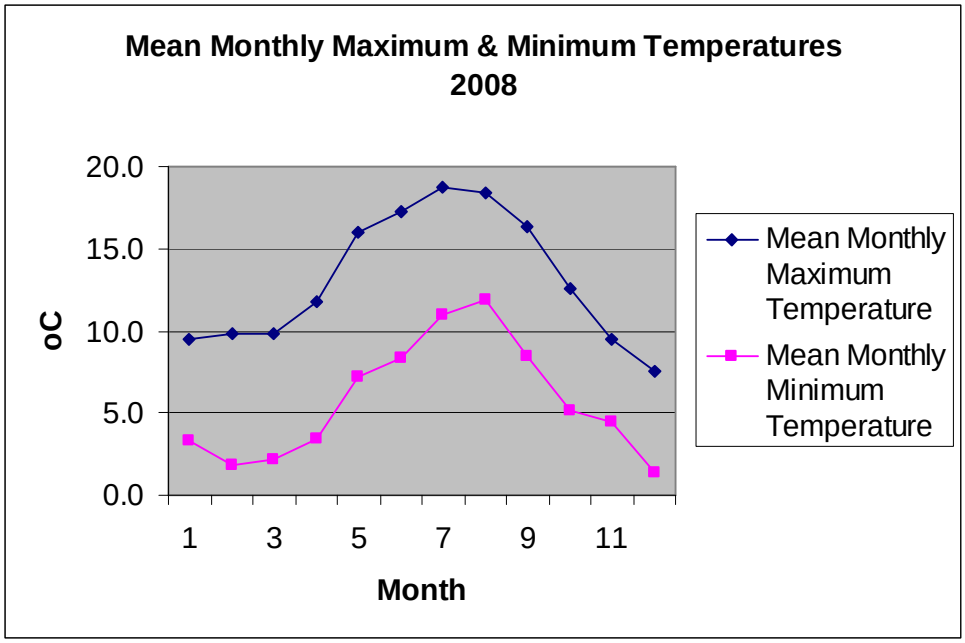


Figure 3.9 Average daily temperatures (min./max.) by month 2008.

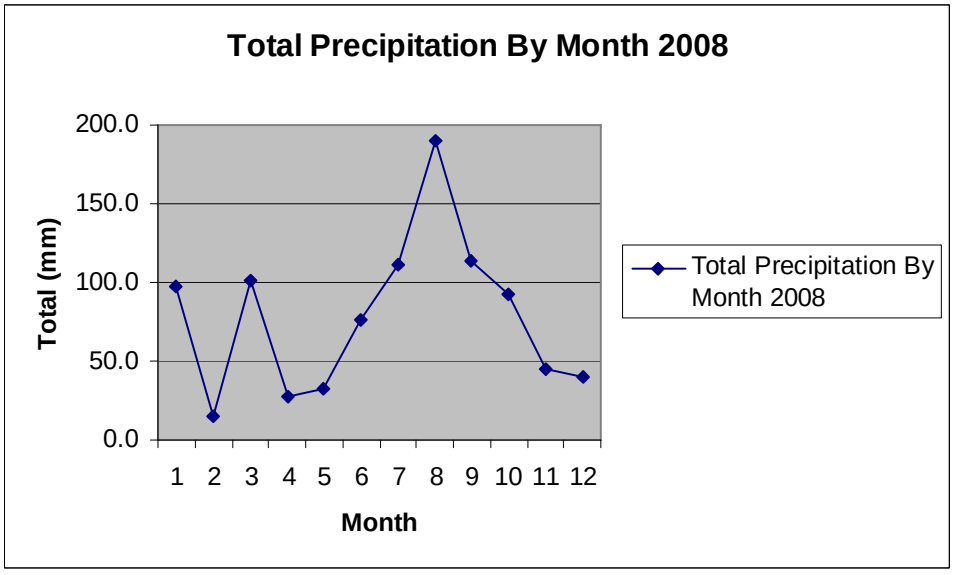


Figure 3.10 Total precipitation volume by month 2008

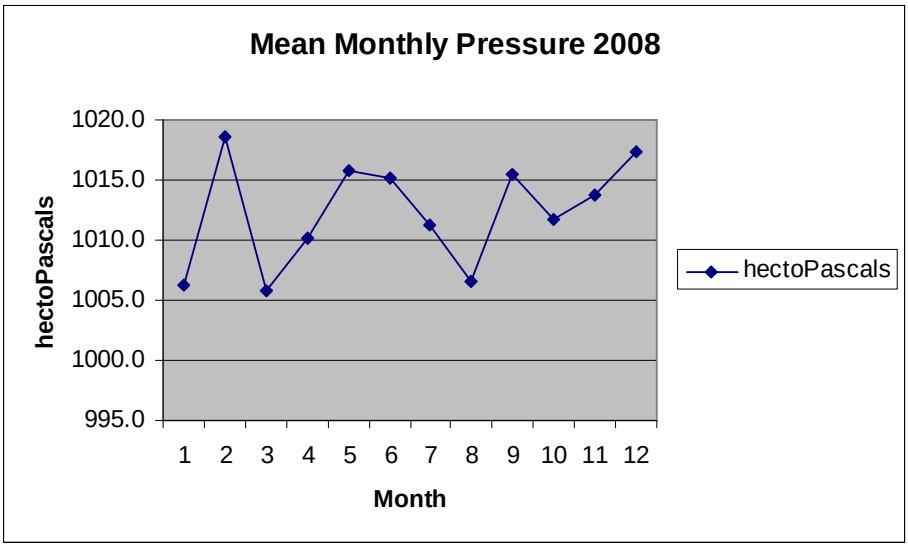


Figure 3.11 Average daily atmospheric pressure by month 2008.

Table 3.12 Average daily Wind Speed, Min / Max, Standard Deviation by month 2008.

Month	Mean Speed (knots)	Min Speed (Knots)	Max Speed (Knots)	Standard Deviation (Knots)	Direction (degrees)
Jan	14.6	0	39	7	214
Feb	12.2	0	36	8	186
Mar	15.0	3	41	6	233
Apr	11.7	2	31	5	205
May	9.7	0	26	5	115
Jun	10.0	0	33	5	229
Jul	10.8	0	21	4	200
Aug	10.4	2	24	4	225
Sept	9.5	1	25	5	210
Oct	12.6	0	28	6	234
Nov	12.4	1	25	5	241
Dec	10.2	0	31	5	215

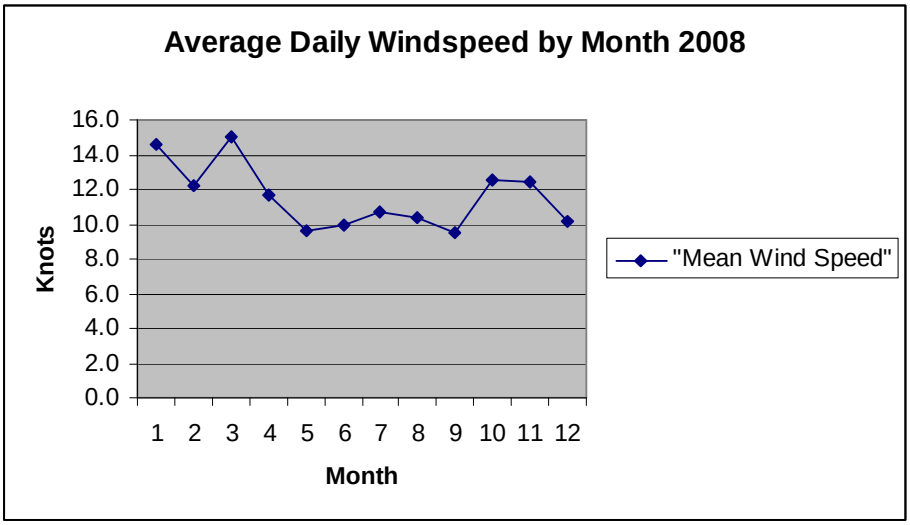


Figure 3.12 Average daily wind speed by month 2008.

The winds are predominantly South Westerly in direction.

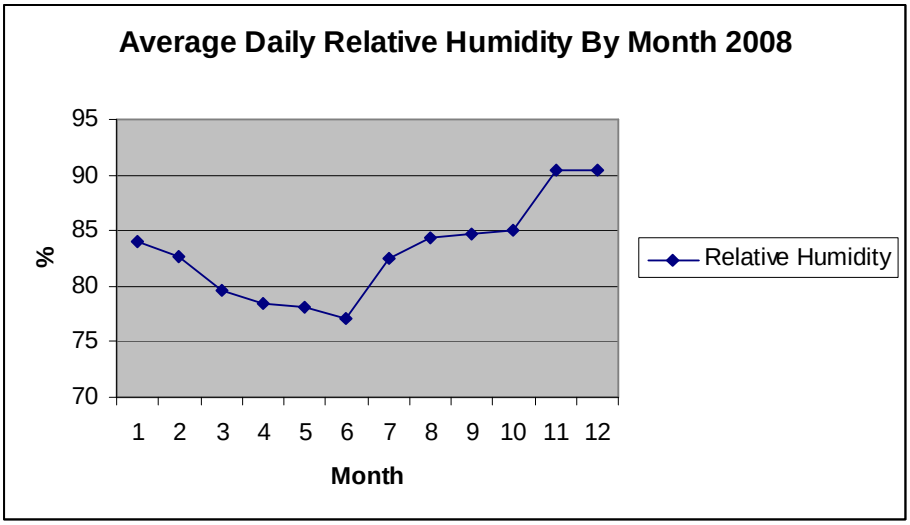


Figure 3.13 Average daily relative humidity by month 2008

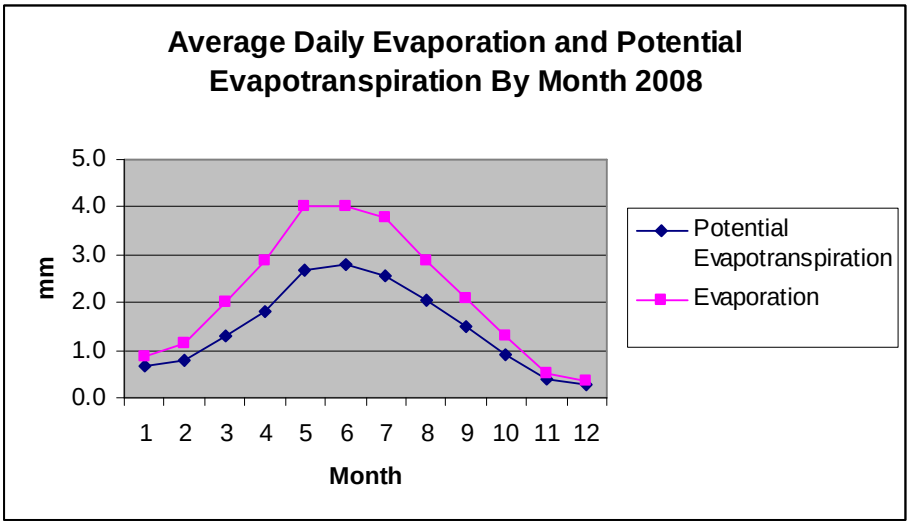


Figure 3.14 Average daily evaporation and potential evapotranspiration by month 2008.

3.7 Resource Consumption

Resources consumed at Balleally Landfill include diesel fuel, electricity, hydraulic oil and lubricating oil. Table 3.13 presents a summary of the quantities of each used on site for the period of this report. Electricity consumed on site was used for the purpose of heating, lighting, the operation of office equipment. The largest consumer of electricity is the leachate treatment plant.

There was a decrease in diesel consumption in 2008, reflecting less capping and tankering. No major generators were run this week year.

Table 3.13 Summary of resources used on site for the reporting period.

Resource	3.8 FCC
Electricity	**295,921** KWh
Diesel	207,672 litres
Petrol	120 litres
Lube Oil	1000 litres (Estimate)

Table 3.14 Electricity consumption on site for the period January 2008 to December 2008.

Year	Site 900109623	Site 901532286	Leachate Treatment Plant 902446909	KWHr Total
2008	1,832*	91,350*	202,739*	295,921*
2007	1,726*	84,900*	202,669*	289,295*
2006	2,109*	97,600*	73,420*	173,129*
2005	1,033*	115,050*	N/R	115,050*
2004	NR	66,250*	N/R	66,250*
2003	NR	NR	N/R	89,155 @
2002	NR	NR	N/R	76,529 @
2001	NR	NR	N/R	55,453 @
2000	NR	NR	N/R	49,016 @

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

Note:

1) There was a significant increase in electricity consumption in the period 2006 – 2008, from previous years as can be observed from Table 3.14. This is attributable to the operation of the new on-site leachate treatment plant, which has the capacity to treat 150m^3/day.

2) The electricity consumption has increased consecutively since the year 2000 with the exception of 2004.

Table 3.15 Equipment and Plant list at Balleally Landfill and quantities 2008.

Type of Item	Item	Quantity	Resource Used
Transport	02 D 76790 Isuzu 4X4 *	1	
	01 D 45819 replaced by 04 D 68456 Ford Fiesta Van*	1	
	04 D 76878 Ford Transit Mini Bus*	1	
	03 D 4835 Isuzu 4X4*	1	
	06 D 77339 VW Twin Cab Pick Up*	1	
Plant	04 D 64948 John Deere 4X4 Tractor*	1	
	07 D 7332 Same Tractor*	1	
	01 D 78637 Renault 7.5t Truck *	1	
	02 D 5577 Renault 4 axle skip lifter*	1	
Heavy Plant	Duratec 3010 Tub Grinder (now sold) *	1	Diesel
	Cat 302.5 mini Excavator*	1	Diesel
	Diesel H/P power washer and Bowser*	1	Diesel
	Bomag 671 compactor*	1	Diesel
	Kamatsu 65px dozer*	3	Diesel
	Cat excavator 330*	1	Diesel
	Kobelco 355 Excavator*	1	Diesel
	15 Ton Vibrating Roller*	1	Diesel
	3 Ton Vibrating Roller*	1	Diesel
	10 KVA 3 Phase Generator*	2	Petrol
	Case 80 5 ton excavator*	1	Diesel
	H.P. Diesel Bowser & Bowser*	1	Diesel
Auxiliary Plant	Scarab Major Road Sweeper*	1	Diesel
	2 Ton Forklift*	1	Diesel
	Wacker Plate*	1	
	CONSAW*	1	Petrol
	6 inch pump*	1	Diesel
	4 inch pump*	1	Diesel
	2 inch Pump*	1	Petrol
	6.5 KVA diesel generator*	1	Petrol
Equipment	Extrusion welder*	1	
	Ingersoll-Rand mobile lighting set*	1	
	Wedger Seam Welder*	1	
	Lyster heater / welder*	1	
Survey	Sokkisna level and tripod*	1	
	Sokkisna theodolite & Tripod*	1	
	NIKON auto level*	1	
	Garmen GPS*	1	
	GMI gas monitor*	1	
	Multi 340I meter*	1	
	GMI FI 2000*	1	
	30 Metre steel Tape*	1	
	Solinist 30m dip meter*	1	
	Psion organiser*	1	
	Various P.C.s and printers*	1	

GCL – Geosynthetic Clay Liner

3.8.1 Resource Use and Energy Efficiency Audit

On 28th October, 2005 the Environmental Protection Agency issued a technical amendment (B) inserting a new Condition 2.5. This condition requires Fingal County Council to carry out an energy efficiency audit. The audit must:

i) identify all opportunities for energy use reduction and efficiency;
ii) be carried out in accordance with the guidance published by the Agency – "Guidance Note on Energy Efficiency Auditing", and
iii) be repeated at intervals required by the Agency.

The recommendations from this audit should be incorporated in the Schedule of Environmental Objectives and Targets under Condition 2.3. Opportunities for reducing water consumption and identifying recycling and reuse initiatives will be investigated and an assessment of the efficiency of use of raw materials in all processes will be carried out.

Energy Efficiency Audit

The best practice Specific Energy Consumption (SEC) sometimes called the Energy Performance Indicator (EPI), of the sector and of any significant processes is determined where possible. The site SEC's are then compared to the best and the average practice. Any discrepancies were investigated during the 2006 energy audit.

The energy audit identified the site SEC. This may be used as a benchmark to identify the success or otherwise of the implementation of the recommendations.

Implication of Audit Findings.

No SEC data could be found for comparable industry sectors and thus no comparison of the site's SEC with others could be made.

The energy audit identified a number of recommendations that could be implemented. Implementation of these will result in a reduction of energy cost and green house gas emissions. However in comparison to other industrial sites the energy consumed at Balleally Landfill is very low, especially when it is considered that Fingal County Council do not directly control the diesel used by the hired heavy plant vehicles. As the energy consumption at Balleally is so low, it is proposed that it may not be necessary for Fingal County Council to have further energy audits conducted at the site.

3.9 Landfill Gas Utilisation

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

The power station/utilisation plant operators, Bioverda Power Systems Limited, regulate the inflow of gas to the station in order to achieve the 50% Methane target. The total power output from the station for the period is shown in Tables 3.16 & 3.17.

Utilisation was reduced during the period 2004-2006 due to the re-location of the plant and repairs needed to the main gas collection pipe. Field reconfigurations were also required due to the advancing capping programme. During 2007, 24 new gas wells were installed in cells 1 & 2. An increase in the gas extraction network occurred in 2008 with the emplacement of an additional 10 new gas wells in cells 1-3. Three "rising landfill gas extraction wells" were placed in the active tipping area (Cell 5) during 2008. The success of these measures has resulted in a consistent increase in electricity production from gas extraction from 2006 through to 2008 (Table 3.16 & 3.17).

Currently sufficient gas is being extracted to run 4 engines.

Table 3.16 Electricity output (MWhr) from the on site power station at Balleally Landfill per year 2003-2008.

YEAR	ELECTRICITY OUTPUT (MWhr)
2003	30,194
2004	21,636
2005	21,234*
2006	20,529*
2007	23,762
2008	27,117

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

Table 3.17 Electricity output (MW) from the on site power station at Balleally Landfill

Month	Combined AER1 & AER3 (MW)
January	2612
February	2394
March	2545
April	2455
May	2594
June	2042
July	2007
August	1856
September	1708
October	2243
November	2276
December	2385
Total	**27,117**

3.10 Review of Nuisance Controls

Condition 7 of Waste Licence 9-2 requires that vermin, birds, flies, mud, dust, litter and odours do not give rise to nuisance at the facility or in the immediate area of the facility. To this end a review of the nuisance controls was initiated.

The Nuisance which gives rise to greatest number of complaints is odour. FCC received fourteen complaints from local residents regarding **odour** emanating from the landfill site on 23rd January, 11th & 12th February, 16th & 22nd April, 16th June, 24th & 30th July, 24th-26th September, 8th October & 28th October & 2nd November. All complaints were responded to as soon as possible after the time they were reported. Odour monitoring Ireland visited the site twice during the year and made many recommendations for odour / surface emission control (EPA Refs. W0009-02/gen43mh & W0009-02 / ak60em). Many of these recommendations have been implemented to date and the remainder are to be completed during 2009 in an effort to further improve odour control.

Where these complaints or weekly nuisance inspections reveal odours associated with landfill activities landfill management take corrective action. Expert advice was sought previously on the installation of effective odour control. The company chosen goes by the name of *Mist-Air* and they are based in the United Kingdom.

Mist Air odour neutraliser is an alternative gas cleaning technology that achieves the transfer from odorous gases to a non-odorous liquid. This is achieved by mixing the contaminated air efficiently with the absorbent mist at the optimum ratio of volume to surface area causing a rapid transfer of the odorous gases into the liquid phase, thereby preventing a smell. The neutraliser is totally biodegradable, together with the many odorous causing pollutants and is safe for animals, humans and plants life. It absorbs Ammonia, Alcohol's, Hydrogen Sulphides, Sulphur Dioxide, Ethyl Mercaptans, Amines and many more gases.

The misting system is a base unit housed in a free-standing lockable steel cabinet that provides all the power for the system. A reinforced circulation hose is then fed from the base unit to the various circuits required from around the site.

The static manifolds are fitted with stainless steel atomising jets. These are mounted around the site at 7 meter centres. The system is currently installed around the active Cell 5. The static manifolds were attached to their own independent poles during late 2005. This is a change in practice based on the idea that if they have their own fixed position then they do not have to be continually moved with the litter netting as the active cell changes levels as filling progresses. This should mean less maintenance and air blocks, which will improve the effectiveness of the system's performance.

Since the construction of the speed ramps along Balleally Lane, there has been an increase in the amount of **mud** deposited on the road. FCC reviewed the road-sweeping programme and had a few trial runs with a footpath-cleansing vehicle and various roadsweepers. It was decided to purchase a larger road sweeper (Scaribb Minor) that had the ability to clean the mud deposited at the ramps and on the road more effectively.

3.11 Review of Bird Control January to December 2008.

Bird Control Ireland visited Balleally Landfill site for the purpose of Bird Control between January 2008 and December 2008.

During this time the site was visited once per month and a jointly operated programme was run. The programme objective was to reduce the numbers of scavenging birds during operational hours to a minimum. During each visit the company undertook efforts to reinforce the daily bird control activities. Bird Control Ireland Ltd recorded their activities in the site manual.

Site staff were responsible for deployment of equipment each day and for keeping daily records. Site equipment was deployed daily during the year though foul weather prevented their usage on a number of days. Damaged equipment was replaced during the year.

Gulls and crows were the most common pest bird on site throughout 2008. Gulls made several attempts throughout the year to raid the site but were moved on with distress calls and visual deterrents. No gulls were harmed during any visit by Bird Control Ireland Ltd.

Bird numbers were much reduced during the Spring and Summer when kites were flown daily and distress calls played regularly. Over all bird activity during the year was excellent.

Activities undertaken during the year included -

- Flying falcons and hawks.
- Use of species specific distress calls.
- Flying various types of kites.
- Use of shot gun.
- Bird scaring (pyrotechnic) cartridges.

Management Duties included -

- Liaison with Site Management.
- Maintenance of Site Log.
- Variation of activities to achieve best results.
- Monthly bird survey and report.
- Equipment maintenance.
- Year end report.

The Balleally project has achieved a measure of success for a low level programme.

Birds can be moved when required using site equipment. During time of severe weather conditions, raiding birds prove more difficult to manage however.

Both BCI and the Council are conscious that the Rogerstown Estuary is an important sanctuary and the programme activities have been tailored to take this into consideration. Throughout the year birds were noted on the Estuary flats before and after control activities.

Bird distress calls were noted to be effective however the fixed system on site did not seem to have the same effect as calls played manually from other locations on site. It seems that a degree of habituation may be affecting the fixed distress call unit.

The speakers for the system are also damaged. The machine would benefit by being moved regularly so as to present a “new” call in respect of the birds.

BCI will provide for some extra visits to site during times of high bird pressure during 2009.

3.12 Recommendations

1. Deploy deterrent equipment as often as weather permits
2. Effect repairs to distress call system and set up in a more mobile fashion
3. Review visit regime with BCI Ltd

4. SITE DEVELOPMENT WORKS

4.1 Work carried out in the reporting period 2008

Table 4.1 Work carried out during 2008.

Objective/ Target	Description	Timescale
Objective 1	**To minimise environmental impact on the immediate environment**	
Target 1	**To remediate banks around existing and new boreholes and up update TOC readings.** Some Tics resurveyed and all relabelled in *situ*.	Ongoing.
Target 2	**To review and extend gas abstraction network in newly capped areas.** Significant new areas harnessed 10 new wells in Cells 1-3. 6 new pin wells along haul roads and three new rising wells in tipping area (Cell 5).	Ongoing
Target 3	**To start the installation of concrete paving around LTP.** Partial Completion 2008.	Ongoing.
Target 4	**Complete Commissioning of Leachate Treatment Plant & Centrifuge.** All parameters in compliance except for COD. Centrifuge to be fully commissioned –	Ongoing,
Target 5	**Complete capping of phases 3 and 11.** Phase 3 complete. Cells 1-4 capped within Phase 11.	Ongoing.
Target 6	**Determine manual procedure for checking leachate levels in the cells.** Placed second level detector (pressure transducer) in cells.	Ongoing
Target 7	**Install leachate borehole(s) near SVB at western end of site & Repair Leachate Monitoring Boreholes at NE section of Site.**	Complete

	Installed leachate borehole(s) near SVB at western end of site & Repair Leachate Monitoring Boreholes at NE section of Site.	
Objective 2	**Restoration of the facility.**	
Target 1	**Installation of final capping layer.** Phases 2 & 3 Complete. Cells 1-4 capped within Phase 11.	Ongoing
Target 2	**Prepare capped areas for landscaping** Phases 2 & 3 Complete. Cells 1-4 capped within Phase 11.	Ongoing
Target 3	**Prepare Landscaping Plan for implementation in 2008 to include planting of northern boundary adjacent to gas plant area, Balleally Lane / Landfill northern boundary (after final capping installed) and capped southern and eastern boundaries up to 27m contour line.** Grass seeding of capped areas ongoing. No other planting this year. Liaison with Parks Department ongoing. Plans will be submitted to The Agency following observation in 2008 Annual Audit Report.	Ongoing
Target 4	**Examine the completion of a shallow vertical barrier at the northern boundary for implementation during restoration of site.** No Progress to report.	Ongoing
Target 5	**Demobilisation of Civic Amenity Area.** Civic Amenity Demobilised.	Complete
Target 5	**Agree proposal with *The Agency* to temporarily erect a sculpture on the facility.** Proposal sent to and Agreed by The Agency – structure erected.	Complete.

4.2 Works for next reporting period (2009)

Table 4.2 Works to be carried out during 2009.

Objective 1	**To minimise environmental impact on the immediate environment**	
Target 1	Update TOC readings and *in situ* labelling around existing and new boreholes.	Feb-Dec 2009.
Target 2	To review and extend gas abstraction network during 2009 in recently capped areas of new cells (3-4). Place extraction wells along SW lobe of old landfill and adjacent to first lift anchor trench along cells 3 & 4.Emplacement of wells in Active Cell #6. Review replacement of some existing wells.	Feb-Dec 2009.
Target 3	Seal leachate risers in pump chambers and apply negative pressure.	June 2009.
Target 4	To provide for Leachate Recirculation in Cells 5 & 6.	Feb-Dec 2009.
Target 5	To progress the installation of concrete paving around Leachate Treatment Plant (LTP).	Feb-Sept 2009.
Target 6	To Complete Commissioning of Leachate Treatment Plant & Centrifuge. Apply for Licence Review.	March 2009.
Target 7	To Commence Capping of northern flanks of cells 5& 6 and tie into base anchor trench. To commence capping of former Civic Amenity Area.	March-Dec 2009.
Target 8	To Prepare grade and place liner for second lift Piggybacking above the haul road Cells 4-6.	March-December 2009.
Target 9	To complete mitigation measures to deal with surface water contamination at SW20a.	March-Dec 2009.
Target 10	To investigate mitigation measures for the prevention of leachate breakout along the southern boundary of the landfill.	March – Dec 2009.

Objective 3	**Restoration of the facility.**	
Target 1	Commence Capping of northern flanks of cells 5& 6 and tie into base anchor trench. To Commence Capping of old civic amenity area.	March-Dec 2009.
Target 2	Prepare capped areas for landscaping.	Jan-Apr 2008.
Target 3	Prepare Landscaping Plan for implementation in 2009 to include planting of northern boundary adjacent to gas plant area, Balleally Lane / Landfill northern boundary (after final capping installed) and capped southern and eastern boundaries up to 27m contour line.	Grass seeding of capped areas ongoing. No other planting this year. Liaison with Parks Department ongoing. Any New Landscaping Plans will be submitted to The Agency following observation in 2008 Annual Audit Report.
Target 4	Examine the completion of a shallow vertical barrier at the northern boundary for implementation during restoration of site.	Apr-Dec 2009.
Target 5	To Prepare Plan for the demobilisation of existing facility offices to a new location.	Jan-Dec 2009.

4.3 Progress on Site Restoration

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

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

Figure 3, Appendix 1, indicates the agreed phases for the capping and restoration of Balleally Landfill. The phasing provides for the restoration of the original landfill initially, and then the landfill extension area. The total area for capping is 46.84 Hectares (115.74 Acres).

Between 2004 and December 2007, 26.24 Hectares (64.85 Acres) were capped. During 2008, an additional 7.34 Hectares (18.14 Acres) were capped. Which means

that, along with the "Old Landfill", Cells 1, 2, 3 and 4 of the new landfill, are now capped, see Figure 4 Appendix 1. A total of 33.59 Hectares (82.99 Acres) is now capped, this equates to 71.7% of the entire landfill.

A proposal was sent to The Agency (Ref: FCC-W0009-02-020) on 22/9/2008 to provide for a second lift "piggybacking" between "new cells" and Top Lobe of the old landfill. This proposal would give a void space of 176,000 tonnes. This proposal was agreed to, subject to conditions, by *The Agency*, (Ref: W0009-02 / ak61em).

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

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

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

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

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

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

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

The total area of the site is 124 Acres. The Licence area is 124 Acres.

See below statistics of capping programme:

Start Date of Capping Programme: May 2004
Progress as of 18th December 2007: Approx. 82.99 Acres (33.59ha)

The final capping profile is made up of:

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

See Appendix I, Figure 4 indicating the areas capped in 2008 and the proposed areas for 2009.

4.4 Annual Topographical Survey

In accordance with Condition 8.5.1 of WL W0009-02 a Topographical Survey was undertaken in Balleally Landfill in September 2008 and submitted to The Agency 10/10/2008 (Ref: FCC-W0009-02-2008-023).

4.5 Slope Stability

As required under Licence Condition 8.8.1. a slope stability survey was undertaken in Balleally Landfill during October 2008.

Amongst the conclusions in the survey report is the statement that, "*The accessible slopes at Balleally Landfill are considered by BMA to be, in general, in good condition and stable."*

<u>The following recommendations were made;</u>

"…….
Temporary slopes should be monitored and inspected for signs of slope instability or distress at regular intervals and especially after exceptional rainfall events.

Vegetation of any un-vegetated, permanent slopes should be carried out as soon as possible……

The minor slope stability issues identified in this report should be addressed as soon as possible".

These recommendations have been communicated to site management and will be implemented.

"Consideration should be given to the establishment of specific monitoring points along the southern slope for measurement during the annual topographic survey."

This recommendation will be discussed with Topographic Survey Company with a view to incorporating it into annual topographic survey.

5. WASTE RECEIVED & CONSIGNED FROM THE FACILITY

5.1 Waste Acceptance & Handling

5.1.1 Waste Reception

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

The system has been in operation since the 25th of May 2005 and consists of two weighbridges, one "in" and one "out". These are linked to a computerised system. An automatic barrier system is proposed to be linked to the computerised system. This will consist of one barrier to prevent the lorry being driven off the weighbridge prematurely and another to prevent the ensuing lorry from getting too close to the weighbridge. The capacity of both weighbridges is 50,000/60,000Kg and the deck size is 18m x 3.6m.

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

Written records of loads arriving on site are maintained. These include the date, weight (tonnes), origin (producer/collector), description of waste (EWC code), the carriers name, vehicle registration and special handling/pre-approval permit number (where applicable) is recorded. The initial point of inspection is the weighbridge and the name of the operator is recorded electronically by the GeneSYS system as the person checking the load in the first instance. Written operational procedures for waste acceptance are available and used for training staff on-site.

The weighbridge is located a few hundreds yards north of the administration building where a service hatch permits communication with the driver and inspection of documentation accompanying the waste consignment (Waste Acceptance Form A, B or C, Permit (if applicable). The site reception area is laid out in a one-way system, which assists the through flow of vehicles. No vehicles deemed unfit to use the site roads are allowed access. Rejected loads are recorded as per Condition 10.2 (i) of the Waste Licence 9-2 detailing the date and type of waste rejected and the facility to which they were directed.

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

Acceptance of waste is as per Schedule A of the Waste Licence Reg. No. 9-2 Waste Acceptance policy agreed by EPA as per condition 5.2.3 and Condition 1.6 of the licence.

Wastes not acceptable are liquid wastes, animal wastes, construction and demolition wastes, whole used tyres and hazardous wastes. Difficult wastes that require special handling can only be accepted if the Environmental Services Department of the Council has given prior authorisation at County Hall, Swords. Authorisation is by means of a valid permit (which expires one month after the date of stamping by the Environmental Services Department) and details the waste type, quantity and any special instructions required by site personnel.

Following acceptance of the load the weighbridge operator directs traffic to the relevant working area for the waste type where a banksman in charge of traffic will give further instructions to drivers.

5.1.2 Waste Inspection

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

A visual inspection can be performed at the weighbridge, if possible. Alternatively, the load can be tipped adjacent to the relevant tipping face and inspected by the designated waste inspector. Where a breach of the law is suspected, the EPA and the Gardaí will be informed.

Where a breach of the waste acceptance policy is suspected the load can be diverted to the Waste Inspection Area/Quarantine Area for further inspection.

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

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

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

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

Where inspection of a load is not possible at the site reception area (e.g. sealed containers), then the waste is deposited on the ground close to the working face. This permits inspection of the load prior to blading and burial. If a non-conformity is discovered or suspected, the waste is isolated and placed back in the transporting container or suitable alternative and removed to the Quarantine area pending management investigation. If the non-compliance is confirmed and deposit on the

site not possible, then the load is returned to the carrier, and the producer and authorities informed. Written records of the incident are recorded at the Weighbridge in the Rejects Book. Loads held on-site overnight are recorded in the Quarantine Register.

5.1.3 Inspection/Quarantine Area

An inspection area is provided as per condition 3.7 of the Waste Licence Reg. No. W0009-02. Any waste not conforming with schedule A and/or agreed Waste Acceptance Policy as per condition 5.2.3 will be rejected and removed off-site or placed in the quarantine area. Random loads and suspect loads will be diverted to the Inspection area for spot checks.

Summary of Waste Received & Consigned

Table 5.1 Quantity and type of waste deposited in Balleally Landfill in 2003-2008 and waste licence limit for Waste Licence W0009-02

Waste Type	Licence Limit (tonnes)	Deposited in 2003 (tonnes)	Deposited in 2004 (tonnes)	Deposited in 2005 (tonnes)	Deposited in 2006 (tonnes)	Deposited in 2007 (tonnes)	Deposited in 2008 (tonnes)
Household	152,500	61,201.52	65,814.99 (+ 6,099.56 C.A) 71,914.55	66,203 (+ 5,801 C.A) 72,004	62056 (+4,891 C.A.) 66,947	63,708 (+4,867 C.A.) +62 F.T. 68,637	50,489 (+ 3,959 C.A.) +10 F.T. 54,458
Commercial	200,000	150,454.96	119,890.35	49,195.57	63,819	61,773	46,248
Sewage Sludge	30,000	4,494	5,104.58	3,402.24	4,623	7,466	5,091
Industrial Non-Hazardous Sludge	6,000	5,749	5,992.8	6,635	6,825	7,061	6,660
Total	**388,500**	**221,899.48**	**202,902.28**	**131,236.81**	**142,214**	**144,937**	**112,457**

C.A – Civic Amenity

Note: As can be seen from the above figures during 2005-2008, the industrial non-hazardous sludge from Leixlip waste water treatment plant exceeded the licence limit of 6,000 tonnes. This is attributable to the expansion of the plant due to an increase in demand for potable water and subsequently an increase in production. Sewage sludge is from Barnageera Sewage Treatment Works which accounted for increases in this waste stream during 2007, no longer comes to Balleally Landfill.

Waste received at Balleally to be disposed of at the landfill is weighed at the weighbridge on entry. A waste acceptance policy has been prepared as per Condition 5.2. This enables the recording of waste into and out of the facility as per Condition 10.2 and 10.5.

5.2 Quarantine Register

Vehicles are taken into quarantine at Balleally Landfill for inspection under the Operation Bruscar Scheme.

Operation Bruscar Introduction:

On Saturday, 16th November 2002 a joint operation between guards and authorised persons under the Waste Management Act, 1996 commenced. This operation was codenamed "Operation Bruscar".

The authorised persons involved identified vehicles that were transporting waste and requested the guard to stop the identified vehicle. The waste on the vehicle was examined and the driver was questioned with regards to the origin and eventual destination of the waste. If, in the opinion of the authorised person, it was necessary to prevent environmental pollution, the vehicle containing the waste was impounded.

All impounded vehicles were taken to the quarantine area at Balleally landfill, where they were detained. This made it possible to further inspect and in detail examine the waste on the impounded vehicles.

Examination of waste is necessary to gather evidence for possible prosecution and to classify and identify the waste to safely dispose of it at a facility that is licensed to accept it.

Three operations were done during November and December 2002 and 41 were executed in 2003. 39 of these vehicles have been impounded to date, 25 of them in 2003.

There were only 7 vehicles impounded in 2004 and 3 vehicles impounded during the reporting period of 2005. This was owing to the temporary closure of the quarantine area in order to facilitate the excavation of the new cell number 6 in July 2004. A replacement quarantine area was built in 2005 but utilisation of this area has not been possible due to outstanding construction issues. All vehicles impounded are recorded in the Balleally Landfill Quarantine Register. Fingal County Council has also agreed to accept vehicles from similar operations from Meath County Council waste officials when required.

2006:

There were seven vehicles impounded in the quarantine area during 2006. All vehicles impounded are recorded in the Balleally Landfill Quarantine Register. Fingal County Council has also agreed to accept vehicles from similar operations from Meath County Council waste officials when required.

2007:

There were six vehicles impounded in the quarantine area during 2007. All vehicles impounded are recorded in the Balleally Landfill Quarantine Register. Fingal County Council has also agreed to accept vehicles from similar operations from Meath County Council waste officials when required.

2008:

No vehicles were impounded in the quarantine area during 2008.

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

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

6. ENVIRONMENTAL INCIDENTS & COMPLAINTS

6.1 Reported Incidents

Table 6.1 below gives a summary of reported incidents during 2008. More details are available at the facility offices.

Table 6.1 Reported Incidents during the Reporting Period 2008

Date of Incident	Nature of Incident	Corrective Action
20/2/2008	Vehicular damage to overground pipework at LTP causing raw leachate to spill (approx 2M3). Spill duration 2 minutes.	EPA notified 20/2/2008. Spillage stopped after 2 minutes and valve (undamaged) closed off at Tank (T1a). Bowser used to draw up spilled leachate which ponded on the ground and was delivered to the leachate sump (P1). Absorbent granules were also applied to the spillage. Response Engineering instructed to repair damage.
11/4/2008	Vehicular damage to overground pipework at LTP causing raw leachate to spill (approx 4M3). Spill duration 5 minutes.	EPA notified 11/4/2008. Spillage stopped after 5 minutes when valve at raw leachate tank (undamaged) was closed. Spilled leachate which ponded was drawn to Swords Waste Water Treatment Plant. Damage was repaired. Following these two incidents, headwalls were built to protect the overground pipework at Raw Leachate and Treated Leachate tanks.
6/7/2008	Fire at Leachate Pump Control Panel Chamber for Cell 2.	Extinguished by fire brigade at Approx. 22:20hrs on Sunday 6/7/2008. EPA notified 7/7/2008. Investigation and corrective actions taken (See Report Ref FCC-W0009-02-2008-016)
18/9/2008	High level of CH4 was detected (>1% v/v) in borehole GA13 by EPA sampling staff.	EPA enforcement section notified 18/9/2008. Daily sampling was undertaken until levels subsided. Samples were taken for trace element analysis and a report was submitted on the incident (See Report Ref: FCC-W0009-02-2008-029)
18/11/2008	Leachate noted to be discharging to inner estuary.	Upon investigation source of leachate found to be Cell 2. Due to plumbing error in October leachate line had been connected to surface water line. Pumping ceased immediately. EPA & ERFB notified 19/11/2008. Repairs were affected and new Standard Operating Procedure adopted. Report submitted to The Agency (FCC-W0009-

		02-2008-032).

6.2 Complaints Summary

A summary of complaints for the reporting period is shown in Table 6.1. There were a total of 14 complaints received at the facility for the reporting period. They all relate to odour. All complaints were responded to as soon as possible after the time they were reported. Odour monitoring Ireland visited the site twice during the year and made many recommendations for odour / surface emission control (EPA Refs. W0009-02/gen43mh & W0009-02 / ak60em). Many of these recommendations have been implemented to date and the remainder are to be completed during 2009 in an effort to further improve odour control.

Table 6.2 Complaints received for the reporting period 2008

Date of Complaint	Nature of Complaint	Complaint	Corrective Action
23/1/2008	Odour	Odour at Dwelling	Investigate Gas Well Field
11/2/2008	Odour	Odour at Dwelling	Met With Residents
12/2/2008	Odour	Odour at Dwelling	Met With Residents
16/4/2008	Odour	Odour at Dwelling	Investigation
22/4/2008	Odour	Sewer Sludge Odour at Dwelling	Investigation
16/6/2008	Odour	Odour at Dwelling	Investigation
24/7/2008	Odour	Odour at Dwelling	Investigate Gas Well Field & Query DCC re water treatment screenings
30/7/2008	Odour	Odour at Dwelling	Investigate Gas Well Field
24/9/2008	Odour	Odour at Dwelling	Instruction issued to close / tape & seal all possible gas escape points.

25/9/2008	Odour	Odour at Dwelling	Contact made with BPS to seal leachate risers & check valves.
26/9/2008	Odour	Odour at Dwelling	Contact made with BPS regarding reconnection of wells.
8/10/2008	Odour	Odour at Dwelling	Contact made with BPS, Engines down temporarily around time of complaint.
28/10/2008	Odour	Odour at Dwelling	FCC personnel visited site of complaint. No odour detected. Complainant invited for site visit 29/1/2008.
2/11/2008	Odour	Odour at Dwelling	Contacted BPS regarding status of engines.

More Details available on Landfill Managers Complaint Register

7. ENVIRONMENTAL MANAGEMENT PROGRAMME

7.1 Environmental Objectives and Targets for 2008.

See section 4.2 for environmental objectives and targets.

7.2 Summary of written procedures

There were no new written procedures during the reporting period.

7.3 Communications Programme for Public Information

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

Environmental Information can be viewed at the following locations:

- At the **Council's Headquarters** between 9.30 a.m. and 12.45 p.m. and 2.00 p.m. and 4.00 p.m. Monday to Friday (excluding public holidays), unless otherwise arranged by prior appointment.
- Permanent facilities for viewing information including a computer to be provided at Balleally Landfill.
- At **Balleally Landfill** by prior appointment with the Landfill Manager.
- A register of information will be made available on www.fingalcoco.ie. A Link to the EPA's website will also be added to the site.

Site Visits

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

Balleally Landfill Liaison Committee

- All information relating to the restoration and aftercare of Balleally Landfill is presented to the Liaison Committee for comment and adoption.
- The members of the committee are:

Mr. Brian Arnold and Mr. Seamus O' Leary - REACT
Mr. John Barrett, and Ms. Rena Condrot - Balleally Residents and Farmers Association
Mr. Des Martin, and Mr. Ben Colgan - RAGE
Cllr. May McKeon, Cllr. Anne Devitt (Chairperson), Cllr. Tom Kelleher, Cllr. Joe Corr - Public Representatives
Mr. John Daly, Mr Martin Kiely and Mr. Mortimer Loftus. - Fingal County Council.

The Committee met six times during 2008. Agenda were set and minutes kept. An annual report was prepared to put before the Swords / Balbriggan Area Committee in February 2009.

Table 7.1 Reports and information available for public inspection 1993-2008.

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

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

Quarterly Monitoring Report and Noise Survey Q3 2006	September 2006
Resource Use and Energy Efficiency Audit	October 2006
Quarterly Monitoring Report Q4 2006	January 2007
Noise Survey Q4 2006	January 2007
2006 Annual Emissions Survey IPS Gas Plant	January 2007
Annual Environmental Report 2006	January 2007
Quarterly Monitoring Report and Noise Survey Q1 2007	April 2007
Quarterly Monitoring Report Q2 2007	July 2007
Noise Survey Q2 2007	July 2007
Quarterly Monitoring Report and Noise Survey Q3 2007	October 2007
Flooding Report	November 2007
Slope Stability Survey Report	December 2007
Quarterly Monitoring Report and Noise Survey Q4 2007	January 2008
Annual Environmental Report 2007	January 2008
Quarterly Monitoring Report Q1 2008	April 2008
Quarterly Monitoring Report Q2 2008	July 2008
Rogerstown Estuary Treated Leachate Discharge Modelling Report.	October 2008
Slope Stability Survey	November 2008
Landfill Gas Trace Element Analysis Report	November 2008
Biological Monitoring Report	November 2008
2008 Annual Emissions Survey IPS Gas Plant	January 2009

Map Information Available	Report Date
Re-location C&D at Balleally	March 2003
Wall & Railing along landfill at Balleally	April 2003
C&D Waste Recovery Area, Balleally	June 2003
Topographical Survey for Balleally June 2003	June 2003
Re-location of Gas Compound at Balleally / 4 Drawings	July 2003
Proposed gas extraction pipe to new gas plant	November 2003
Monitoring Map (J1/DG0008) For Balleally	December 2003
Balleally Leachate Treatment Plant Process & Instrumentation Drawing	July 2004
Balleally Leachate Treatment Plant Site Plan Layout	July 2004
Topographical Survey for Balleally Landfill June 2004	August 2004
Revised Monitoring Drawing	October 2004
Installation of new landfill gas management infrastructure.	February 2005
Topographical Survey	October2005
Topographical Survey	August 2006
Provision of Public Car Park and Walkway	February 2007
New IPS Gas Wells	February 2007
Phase 2 Piggybacking	April &July 2007
Joining of existing two vertical barrier walls	June 2007
Installation of New Landfill Gas Management Infrastructure	July 2007
Topographical Survey	December 2007
Updated as built drawings for surface water / leachate infrastructure	October 2008
Topographic Survey	October 2008

7.4 Financial Provisions

Condition 12.2 of the licence requires the establishment of a fund to implement the Restoration and Aftercare Plan (submitted as per Condition 4.1 in July 2003).

FCC received a letter from The Agency during 2008 regarding Environmental Liability Risk Assessment (ELRA), Residuals Management Plans (RMP), Closure Remediation and Aftercare Plans (CRAMP) and Financial Provision (FP).

In order to assist The Agency in their assessment on the uptake of Environmental Liability Risk Assessment (ELRA), Residuals Management Plans (RMP), Closure Remediation and Aftercare Plans (CRAMP) and Financial Provision (FP), the following information was submitted to The Agency in relation to Balleally Landfill.

- Balleally Risk Categorisation as derived using the system set out in The Agency's Guidance Document.

This specific exercise has not been carried out to date. However on looking at the guidance document it appears similar to the "Methodology for Determining Enforcement Category of Licences". This exercise gave Balleally an A1 enforcement category which would probably equate to a Risk Category 3 classification.

- The facility's RMP/CRAMP was submitted to "The Agency" on 4/7/2003. It was agreed by "The Agency" during 2003. The RMP / CRAMP have not yet been fully costed.

- Fingal County Council's position to date with regard to financial provision currently in place for Balleally has been stated as follows; "In accordance with Condition 12.2 of the Waste Licence, Fingal County Council shall establish and maintain a fund or other form of approved security, that is adequate to assure the financial capability of implementing the Restoration and Aftercare Plan as agreed with "The Agency"." Financial provision is made on an annual basis at Fingal County Council budgeting meetings.

As the CRAMP/RMP predates the Guidance Document (2006), there are some differences in content and methodology. The contents of the CRAMP/RMP broadly reflect the suggested contents in the guidance document. It is also worth stating that *The Agency* approved of the CRAMP/RMP at the time of submission. The financial provision is considered adequate.

Staff from Fingal County Council intend to attend a conference in 2009 which is to be organised by The Agency on implementation of the Environmental Liability Directive.

7.5 Management Structure

The facility is owned and operated by Fingal County Council. The Environmental Services Department of Fingal County Council manage the landfill facility. Some changes in the management structure occurred during 2008. A description of the current management structure is detailed in Appendix V.

APPENDIX I
DRAWINGS

APPENDIX II
GROUNDWATER MONITORING RESULTS

APPENDIX III
SURFACE WATER MONITORING RESULTS

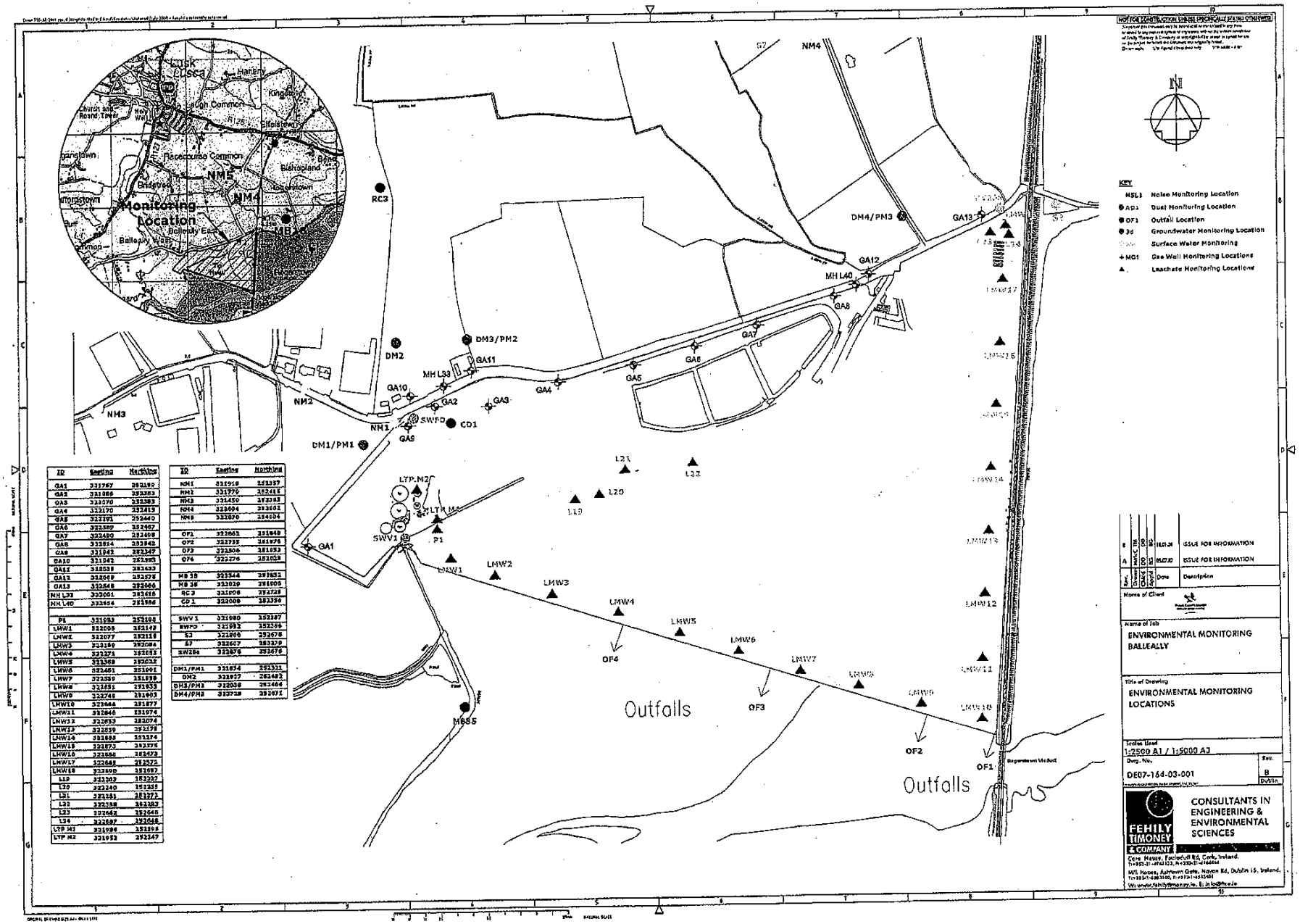
APPENDIX IV
LEACHATE LEVELS MONITORING RESULTS

APPENDIX V
LEACHATE QUALITY

APPENDIX VI
LANDFILL GAS
MONITORING RESULTS

APPENDIX VI
STAFF STRUCTURE

APPENDIX I
DRAWINGS



ID	Easting	Northing
GA1	321787	352190
GA2	321986	352363
GA3	322070	352383
GA4	322170	352419
GA5	322391	352440
GA6	322389	352467
GA7	322480	352508
GA8	322554	352542
GA9	321941	352347
GA10	321941	352383
GA11	322038	352603
GA12	322649	352578
GA13	322648	352966
NM L39	322001	352468
NM L40	322654	352986
P1	321983	352190
LMW1	322008	352149
LMW2	322077	352118
LMW3	322180	352064
LMW4	322271	352033
LMW5	322368	352012
LMW6	322461	351991
LMW7	322559	351958
LMW8	322681	351939
LMW9	322748	351903
LMW10	322864	351877
LMW11	322846	351974
LMW12	322853	352074
LMW13	322839	352178
LMW14	322698	352174
LMW15	322672	352276
LMW16	322886	352473
LMW17	322668	352572
LMW18	322890	352697
L19	322302	352232
L20	322240	352262
L21	322181	352272
L22	322288	352282
L23	322462	352048
L24	322687	352048
LTP N1	321984	352198
LTP N2	321983	352147

ID	Easting	Northing
NM1	321918	352197
NM2	321976	352418
NM3	321450	352383
NM4	322404	352602
NM5	322070	354034
OF1	322661	351849
OF2	322733	351976
OF3	322506	351853
OF4	322276	352028
MB 1B	322344	352652
MB 5B	322030	354005
RC 3	321908	352728
CD 1	322008	352350
SWV 3	321980	352387
SWPD	321983	352306
S3	321906	352678
S7	322607	352329
SW18a	322676	352676
DM1/PM1	321874	352331
DM2	322027	352462
DM3/PM2	322038	352464
DM4/PM3	322728	352971

F:\New EESD\Environment\E01 Landfills\E0101 Balladyl\9-2 Licence Year 6 (2008)\AER_2007\FTco Inserts\Appendices\Compound for IPS electricity generator Balladdy.dwg 23/1/2008 14:07

HORGAN LYNCH + PARTNERS
CONSULTING ENGINEERS

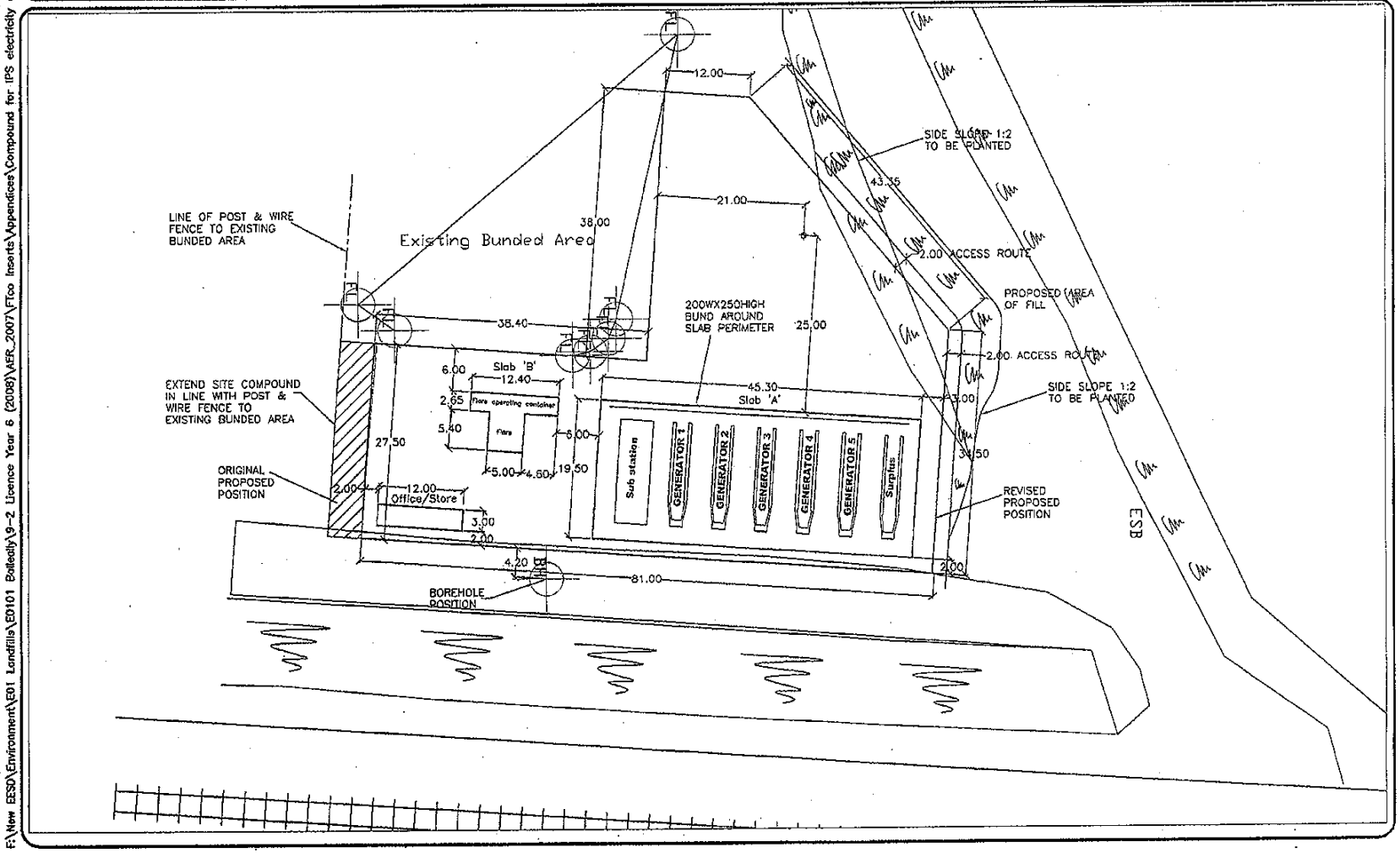
JOB

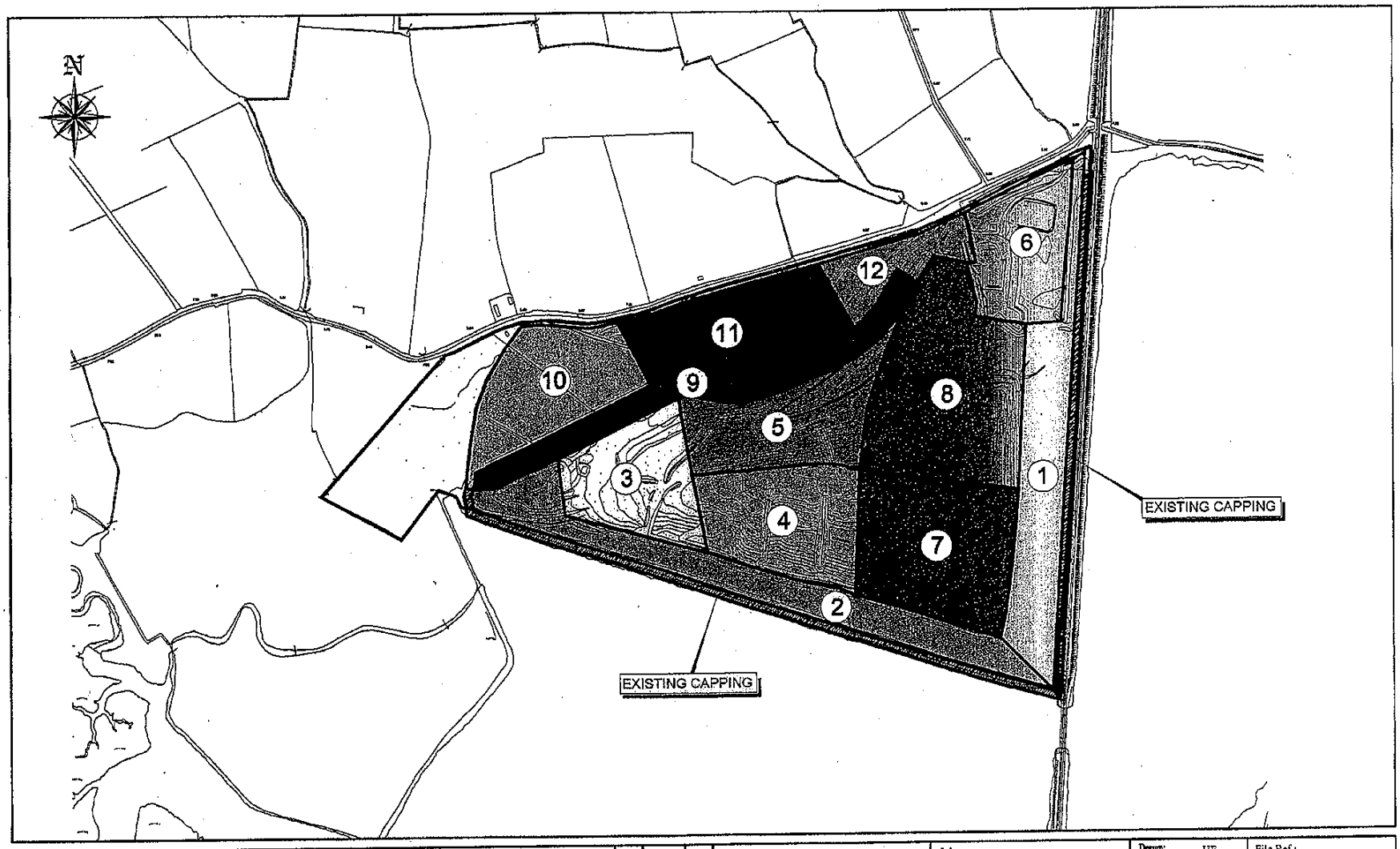
CLIENT

TITLE

REV	DATE	BY	DESCRIPTION
1	23.07.03	TK	BUND, ACO CHANNEL AND PLANTING ADDED
0	14.07.03	TMcM	REVISED LAYOUT 1

DRAWN TMcM
DATE July 2003
CHKD
DRG. NO.
REV.
SCALE 1:500
A3





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

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

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

Job: BALLEALLY LANDFILL RESTORATION AND AFTERCARE PLAN

Title: RESTORATION PHASING

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

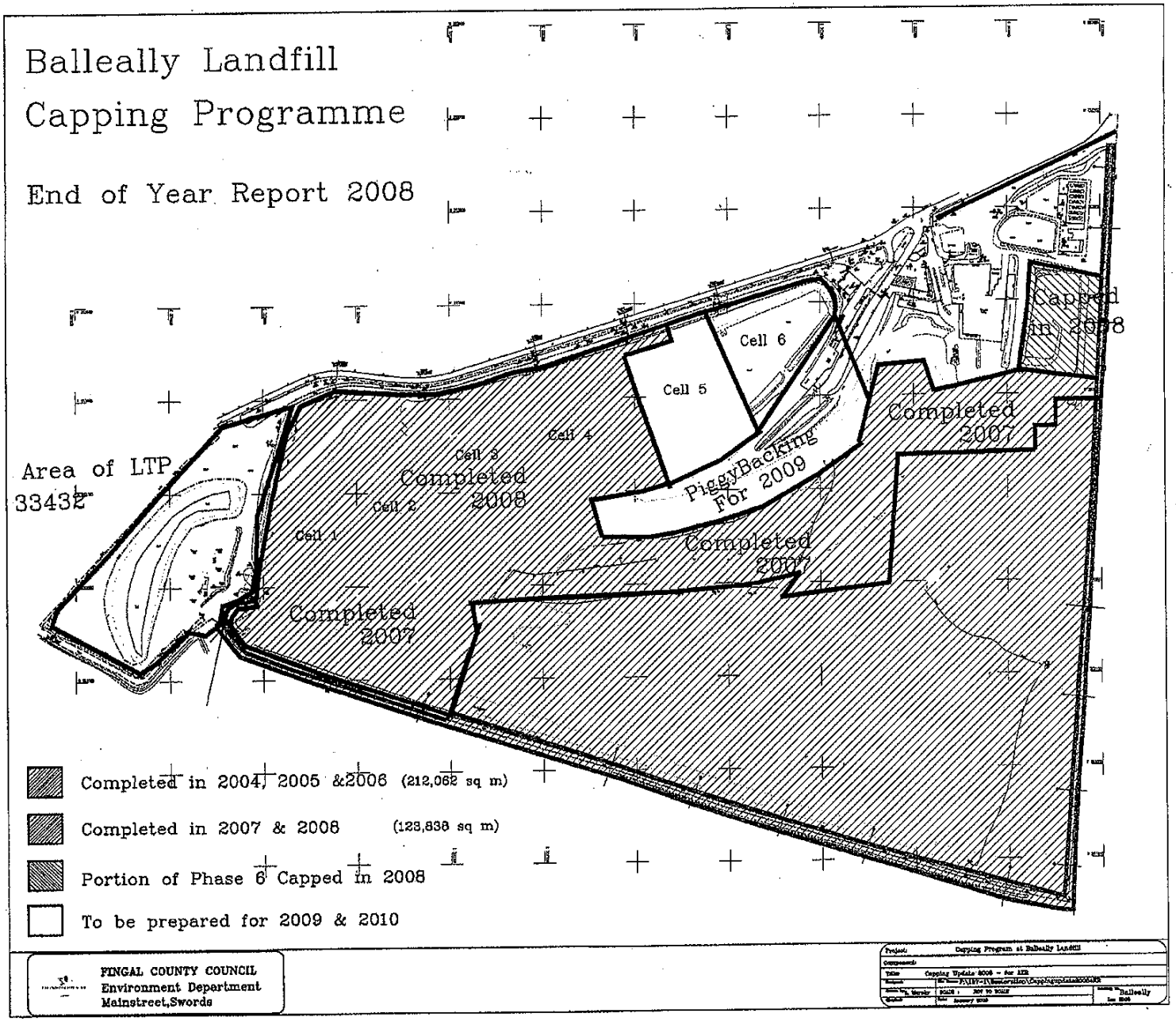
File Ref.: 149507002FG0300

Drawing No.: FIG 3.0

Rev.: A04

Balleally Landfill
Capping Programme

End of Year Report 2008



FINGAL COUNTY COUNCIL
Environment Department
Mainstreet,Swords

APPENDIX II
GROUNDWATER MONITORING RESULTS

CD1 Parameter	Standard	Date 15/01/2008	06/02/2008	06/03/2008	24/04/2008	07/05/2008	11/06/2008	09/07/2008	14/08/2008	09/09/2008
pH	≥ 6.5 & ≤ 9.5[1]	8.24	7.11	7.45	7.78	7.58	10.43	5.43	7.01	7.95
Temp (oC)	25[1]	8.6	12.2	9.1	9.8	12.3	14.3	17.3	15.2	15.9
Ammoniacal Nitrogen (mg/l)	0.12[1]	0.3	0.18	0.13	0.06	0.16	0.58	0.42	0.18	0.17
BOD (mg/l)	5[2]	3	1.64	1.08	0.49	0.42	0.21	0.16		<2
COD (mg/l)	40[2]	<15	178	210	61	39	68	62	34	18
Total Suspended Solids (mg/l)	50[2]	13	100	<10	<10	<10	41	25	<10	<10
Dissolved Oxygen (mg/l)	No abnormal Change	5.8	6.8	4.4	0.9	1	1.2	9.6	5.6	2.84
Chloride (mg/l)	30[1]	21	38	47	39	40	42	51	52	51
Conductivity (mS/cm)	1[1]	0.993	1.12	1.077	1.119	1.207	1.141	1.191	0.886	1.13

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

MB35 - Downstream Parameter	Standard	Date January 08	May 08	July 07	July 08	Date January 09
Ammoniacal Nitrogen as N (mg/l)	0.12[1]	58	67	6.4	402	105
Chloride (mg/l)	30[1]	24168	17380	34084	16100	26058
Dissolved Oxygen (mg/l)	No abnormal Change	4.5	4.6	4.2	8.3	8.15
Electrical Conductivity (mS/cm)	1[1]	1406	2155	4155	1885	1885.25
pH (pH units)	≥ 6.5 & ≤ 9.5[1]	7.55	6.99	7.5	7.79	7.766
Temp (oC)	25[1]	11	10.7	13	13.2	14.2
Total Organic Carbon (mg/l)	No abnormal Change[1]	3	4	3	<2	3.3333333
Cyanide (mg/l)	0.01[1]			<0.05	0.05	
Fluoride (mg/l)	1[1]			0.5	0.3	
Dissolved Mercury Low Level (ug/l)	1[1]			<0.05	<0.05	
Sulphate (mg/l)	200[1]			4529	2074	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change[1]			660	200	
Total Phosphorous (mg/l)	No abnormal Change 1			<0.05	<0.05	
Ortho Phosphate as PO4 (mg/l)	0.03[1]			<0.03	0.11	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change 1			<0.3	3.1	
Sodium (mg/l)	150[1]			8000	22	
Potassium (mg/l)	5[1]			330	1.4	
Total Chromium (mg/l)	0.03[1]			<0.05	0.009	
Dissolved Boron Low Level (ug/l)	1000[1]			4017	3508	
Dissolved Cadmium Low Level (ug/l)	5[1]			0.8	0.4	
Dissolved Calcium Low Level (ug/l)	30[1]			415100	422100	
Dissolved Copper Low Level (ug/l)	30[1]			<1	4	
Dissolved Iron Low Level (ug/l)	200[1]			56	869	
Dissolved Lead Low Level (ug/l)	10[1]			6	2	
Dissolved Magnesium Low Level (ug/l)	50000[1]			151600	1545000	
Dissolved Manganese Low Level (ug/l)	50[1]			2464	261	
Dissolved Nickel Low Level (ug/l)	20[1]			18	10	
Dissolved Zinc Low Level (ug/l)	100[1]			14	28	
Total Cyanide (mg/l)	10[1]			<0.05	0.05	

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

RC3 - Upstream Parameter	Standard	Date January	May	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.12[1]	<0.2	0.5	<0.2	6	3
Chloride (mg/l)	30[1]	52	56	63	47	48
Dissolved Oxygen (mg/l)	No abnormal Change	5.3	5.75		3.4	5.2
Electrical Conductivity (mS/cm)	1[1]	0.938	1.005	1.085	0.903	1.008
pH (pH units)	≥ 6.5 & ≤ 9.5[1]	7.6	6.92	7.46	7.37	7.6
Temp (oC)	25[1]	10.2	13	14.1	12.1	13.3
Total Organic Carbon (mg/l)		<2	<2	<2	8	3
Cyanide (mg/l)	0.01[1]			<0.05	0.05	
Fluoride (mg/l)	1[1]			0.2	0.2	
Dissolved Mercury Low Level (ug/l)	1[1]			<0.05	<0.05	
Sulphate (mg/l)	200[1]			46	42	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change			178	550	
Total Phosphorous (mg/l)	No abnormal Change 1			<0.05	0.24	
Ortho Phosphate as PO4 (mg/l)	0.03[1]			<0.03	0.05	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change 1			63	156	
Sodium (mg/l)	150[1]			21.5	554	
Potassium (mg/l)	5[1]			1.9	37.5	
Total Chromium (mg/l)	0.03[1]			<0.05	<0.001	
Dissolved Boron Low Level (ug/l)	1000[1]			27	53	
Dissolved Cadmium Low Level (ug/l)	5[1]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)	30[1]			174500	171000	
Dissolved Copper Low Level (ug/l)	30[1]			3	<1	
Dissolved Iron Low Level (ug/l)	200[1]			8	84	
Dissolved Lead Low Level (ug/l)	10[1]			70	25	
Dissolved Magnesium Low Level (ug/l)	50000[1]			10460	11030	
Dissolved Manganese Low Level (ug/l)	50[1]			4	<1	
Dissolved Nickel Low Level (ug/l)	20[1]			3	2	
Dissolved Zinc Low Level (ug/l)	100[1]			15	23	
Total Cyanide (mg/l)	10[1]			<0.05	0.05	

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

CD1 - Under Liner	Standard	Date				
Parameter		January	May	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.12[1]	0.3	0.6	1.2	0.44	0.6
Chloride (mg/l)	30[1]	21	40	17	31	49
Dissolved Oxygen (mg/l)	No abnormal Change	5.8	1	4.5	9.6	4.83
Electrical Conductivity (mS/cm)	1[1]	0.993	0.207	1.005	0.919	0.808
pH (pH units)	≥ 6.5 & ≤ 9.5[1]	8.24	11.68	7.54	8.54	8.98
Temp (oC)	25[1]	8.6	12.3	16	17.7	12.5
Total Organic Carbon (mg/l)		5	1.61	6	16	10
Cyanide (mg/l)	0.01[1]			<0.05	<0.05	
Fluoride (mg/l)	1[1]			0.2	0.1	
Dissolved Mercury Low Level (ug/l)	1[1]			<0.05	<0.05	
Sulphate (mg/l)	200[1]			357	476	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change[1]			256	50	
Total Phosphorous (mg/l)	No abnormal Change 1			<0.05	0.05	
Ortho Phosphate as PO4 (mg/l)	0.03[1]			<0.03	<0.03	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change 1			1.6	8.1	
Sodium (mg/l)	150[1]			20.5	114	
Potassium (mg/l)	5[1]			8	7.9	
Total Chromium (mg/l)	0.03[1]			<0.05	0.015	
Dissolved Boron Low Level (ug/l)	1000[1]			100	66	
Dissolved Cadmium Low Level (ug/l)	5[1]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)	30[1]			197100	81270	
Dissolved Copper Low Level (ug/l)	30[1]			<1	38	
Dissolved Iron Low Level (ug/l)	200[1]			18	80	
Dissolved Lead Low Level (ug/l)	10[1]			<1	<1	
Dissolved Magnesium Low Level (ug/l)	50000[1]			14800	6403	
Dissolved Manganese Low Level (ug/l)	50[1]			2	19	
Dissolved Nickel Low Level (ug/l)	20[1]			5	30	
Dissolved Zinc Low Level (ug/l)	100[1]			17	61	
Total Cyanide (mg/l)	10[1]			<0.05	<0.05	

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

APPENDIX III
SURFACE WATER MONITORING RESULTS

S3 Parameter	Standard	Date 15/01/2008	06/02/2008	06/03/2008	24/04/2008	07/05/2008	11/05/2008	09/07/2008	14/08/2008	09/09/2008
pH	≥ 5.5 & ≤ 8.5 [1]	8.17	8.3	7.75	8.12	8	7.89	5.44	7.75	8.03
Temp (oC)	No abnormal change [2]	6.6	5.1	6.9	8.5	11.8	13.3	15.9	13.9	14.2
Ammoniacal Nitrogen as N (mg/l)	0.23 [1]	0.07	1	0.5	0.19	0.17	0.28	0.09	0.04	0.14
BOD (mg/l)	5 [1]	<2	10	<2	<2	<2	<2	2		<2
COD (mg/l)	40 [1,3]	21	178	<15	<15	19	35	24	24	16
Total Suspended Solids (mg/l)	35 [2]	<10	16	26	<10	<10	<10	13	<10	<10
Dissolved Oxygen (mg/l)	No abnormal Change [2]	5.4	5.7	4.3	12.7	8.01	4.63	5.57	8.45	4.88
Chloride (mg/l)	250 [1]	174	52	68	76	90	124	91	52	72
Conductivity (mS/cm)	1 [1]	0.717	0.745	0.962	0.908	0.975	1.45	1.06	0.686	0.743

Note:-Cells Shaded indicate results higher than MAC or IGV

1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).

2=This Value used as an indicator only.

3 Limit for A3 waters specified only

SWV1 - Inner Estuary	Standard	Date				
Parameter		Jan 08	May 08	July 07	July 08	Oct 08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	153	206	13	73	93
BOD (mg/l)	5[1]	3	6	<0.05	19	90
COD (mg/l)	40[1,3]	74	94	300	56	23
Chloride (mg/l)	250[1]	186	248	97	2414	46
Dissolved Oxygen (mg/l)	No abnormal Change [2]	4.8	4.9	1.196	7.2	4.79
Conductivity (mS/cm)	1[1]	1.71	2.1	2.18	8.5	0.815
pH	≥ 5.5 & ≤ 8.5 [1]	7.93	6.94	7.61	7.39	7.85
Total Suspended Solids (mg/l)	50[2]	<10	<10	<0.05	38	243
Temp (oC)	No abnormal Change [2]	6.8	14.2	17.4	20.7	12.5
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			<0.03	533	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			300	280	
Total Phosphorous (mg/l)	No abnormal Change [2]			143	0.14	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			2.3	0.21	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			4.5	8.4	
Sodium (mg/l)	No abnormal Change [2]			14	1321	
Potassium (mg/l)	No abnormal Change [2]			26	67.3	
Dissolved Chromium (mg/l)	0.1[2]			0.18	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			<0.4	665	
Dissolved Cadmium Low Level (ug/l)	5[2]			17500	<0.4	
Dissolved Calcium Low Level (ug/l)				<1	222700	
Dissolved Copper Low Level (ug/l)	50[2]			6	6	
Dissolved Iron Low Level (ug/l)	1000[2]			<1	64	
Dissolved Lead Low Level (ug/l)	5[2]			16840	<1	
Dissolved Magnesium Low Level (ug/l)				<1	252200	
Dissolved Manganese Low Level (ug/l)	300[2]			4	1590	
Dissolved Nickel Low Level (ug/l)	100[2]			2	11	
Dissolved Zinc Low Level (ug/l)	100[2]			2	23	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

SW20a - Drain N field Parameter	Standard	Date January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	46.6	45	36.2	144.1	31.8
BOD (mg/l)	5[1]	5	11	2	8	5
COD (mg/l)	40[1,3]	62	162	42	126	41
Chloride (mg/l)	250[1]	53	444	86	384	99
Dissolved Oxygen (mg/l)	No abnormal Change [2]	4.7	4.8		8.1	2.58
Conductivity (mS/cm)	1[1]	2.295	3.952	1.183	3.73	1.261
pH	≥ 5.5 & ≤ 8.5 [1]	7.38	6.78	7.21	7.54	7.42
Total Suspended Solids (mg/l)	50[2]	<10	43	<10	70	220
Temp (oC)	No abnormal Change [2]	6.9	14	15.5	9.1	12.1
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			104	74	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			433	1490	
Total Phosphorous (mg/l)	No abnormal Change [2]			0.27	0.05	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			0.37	<0.03	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			1.5	0.4	
Sodium (mg/l)	No abnormal Change [2]			60	286	
Potassium (mg/l)	No abnormal Change [2]			38	125.5	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	4	
Dissolved Boron Low Level (ug/l)	2000[2]			278	1244	
Dissolved Cadmium Low Level (ug/l)	5[2]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)				97000	145900	
Dissolved Copper Low Level (ug/l)	50[2]			14	4	
Dissolved Iron Low Level (ug/l)	1000[2]			30	128	
Dissolved Lead Low Level (ug/l)	5[2]			<1	<1	
Dissolved Magnesium Low Level (ug/l)				17730	102500	
Dissolved Manganese Low Level (ug/l)	300[2]			26	686	
Dissolved Nickel Low Level (ug/l)	100[2]			12	48	
Dissolved Zinc Low Level (ug/l)	100[2]			<1	22	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

S7 - Upstream	Standard	Date				
Parameter		January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	<0.2	<0.2	1	<0.2	0.3
BOD (mg/l)	5[1]	<2	<2	2	<2	3
COD (mg/l)	40[1,3]	22	<15	23	17	21
Chloride (mg/l)	250[1]	54	61	50	70	55
Dissolved Oxygen (mg/l)	No abnormal Change [2]	5.7	5.9		9.4	4.25
Conductivity (mS/cm)	1[1]	0.717	0.789	0.802	0.839	0.697
pH	≥ 5.5 & ≤ 8.5 [1]	8.57	7.3	7.55	7.82	7.93
Total Suspended Solids (mg/l)	50[2]	<10	<10	<10	25	22
Temp (oC)	No abnormal Change [2]	7	13.2	15.4	17.2	11.8
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			48	56	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			363	290	
Total Phosphorous (mg/l)	No abnormal Change [2]			0.28	0.14	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			0.54	0.7	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			6.8	3.3	
Sodium (mg/l)	No abnormal Change [2]			21	5.7	
Potassium (mg/l)	No abnormal Change [2]			4.3	6.4	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			91	117	
Dissolved Cadmium Low Level (ug/l)	5[2]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)				134700	143700	
Dissolved Copper Low Level (ug/l)	50[2]			<1	2	
Dissolved Iron Low Level (ug/l)	1000[2]			14	60	
Dissolved Lead Low Level (ug/l)	5[2]			<1	<1	
Dissolved Magnesium Low Level (ug/l)				9647	13380	
Dissolved Manganese Low Level (ug/l)	300[2]			<1	<1	
Dissolved Nickel Low Level (ug/l)	100[2]			3	3	
Dissolved Zinc Low Level (ug/l)	100[2]			<1	15	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

S3 - Outer Estuary	Standard	Date				
Parameter		January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	0.07	7	2.7	9	3.5
BOD (mg/l)	5[1]	<2	<2	<2	2	2
COD (mg/l)	40[1,3]	21	19	16	24	22
Chloride (mg/l)	250[1]	174	90	62	91	59
Dissolved Oxygen (mg/l)	No abnormal Change [2]	5.4	8.01		9.3	6
Conductivity (mS/cm)	1[1]	0.76	1.073	0.938	1.06	0.765
pH	≥ 5.5 & ≤ 8.5 [1]	8.17	8	7.54	7.3	7.8
Total Suspended Solids (mg/l)	50[2]	<10	<10	<10	13	13
Temp (oC)	No abnormal Change [2]	6.6	11.8	14	15.9	11.9
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			66	70	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			375	300	
Total Phosphorous (mg/l)	No abnormal Change [2]			0.07	<0.05	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			0.39	0.1	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			13.1	20.2	
Sodium (mg/l)	No abnormal Change [2]			27.5	47.8	
Potassium (mg/l)	No abnormal Change [2]			7	23	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			118	189	
Dissolved Cadmium Low Level (ug/l)	5[2]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)				147400	147100	
Dissolved Copper Low Level (ug/l)	50[2]			<1	<1	
Dissolved Iron Low Level (ug/l)	1000[2]			7	54	
Dissolved Lead Low Level (ug/l)	5[2]			<1	<1	
Dissolved Magnesium Low Level (ug/l)				11760	18840	
Dissolved Manganese Low Level (ug/l)	300[2]			<1	<1	
Dissolved Nickel Low Level (ug/l)	100[2]			5	7	
Dissolved Zinc Low Level (ug/l)	100[2]			<1	23	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

SWFD - Northern French Drain	Standard	Date				
Parameter		January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	024	<0.2	<15	014	024
BOD (mg/l)	5[1]	<2	3	<0.05	5	<3
COD (mg/l)	40[1,3]	<15	<15	1300	<15	<15
Chloride (mg/l)	250[1]	55	64	49	59	54
Dissolved Oxygen (mg/l)	No abnormal Change [2]	4.9	5.1	1.087	9.5	2.17
Conductivity (mS/cm)	1[1]	1174	1009	1112	0.71	1119
pH	≥ 5.5 & ≤ 8.5 [1]	7.81	6.83	7.66	7.57	7.7
Total Suspended Solids (mg/l)	50[2]	<10	<10	<0.05	14	24
Temp (oC)	No abnormal Change [2]	8.3	14.2	15.2	16.7	12.9
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			0.18	222	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			300	310	
Total Phosphorous (mg/l)	No abnormal Change [2]			130	<0.05	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			13.6	<0.03	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			4.9	14	
Sodium (mg/l)	No abnormal Change [2]			19	32.7	
Potassium (mg/l)	No abnormal Change [2]			<10	12.6	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			<0.4	117	
Dissolved Cadmium Low Level (ug/l)	5[2]			192200	<0.4	
Dissolved Calcium Low Level (ug/l)				<1	210400	
Dissolved Copper Low Level (ug/l)	50[2]			10	2	
Dissolved Iron Low Level (ug/l)	1000[2]			<1	39	
Dissolved Lead Low Level (ug/l)	5[2]			16080	<1	
Dissolved Magnesium Low Level (ug/l)				<1	18570	
Dissolved Manganese Low Level (ug/l)	300[2]			3	<1	
Dissolved Nickel Low Level (ug/l)	100[2]			2	2	
Dissolved Zinc Low Level (ug/l)	100[2]			2	25	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

APPENDIX IV
LEACHATE LEVELS MONITORING RESULTS

Monitoring Location Leachate/Gas	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	LEVEL OF LIQUID IN WELL (mAOD)											
LMW1				3.92	3.50	3.49	3.56	3.38	3.53	3.49	3.31	3.38
LMW2												
LMW3				5.52	5.69	5.62		5.56	5.76		5.56	5.59
LMW4	6.30	5.65	5.76	5.70	5.71	5.67	5.69	4.60	5.76	5.81	5.55	5.56
LMW5	6.94	6.05	6.15	6.10	6.11	6.06	6.11	5.99	6.11	6.13	5.87	5.90
LMW6	6.59	5.60	5.74	5.70	5.70	5.63	5.68	5.62	5.75	5.76	5.50	5.48
LMW7				5.08	5.08	5.19	5.10	5.03	5.17	5.13	4.97	4.94
LMW8	5.27	4.14									4.89	
LMW9				4.31	4.29	4.20	3.99	4.14	4.23	4.36	4.09	4.09
LMW10	4.32	3.58	3.52	3.46	3.39	3.25	3.13	3.08	3.35	3.33	3.23	3.19
LMW11	4.09	3.44	3.52	3.47	3.39	3.20	3.12	3.17	3.37	3.39	3.27	3.23
LMW12				3.51	3.44	3.23	3.16	3.22	3.44	3.07	2.93	2.84
LMW13				3.13	3.04	2.84	2.79	2.76	3.08	3.70	3.41	3.37
LMW14	4.80	3.60	3.88	3.79	3.71	3.45	3.40	3.29	3.61			
LMW15		5.88										
LMW16	5.35	2.40										
LMW17	4.54	4.46	2.50	4.45	4.38	4.16	4.58	4.10	4.40	4.38	4.22	4.18
LMW18	4.39	4.23	4.35	4.25	3.19	3.99	3.97	4.07	4.27	4.15	4.02	3.77
L19	14.56	13.81							11.14			5.65
L20	14.93	15.61		11.58	10.41							
L21												
L22												
L23	4.52	4.39	4.42	4.36	4.02	4.08	4.14	4.43	4.49	4.45	4.23	4.22
L24	4.42	4.36	4.41	4.36	4.28	4.09	4.05	4.24	4.36	4.31	4.15	4.13

APPENDIX V
LEACHATE QUALITY

Parameter	LMW1	LMW6	LMW7	LMW9	LMW10	LMW11	LMW13	LMW14	LMW17	LMW18	L23	L24	Pipe 1A	Pipe 1 B	Pipe 1 C
Ammoniacal Nitrogen as N (mg/l)	590.40	684.50	894.40	574.00	485.90	427.70	88.90	211.90	192.50	736.90	77.90	225.10	1682.60	846.90	717.00
BOD Unfiltered (mg/l)	507.00	421.00	96.00	166.00	120.00	414.00	13.00	32.00	9.00	105.00	12.00	15.00	394.00	106.00	227.00
COD Unfiltered (mg/l)	970.00	988.00	1843.00	714.00	763.00	625.00	121.00	294.00	219.00	795.00	97.00	261.00	3350.00	1446.00	1323.00
Chloride (mg/l)	1425.00	1258.00	1930.00	999.00	1096.00	851.00	272.00	411.00	228.00	980.00	85.00	247.00	1851.00	1384.00	1414.00
Conductivity (mS/cm) @ 20oC	11.00	10.00	13.50	10.00	10.00	9.00	2.92	4.38	3.64	10.00	2.27	3.75	19.00	13.00	12.00
pH	7.34	7.46	7.55	7.33	7.40	7.19	7.04	6.85	6.84	7.13	6.73	6.86	7.93	7.51	7.49
Temp (oC)	10.90	16.20	25.90	30.60	12.20	14.30	14.50	14.90	11.30	12.10	12.70	12.50	33.10	31.50	29.70
Fluoride (mg/l)	0.70	0.80	1.00	0.70	0.60	1.00	0.30	0.50	0.50	0.60	0.50	0.50	<0.1	1.10	0.90
Dissolved Mercury Low Level (ug/l)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate (mg/l)	<3	<3	<3	<3	<3	83.00	64.00	11.00	<3	<3	85.00	135.00	6.00	67.00	35.00
Total Phosphorous (mg/l)	1.71	1.20	1.43	1.44	0.62	0.56	<0.05	0.55	0.68	2.07	1.24	0.64	10.01	3.00	1.16
Ortho Phosphate as PO4 (mg/l)	6.80	7.70	2.40	7.80	5.70	2.40	0.03	3.30	3.50	1.90	4.70	0.03	27.23	1.03	0.37
Total Oxidised Nitrogen as N (mg/l)	<0.3	<0.3	0.30	<0.3	<0.3	<0.3	2.30	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<.3	0.40
Sodium (mg/l)	873.60	829.10	1106.00	742.40	885.50	652.00	192.10	320.30	1774.40	646.10	75.40	178.70	1142.00	833.00	850.90
Potassium (mg/l)	423.40	415.00	547.30	414.50	395.80	356.60	94.00	104.50	95.30	274.80	36.70	83.70	752.80	452.70	419.00
Total Chromium (mg/l)	0.03	0.04	0.06	0.03	0.03	0.02	0.01	0.01	0.01	0.02	0.00	0.01	NDP	NDP	NDP
Dissolved Boron Low Level (ug/l)	3306.00	3259.00	4623.00	4074.00	4275.00	2788.00	974.00	3058.00	1085.00	2422.00	847.00	943.00	NDP	NDP	NDP
Dissolved Cadmium Low Level (ug/l)	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NDP	NDP	NDP
Dissolved Calcium Low Level (ug/l)	161400.00	122400.00	126700.00	148200.00	172500.00	175000.00	141300.00	188500.00	249000.00	113600.00	233400.00	259000.00	NDP	NDP	NDP
Dissolved Copper Low Level (ug/l)	12.00	<1	10.00	17.00	<1	<1	3.00	3.00	2.00	<1	2.00	<1	NDP	NDP	NDP
Dissolved Iron Low Level (ug/l)	1286.00	1576.00	3602.00	774.00	1389.00	870.00	165.00	292.00	430.00	1108.00	285.00	303.00	NDP	NDP	NDP
Dissolved Lead Low Level (ug/l)	1.00	<1	10.00	2.00	<1	<1	<1	1.00	<1	6.00	<1	<1	NDP	NDP	NDP
Dissolved Magnesium Low Level (ug/l)	207700.00	141400.00	189800.00	229500.00	254600.00	240700.00	69060.00	109000.00	108400.00	152700.00	35320.00	79160.00	NDP	NDP	NDP
Dissolved Manganese Low Level (ug/l)	505.00	979.00	767.00	676.00	407.00	714.00	1461.00	2673.00	1467.00	358.00	980.00	1929.00	NDP	NDP	NDP
Dissolved Nickel Low Level (ug/l)	106.00	112.00	170.00	85.00	55.00	40.00	22.00	53.00	38.00	111.00	9.00	21.00	NDP	NDP	NDP
Dissolved Zinc Low Level (ug/l)	57.00	51.00	46.00	125.00	71.00	37.00	229.00	107.00	32.00	55.00	14.00	16.00	NDP	NDP	NDP
Total Cyanide (mg/l)	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.05	0.05

APPENDIX VI
LANDFILL GAS
MONITORING RESULTS

CO2	Jan (%v/v)	Feb (%v/v)	Mar (%v/v)	April (%v/v)	May (%v/v)	June (%v/v)	July (%v/v)	Aug (%v/v)	Sep (%v/v)	Oct (%v/v)	Nov (%v/v)	Dec (%v/v)
GA1	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2
GA2	0.6	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.7
GA3	1.1	0.0	0.7	0.0	1.3	9.6	0.4	0.0	1.7	9	0.6	0.5
GA4	1.9	0.7	0.8	0.9	0.8	4.2	45	2.2	2.2	1.7	1.1	0.7
GA5	3.2	2.5	3.6	0.1	2.8	3.6	0.0	0.9	4.1	3.9	4.2	4.2
GA6	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	1.3
GA7	1.3	1.5	1.9	1.3	0.9	3.1	5.2	0.9	4.2	3.9	3.9	1.7
GA8	1.4	1.1	1.1	0.3	0.6	0.6	0.5	0.0	0.2	0.0	0.3	1.5
GA9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.8
GA10	0.3	0.4	0.4	0.2	0.3	0.6	0.6	0.9	0.7	0.6	0.6	0.6
GA11	0.2	0.0	0.2	0.0	0.1	5.2	35	1.0	1.4	28	2.0	1.8
GA12	0.1	0.1	0.2	0.3	0.5	0.0	1.3	0.0	0.7	0.7	0.7	0.7
GA13	0.1	0.5					36	0.4	0.3	60	0.2	0.2
MHL33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHL40	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.1
LMW4	7.6	4.4		3.8	4.1	4.2	6.8	3.0	4.9	3.8	4.5	3.3
LMW5	10.0	12.0	6.6	3.2	4.4	3.9	8.1	7.1	5.9	4.2	12.0	8.6
LMW10	0.0		1.5	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0
LMW14	0.0	33.0	35.0	26.9	37.0	36.0	39.0	38.0	37.0	36.0	35.0	37.0
LMW18	0.1	0.3	0.3	0.1	0.6	0.5	0.7	0.3	0.3	0.5	0.4	0.7

O2	Jan (%v/v)	Feb (%v/v)	Mar (%v/v)	April (%v/v)	May (%v/v)	June (%v/v)	July (%v/v)	Aug (%v/v)	Sep (%v/v)	Oct (%v/v)	Nov (%v/v)	Dec (%v/v)
GA1	20.8	20.9	21.5	20.9	21.4	20.6	21.2	21.1	21.3	20.6	20.5	21.0
GA2	20.6	20.6	21.2	21.0	21.1	20.6	21.1	20.8	21.3	20.5	20.3	20.7
GA3	17.5	20.9	19.0	20.8	17.9	0.9	20.2	20.8	16.5	15.5	19.0	19.8
GA4	14.9	18.6	18.3	18.6	17.4	8.0	10.2	16.2	15.7	16.6	17.5	19.3
GA5	0.0	2.7	1.0	20.3	3.5	3.0	20.9	1.5	0.7	0.9	2.3	0.7
GA6	21.1	21.0	21.0	20.8	20.7	20.5	20.6	20.5	20.7	20.4	20.6	20.0
GA7	18.5	17.3	15.1	18.1	17.8	11.4	9.8	19.0	15.2	13.9	13.9	17.2
GA8	19.6	19.5	19.3	20.5	19.2	19.6	20.1	20.5	20.7	20.5	20.5	19.4
GA9	20.9	21.0	21.5	20.9	21.2	20.6	19.7	18.1	21.0	18.8	20.1	19.9
GA10	20.6	20.6	20.5	20.9	20.1	20.1	19.9	19.0	19.9	20.0	20.3	20.0
GA11	20.2	21.0	20.1	21.0	20.2	17.4	13.3	17.3	16.2	12.4	12.9	14.3
GA12	20.8	21.1	20.7	20.8	20.0	20.9	19.0	20.4	19.8	19.9	20.5	19.9
GA13	20.5	20.3					7.2	21.1	20.5	8.7	21.1	21.1
MHL33	20.9	20.5	20.9	20.9	20.7	20.8	20.5	20.5	20.8	20.6	20.7	20.7
MHL40	20.9	21.0	20.9	21.1	20.1	21.0	20.6	20.4	20.8	20.4	21.0	20.6
LMW4	16.4	18.5		18.9	17.8	18.4	16.7	19.3	17.4	18.6	17.8	19.1
LMW5	11.6	12.0	15.0	18.8	17.3	17.6	14.5	15.0	15.3	16.1	11.0	13.5
LMW10	20.9		19.6	20.9	20.7	20.8	21.2	21.2	21.0	20.9	21.0	20.9
LMW14	34.0	0.4	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
LMW18	22.1	21.4	21.3	20.9	20.6	20.2	20.9	20.5	20.4	20.5	20.6	20.8

CH4	Jan (%v/v)	Feb (%v/v)	Mar (%v/v)	April (%v/v)	May (%v/v)	June (%v/v)	July (%v/v)	Aug (%v/v)	Sep (%v/v)	Oct (%v/v)	Nov (%v/v)	Dec (%v/v)
GA1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA3	21	0.0	0.3	0.0	0.3	7	0.2	0.0	24	32	0.2	0.0
GA4	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1	0.0	0.0	0.0	0.0
GA5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA6	0.0	0.0	0.0	0.0	0.5	0.0	0.2	0.0	0.0	0.0	0.0	1.6
GA7	0.0	0.0	0.0	0.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA8	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA12	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA13	0.9	0.9					61.0	0.1	0.0	33.5	0.0	0.0
MHL33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHL40	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMW4	10.4	6.5		4.4	6.1	5.5	9.1	4.3	6.7	5.2	6.5	4.6
LMW5	7.8	9.7	4.9	1.7	2.8	2.7	6.1	5.2	4.3	4.9	10.0	5.7
LMW10	0.0		2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMW14	63.0	66.0	65.0	39.2	63.0	65.0	61.0	62.0	63.0	65.0	64.0	62.0
LMW18	0.0	0.2	0.2	0.0	0.3	0.4	0.5	0.2	0.2	0.4	0.3	0.4

APPENDIX VI
STAFF STRUCTURE

Balleally Landfill – Waste Licence W0009-02:
Condition 2.2.1. Management Structure – 01st November 2008

TITLE	NAME	BASE	DUTIES AND RESPONSIBILITIES	QUALIFICATIONS	EXPERIENCE
Senior Engineer, Environment	Mr. J. Daly	HQ	Responsible for Waste Management Enforcement and Waste Infrastructure.	B.E. (Civil Engineering), 1986. M.Sc. Environmental Engineering, 1993. MIEI.	15 years Water Service and Waste Management experience. 14 years LA experience.
Senior Executive Engineer, Environment	Mr. M. Kiely	HQ	Responsible for Waste Infrastructure within the Environment Department.	B.E. (Civil Engineering) 1977, F.Á.S. Waste Management Training Course.	Approx.30 years LA experience including 18 years Waste Management experience. Joined the Environmental Services Department of FCC in Jul 2001.
Landfill Manager	Mr. Declan Howard,	Balleally Landfill	On-site supervision of landfill operations, licence conditions, engineering works and overall management of site staff. Landfill development and design works.	Diploma in Civil Engineering (NCEA) A. Eng. AMIEI, MIIS (Institute of Irish Surveyors). F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	34 years in Local Authority Service and 20 years in Environment Section.
Executive Engineer	Mr. Aidan Murphy	HQ	Supervision of external contracts. Liaison with consultants and contractors for development works and capping program.	B.E. (Mechanical Engineering), Eurlng, MIEI, Chartered Engineer. F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	10 years Engineer Officer, Defence Forces, 6 Years Project Management Construction Industry. Joined the Environmental Services Department in July 2004.
A/Environmental Scientist	Dr. Mortimer Loftus	HQ	Management of Waste Licence Compliance. Supervision of scientific monitoring, reporting and liaison with the Environmental Protection Agency.	Ph.D. Ecology, B.Sc. Environmental Science, Dip Environmental Impact Assessment Management, Dip Environmental Management, F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	1996-2004 Soil Research and Mapping in Teagasc. Joined the Environmental Services Department in July 2004.
Landfill Foreman	Mr. John Lacey	Balleally Landfill	Deputy in the absence of the Landfill Manager, Waste Acceptance Manager, safety inspections and day to day supervision of staff.	Completed courses in Health and Safety (NIFAST), Manual Handling, Evasive Driving & Trenching. Also Fire Warden and Supervisors courses.	Over 30 years Local Authority Service. Assistant Foreman in Dunsink Landfill for 12 years before being appointed Foreman for Balleally Landfill in 1998.
A/Assistant Foreman	Mr. Mick Harford	Balleally Landfill	Assistant to Landfill Foreman, task management of site operatives for general works and capping program.	A/Assistant Foreman.	Working at Balleally Landfill Site since 1986.

APPENDIX I
DRAWINGS

APPENDIX II
GROUNDWATER MONITORING RESULTS

CD1 Parameter	Standard	Date 15/01/2008	06/02/2008	06/03/2008	24/04/2008	07/05/2008	11/06/2008	09/07/2008	14/08/2008	09/09/2008
pH	≥ 6.5 & ≤ 9.5[1]	8.24	7.45	7.8	7.53	8.43	5.43	10.1	7.95	
Temp (oC)	25[1]	8.6	9.1	9.8	12.3	14.3	17.3	15.2	15.9	
Ammoniacal Nitrogen (mg/l)	0.12[1]	0.3	1.8	3.8	3.6	4.6	6.9	4.4	1.8	7
BOD (mg/l)	5[2]	3	64	105	49	42	21	6		<2
COD (mg/l)	40[2]	<15	178	210	61	69	68	162	34	18
Total Suspended Solids (mg/l)	50[2]	13	109	<10	<10	<10	41	25	<10	<10
Dissolved Oxygen (mg/l)	No abnormal Change	5.8	6.8	4.4	0.9	1	1.2	9.6	5.6	2.84
Chloride (mg/l)	30[1]	21	38	47	59	40	42	51	32	51
Conductivity (mS/cm)	1[1]	0.993	1.12	1.077	1.19	1.207	1.21	1.31	0.886	1.16

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

MB35 - Downstream Parameter	Standard	Date January 08	May 08	July 07	July 08	Date January 09
Ammoniacal Nitrogen as N (mg/l)	0.12[1]	5.8	5.7	6.4	0.2	0.015
Chloride (mg/l)	30[1]	21141.68	17380	34084	16100	25098
Dissolved Oxygen (mg/l)	No abnormal Change	4.5	4.6	4.2	8.3	8.15
Electrical Conductivity (mS/cm)	1[1]	41.5	41.5	41.55	68.5	68.525
pH (pH units)	≥ 6.5 & ≤ 9.5[1]	7.55	6.99	7.5	7.79	7.765
Temp (oC)	25[1]	11	10.7	13	13.2	14.2
Total Organic Carbon (mg/l)	No abnormal Change	3	4	3	<2	3.3333333
Cyanide (mg/l)	0.01[1]			<0.05	0.05	
Fluoride (mg/l)	1[1]			0.5	0.3	
Dissolved Mercury Low Level (ug/l)	1[1]			<0.05	<0.05	
Sulphate (mg/l)	200[1]			4529	2074	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change[1]			660	200	
Total Phosphorous (mg/l)	No abnormal Change 1			<0.05	<0.05	
Ortho Phosphate as PO4 (mg/l)	0.03[1]			<0.03	0.01	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change 1			<0.3	3.1	
Sodium (mg/l)	150[1]			8000	22	
Potassium (mg/l)	5[1]			330	1.4	
Total Chromium (mg/l)	0.03[1]			<0.05	0.009	
Dissolved Boron Low Level (ug/l)	1000[1]			4017	3905	
Dissolved Cadmium Low Level (ug/l)	5[1]			0.8	0.4	
Dissolved Calcium Low Level (ug/l)	30[1]			415100	232700	
Dissolved Copper Low Level (ug/l)	30[1]			<1	4	
Dissolved Iron Low Level (ug/l)	200[1]			56	660	
Dissolved Lead Low Level (ug/l)	10[1]			6	2	
Dissolved Magnesium Low Level (ug/l)	50000[1]			151600	545000	
Dissolved Manganese Low Level (ug/l)	50[1]			2454	2616	
Dissolved Nickel Low Level (ug/l)	20[1]			18	10	
Dissolved Zinc Low Level (ug/l)	100[1]			14	28	
Total Cyanide (mg/l)	10[1]			<0.05	0.05	

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

RC3 - Upstream Parameter	Standard	Date January	May	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.12[1]	<0.2	0.09	<0.2	6	5
Chloride (mg/l)	30[1]	52	50	63	27	26
Dissolved Oxygen (mg/l)	No abnormal Change	5.3	5.75		3.4	5.2
Electrical Conductivity (mS/cm)	1[1]	0.938	1005	1.085	0.903	1.008
pH (pH units)	≥ 6.5 & ≤ 9.5[1]	7.6	6.92	7.46	7.37	7.6
Temp (oC)	25[1]	10.2	13	14.1	12.1	13.3
Total Organic Carbon (mg/l)		<2	<2	<2	8	3
Cyanide (mg/l)	0.01[1]			<0.05	0.05	
Fluoride (mg/l)	1[1]			0.2	0.2	
Dissolved Mercury Low Level (ug/l)	1[1]			<0.05	<0.05	
Sulphate (mg/l)	200[1]			46	42	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change[1]			178	550	
Total Phosphorous (mg/l)	No abnormal Change 1			<0.05	0.24	
Ortho Phosphate as PO4 (mg/l)	0.03[1]			<0.03	0.05	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change 1			63	156	
Sodium (mg/l)	150[1]			21.5	5584	
Potassium (mg/l)	5[1]			1.9	3875	
Total Chromium (mg/l)	0.03[1]			<0.05	<0.001	
Dissolved Boron Low Level (ug/l)	1000[1]			27	53	
Dissolved Cadmium Low Level (ug/l)	5[1]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)	30[1]			174500	174900	
Dissolved Copper Low Level (ug/l)	30[1]			3	<1	
Dissolved Iron Low Level (ug/l)	200[1]			8	84	
Dissolved Lead Low Level (ug/l)	10[1]			70	23	
Dissolved Magnesium Low Level (ug/l)	50000[1]			10460	11030	
Dissolved Manganese Low Level (ug/l)	50[1]			4	<1	
Dissolved Nickel Low Level (ug/l)	20[1]			3	2	
Dissolved Zinc Low Level (ug/l)	100[1]			15	23	
Total Cyanide (mg/l)	10[1]			<0.05	0.05	

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

CD1 - Under Liner Parameter	Standard	Date January	May	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.12[1]	0.03	0.16	1.2	0.24	0.18
Chloride (mg/l)	30[1]	21	20	17	58	49
Dissolved Oxygen (mg/l)	No abnormal Change	5.8	1	4.5	9.6	4.83
Electrical Conductivity (mS/cm)	1[1]	0.993	1.207	1.005	1.191	0.808
pH (pH units)	≥ 6.5 & ≤ 9.5[1]	8.24	7.58	7.54	8.54	8.98
Temp (oC)	25[1]	8.6	12.3	16	17.7	12.5
Total Organic Carbon (mg/l)		5	31	6	16	10
Cyanide (mg/l)	0.01[1]			<0.05	<0.05	
Fluoride (mg/l)	1[1]			0.2	0.1	
Dissolved Mercury Low Level (ug/l)	1[1]			<0.05	<0.05	
Sulphate (mg/l)	200[1]			357	476	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change[1]			256	50	
Total Phosphorous (mg/l)	No abnormal Change[1]			<0.05	0.05	
Ortho Phosphate as PO4 (mg/l)	0.03[1]			<0.03	<0.03	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change[1]			1.6	8.1	
Sodium (mg/l)	150[1]			20.5	114	
Potassium (mg/l)	5[1]			8	79	
Total Chromium (mg/l)	0.03[1]			<0.05	0.015	
Dissolved Boron Low Level (ug/l)	1000[1]			100	66	
Dissolved Cadmium Low Level (ug/l)	5[1]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)	30[1]			197100	81270	
Dissolved Copper Low Level (ug/l)	30[1]			<1	38	
Dissolved Iron Low Level (ug/l)	200[1]			18	80	
Dissolved Lead Low Level (ug/l)	10[1]			<1	<1	
Dissolved Magnesium Low Level (ug/l)	50000[1]			14800	6403	
Dissolved Manganese Low Level (ug/l)	50[1]			2	19	
Dissolved Nickel Low Level (ug/l)	20[1]			5	30	
Dissolved Zinc Low Level (ug/l)	100[1]			17	61	
Total Cyanide (mg/l)	10[1]			<0.05	<0.05	

Note:-Cells Shaded indicate results higher than MAC or IGV

1=EPA IGV Interim Guideline Values, from EPA, Towards setting Guideline Values for the Protection of Groundwater in Ireland

2=(Quality of Surface Water intended for the abstraction of drinking water) Regs., 1989.

APPENDIX III
SURFACE WATER MONITORING RESULTS

S3 Parameter	Standard	Date 15/01/2008	06/02/2008	06/03/2008	24/04/2008	07/05/2008	11/06/2008	09/07/2008	14/08/2008	09/09/2008
pH	≥ 5.5 & ≤ 8.5 [1]	8.17	8.3	7.75	8.12	8	7.89	5.44	7.75	8.03
Temp (oC)	No abnormal change [2]	6.6	5.1	6.9	8.5	11.8	13.3	15.9	13.9	14.2
Ammoniacal Nitrogen as N (mg/l)	0.23 [1]	0.05	0.1	0.15	0.09	0.17	0.29	0.5	0.4	0.2
BOD (mg/l)	5 [1]	<2	10	<2	<2	<2	<2	2		<2
COD (mg/l)	40 [1,3]	21	28	<15	<15	19	35	24	24	16
Total Suspended Solids (mg/l)	35 [2]	<10	16	26	<10	<10	<10	13	<10	<10
Dissolved Oxygen (mg/l)	No abnormal Change [2]	5.4	5.7	4.3	12.7	8.01	4.63	5.57	8.45	4.88
Chloride (mg/l)	250 [1]	174	52	68	76	90	124	91	52	72
Conductivity (mS/cm)	1 [1]	0.717	0.745	0.962	0.908	1.078	1.245	1.06	0.686	0.743

Note:-Cells Shaded indicate results higher than MAC or IGV

1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).

2=This Value used as an indicator only.

3 Limit for A3 waters specified only

SWV1 - Inner Estuary	Standard	Date				
Parameter		Jan 08	May 08	July 07	July 08	Oct 08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	1688	1053	1.16	7.3	0.9
BOD (mg/l)	5[1]	3	3	<0.05	16	30
COD (mg/l)	40[1,3]	24	61	330	50	231
Chloride (mg/l)	250[1]	186	196	97	2484	46
Dissolved Oxygen (mg/l)	No abnormal Change [2]	4.8	4.9	1.196	7.2	4.79
Conductivity (mS/cm)	1[1]	712	21	12.6	48.5	0.815
pH	≥ 5.5 & ≤ 8.5 [1]	7.93	6.94	7.61	7.39	7.85
Total Suspended Solids (mg/l)	50[2]	<10	<10	<0.05	38	243
Temp (oC)	No abnormal Change [2]	6.8	14.2	17.4	20.7	12.5
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			<0.03	535	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			300	280	
Total Phosphorous (mg/l)	No abnormal Change [2]			143	0.14	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			2.3	0.21	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			4.5	8.4	
Sodium (mg/l)	No abnormal Change [2]			14	1321	
Potassium (mg/l)	No abnormal Change [2]			26	67.3	
Dissolved Chromium (mg/l)	0.1[2]			0.16	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			<0.4	665	
Dissolved Cadmium Low Level (ug/l)	5[2]			1.6400	<0.4	
Dissolved Calcium Low Level (ug/l)				<1	222700	
Dissolved Copper Low Level (ug/l)	50[2]			6	6	
Dissolved Iron Low Level (ug/l)	1000[2]			<1	64	
Dissolved Lead Low Level (ug/l)	5[2]			1.8820	<1	
Dissolved Magnesium Low Level (ug/l)				<1	252200	
Dissolved Manganese Low Level (ug/l)	300[2]			4	1590	
Dissolved Nickel Low Level (ug/l)	100[2]			2	11	
Dissolved Zinc Low Level (ug/l)	100[2]			2	23	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

SW20a - Drain N field Parameter	Standard	Date January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	4.36	145	35.2	44	318
BOD (mg/l)	5[1]	5	1	12	8	5
COD (mg/l)	40[1,3]	62	152	42	146	141
Chloride (mg/l)	250[1]	53	442	86	584	99
Dissolved Oxygen (mg/l)	No abnormal Change [2]	4.7	4.8		8.1	2.58
Conductivity (mS/cm)	1[1]	2.98	3.952	1.3	3.73	1.201
pH	≥ 5.5 & ≤ 8.5 [1]	7.38	6.78	7.21	7.54	7.42
Total Suspended Solids (mg/l)	50[2]	<10	43	<10	78	220
Temp (oC)	No abnormal Change [2]	6.9	14	15.5	9.1	12.1
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			104	74	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			433	1490	
Total Phosphorous (mg/l)	No abnormal Change [2]			0.27	0.05	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			0.37	<0.03	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			1.5	0.4	
Sodium (mg/l)	No abnormal Change [2]			60	286	
Potassium (mg/l)	No abnormal Change [2]			38	125.5	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	2	
Dissolved Boron Low Level (ug/l)	2000[2]			278	1244	
Dissolved Cadmium Low Level (ug/l)	5[2]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)				97000	145900	
Dissolved Copper Low Level (ug/l)	50[2]			14	4	
Dissolved Iron Low Level (ug/l)	1000[2]			30	128	
Dissolved Lead Low Level (ug/l)	5[2]			<1	<1	
Dissolved Magnesium Low Level (ug/l)				17730	102500	
Dissolved Manganese Low Level (ug/l)	300[2]			26	686	
Dissolved Nickel Low Level (ug/l)	100[2]			12	48	
Dissolved Zinc Low Level (ug/l)	100[2]			<1	22	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

S7 - Upstream	Standard	Date				
Parameter		January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	<0.2	<0.2		<0.2	0.3
BOD (mg/l)	5[1]	<2	<2	2	<2	3
COD (mg/l)	40[1,3]	22	<15	23	17	21
Chloride (mg/l)	250[1]	54	61	50	70	55
Dissolved Oxygen (mg/l)	No abnormal Change [2]	5.7	5.9		9.4	4.25
Conductivity (mS/cm)	1[1]	0.717	0.789	0.802	0.839	0.697
pH	≥ 5.5 & ≤ 8.5 [1]	8.5	7.3	7.55	7.82	7.93
Total Suspended Solids (mg/l)	50[2]	<10	<10	<10	25	22
Temp (oC)	No abnormal Change [2]	7	13.2	15.4	17.2	11.8
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			48	56	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			363	290	
Total Phosphorous (mg/l)	No abnormal Change [2]			0.28	0.14	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			0.54	0.7	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			6.8	3.3	
Sodium (mg/l)	No abnormal Change [2]			21	5.7	
Potassium (mg/l)	No abnormal Change [2]			4.3	6.4	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			91	117	
Dissolved Cadmium Low Level (ug/l)	5[2]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)				134700	143700	
Dissolved Copper Low Level (ug/l)	50[2]			<1	2	
Dissolved Iron Low Level (ug/l)	1000[2]			14	60	
Dissolved Lead Low Level (ug/l)	5[2]			<1	<1	
Dissolved Magnesium Low Level (ug/l)				9647	13380	
Dissolved Manganese Low Level (ug/l)	300[2]			<1	<1	
Dissolved Nickel Low Level (ug/l)	100[2]			3	3	
Dissolved Zinc Low Level (ug/l)	100[2]			<1	15	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

S3 - Outer Estuary	Standard	Date				
Parameter		January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	0.07	7	0.07	9	3.5
BOD (mg/l)	5[1]	<2	<2	<2	2	2
COD (mg/l)	40[1,3]	21	19	16	24	22
Chloride (mg/l)	250[1]	174	90	62	91	59
Dissolved Oxygen (mg/l)	No abnormal Change [2]	5.4	8.01		9.3	6
Conductivity (mS/cm)	1[1]	0.76	1.073	0.938	1.156	0.765
pH	≥ 5.5 & ≤ 8.5 [1]	8.17	8	7.54	7.3	7.8
Total Suspended Solids (mg/l)	50[2]	<10	<10	<10	13	13
Temp (oC)	No abnormal Change [2]	6.6	11.8	14	15.9	11.9
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			66	70	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			375	300	
Total Phosphorous (mg/l)	No abnormal Change [2]			0.07	<0.05	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			0.39	0.1	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			13.1	20.2	
Sodium (mg/l)	No abnormal Change [2]			27.5	47.8	
Potassium (mg/l)	No abnormal Change [2]			7	23	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			118	189	
Dissolved Cadmium Low Level (ug/l)	5[2]			<0.4	<0.4	
Dissolved Calcium Low Level (ug/l)				147400	147100	
Dissolved Copper Low Level (ug/l)	50[2]			<1	<1	
Dissolved Iron Low Level (ug/l)	1000[2]			7	54	
Dissolved Lead Low Level (ug/l)	5[2]			<1	<1	
Dissolved Magnesium Low Level (ug/l)				11760	18840	
Dissolved Manganese Low Level (ug/l)	300[2]			<1	<1	
Dissolved Nickel Low Level (ug/l)	100[2]			5	7	
Dissolved Zinc Low Level (ug/l)	100[2]			<1	23	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

SWFD - Northern French Drain	Standard	Date				
Parameter		January 08	May 08	July 07	July 08	Oct-08
Ammoniacal Nitrogen as N (mg/l)	0.23[1]	0.4	<0.2	<15	0.4	0.4
BOD (mg/l)	5[1]	<2	3	<0.05	5	<3
COD (mg/l)	40[1,3]	<15	<15	360	<15	<15
Chloride (mg/l)	250[1]	55	64	49	59	54
Dissolved Oxygen (mg/l)	No abnormal Change [2]	4.9	5.1	1.087	9.5	2.17
Conductivity (mS/cm)	1[1]	0.74	1.005	1.12	1.07	1.13
pH	≥ 5.5 & ≤ 8.5 [1]	7.81	6.83	7.66	7.57	7.7
Total Suspended Solids (mg/l)	50[2]	<10	<10	<0.05	14	24
Temp (oC)	No abnormal Change [2]	8.3	14.2	15.2	16.7	12.9
Dissolved Mercury Low Level (ug/l)	<0.1[2]			<0.05	<0.05	
Sulphate (mg/l)	200[2]			0.18	222	
Total Alkalinity AS CACO3 (mg/l)	No abnormal Change [2]			300	310	
Total Phosphorous (mg/l)	No abnormal Change [2]			130	<0.05	
Ortho Phosphate as PO4 (mg/l)	No abnormal Change [2]			13.6	<0.03	
Total Oxidised Nitrogen as N (mg/l)	No abnormal Change [2]			4.9	14	
Sodium (mg/l)	No abnormal Change [2]			19	32.7	
Potassium (mg/l)	No abnormal Change [2]			<10	12.6	
Dissolved Chromium (mg/l)	0.1[2]			<0.05	<1	
Dissolved Boron Low Level (ug/l)	2000[2]			<0.4	117	
Dissolved Cadmium Low Level (ug/l)	5[2]			192205	<0.4	
Dissolved Calcium Low Level (ug/l)				<1	210400	
Dissolved Copper Low Level (ug/l)	50[2]			10	2	
Dissolved Iron Low Level (ug/l)	1000[2]			<1	39	
Dissolved Lead Low Level (ug/l)	5[2]			116080	<1	
Dissolved Magnesium Low Level (ug/l)				<1	18570	
Dissolved Manganese Low Level (ug/l)	300[2]			3	<1	
Dissolved Nickel Low Level (ug/l)	100[2]			2	2	
Dissolved Zinc Low Level (ug/l)	100[2]			2	25	

Note:-Cells Shaded indicate results higher than MAC or IGV
1=Maximum Admissible Concentration for A1 waters, as classified by the Surface Water Regulations (1989).
2=EQS = Environmental Quality Standard for Surface Water Estuarine, Coastal and Marine Waters Where Applicable

APPENDIX IV
LEACHATE LEVELS MONITORING RESULTS

Monitoring Location Leachate/Gas	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	LEVEL OF LIQUID IN WELL (mAOD)											
LMW1				3.92	3.50	3.49	3.56	3.38	3.53	3.49	3.31	3.38
LMW2												
LMW3				5.52	5.69	5.62		5.66	5.76		5.55	5.59
LMW4	6.30	5.65	5.76	5.71	5.71	5.67	5.69	4.60	5.76	5.81	5.65	5.56
LMW5	6.94	6.05	6.15	6.10	6.11	6.06	6.11	5.99	6.11	6.13	5.87	5.90
LMW6	6.59	5.60	5.74	5.70	5.70	5.63	5.68	5.62	5.75	5.76	5.50	5.48
LMW7				5.08	5.08	5.19	5.10	5.03	5.17	5.13	4.97	4.94
LMW8	5.27	4.14									4.89	
LMW9				4.31	4.29	4.20	3.99	4.14	4.23	4.36	4.09	4.09
LMW10	4.32	3.58	3.52	3.46	3.39	3.25	3.13	3.08	3.35	3.33	3.23	3.19
LMW11	4.09	3.44	3.52	3.47	3.39	3.20	3.12	3.17	3.37	3.39	3.27	3.23
LMW12				3.51	3.44	3.23	3.16	3.22	3.44	3.07	2.93	2.84
LMW13				3.13	3.04	2.84	2.79	2.76	3.08	3.70	3.41	3.37
LMW14	4.80	3.60	3.88	3.79	3.71	3.45	3.40	3.29	3.61			
LMW15		3.33										
LMW16	5.35	2.40										
LMW17	4.54	4.46	2.50	4.45	4.38	4.16	4.58	4.10	4.40	4.38	4.22	4.18
LMW18	4.39	4.23	4.35	4.25	3.19	3.99	3.97	4.07	4.27	4.15	4.02	3.77
L19	14.56	13.81							11.14			5.65
L20	14.93	15.61		11.58	10.41							
L21												
L22												
L23	4.52	4.39	4.42	4.36	4.02	4.08	4.14	4.43	4.49	4.45	4.23	4.22
L24	4.42	4.36	4.41	4.36	4.28	4.09	4.05	4.24	4.36	4.31	4.15	4.13

APPENDIX V
LEACHATE QUALITY

Parameter	LMW1	LMW6	LMW7	LMW9	LMW10	LMW11	LMW13	LMW14	LMW17	LMW18	L23	L24	Pipe 1A	Pipe 1 B	Pipe 1 C
Ammoniacal Nitrogen as N (mg/l)	590.40	664.50	894.40	574.00	485.90	427.70	88.90	211.90	192.50	738.90	77.90	225.10	1682.60	846.90	717.00
BOD Unfiltered (mg/l)	507.00	421.00	96.00	166.00	120.00	414.00	13.00	32.00	9.00	105.00	12.00	15.00	394.00	106.00	227.00
COD Unfiltered (mg/l)	970.00	968.00	1843.00	714.00	763.00	625.00	121.00	294.00	219.00	795.00	97.00	261.00	3350.00	1446.00	1323.00
Chloride (mg/l)	1425.00	1258.00	1930.00	999.00	1086.00	851.00	272.00	411.00	228.00	980.00	85.00	247.00	1851.00	1384.00	1414.00
Conductivity (mS/cm) @ 20oC	11.00	10.00	13.50	10.00	10.00	9.00	2.92	4.38	3.64	10.00	2.27	3.75	19.00	13.00	12.00
pH	7.34	7.46	7.55	7.33	7.40	7.19	7.04	6.85	6.84	7.13	6.73	6.86	7.93	7.51	7.49
Temp (oC)	10.90	16.20	25.90	30.60	12.20	14.30	14.50	14.90	11.30	12.10	12.70	12.50	33.10	31.50	29.70
Fluoride (mg/l)	0.70	0.80	1.00	0.70	0.60	1.00	0.30	0.50	0.50	0.60	0.50	0.50	<0.1	1.10	0.90
Dissolved Mercury Low Level (ug/l)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate (mg/l)	<3	<3	<3	<3	<3	83.00	64.00	11.00	<3	<3	85.00	135.00	6.00	67.00	35.00
Total Phosphorous (mg/l)	1.71	1.20	1.43	1.44	0.62	0.56	<0.05	0.55	0.68	2.07	1.24	0.64	10.01	3.00	1.16
Ortho Phosphate as PO4 (mg/l)	6.80	7.70	2.40	7.80	5.70	2.40	0.03	3.30	3.50	1.90	4.70	0.03	27.23	1.03	0.37
Total Oxidised Nitrogen as N (mg/l)	<0.3	<0.3	0.30	<0.3	<0.3	<0.3	2.30	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<.3	0.40
Sodium (mg/l)	873.60	829.10	1106.00	742.40	885.50	652.00	192.10	320.30	1774.40	646.10	75.40	179.70	1142.00	833.00	850.90
Potassium (mg/l)	423.40	415.00	547.30	414.50	395.80	356.60	94.00	104.50	95.30	274.60	36.70	83.70	752.80	452.70	419.00
Total Chromium (mg/l)	0.03	0.04	0.06	0.03	0.03	0.02	0.01	0.01	0.01	0.02	0.00	0.01	NDP	NDP	NDP
Dissolved Boron Low Level (ug/l)	3306.00	3259.00	4623.00	4074.00	4275.00	2786.00	974.00	3058.00	1085.00	2422.00	847.00	943.00	NDP	NDP	NDP
Dissolved Cadmium Low Level (ug/l)	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NDP	NDP	NDP
Dissolved Calcium Low Level (ug/l)	161400.00	122400.00	126700.00	148200.00	172500.00	175000.00	141300.00	188500.00	249000.00	113600.00	233400.00	259000.00	NDP	NDP	NDP
Dissolved Copper Low Level (ug/l)	12.00	<1	10.00	17.00	<1	<1	3.00	3.00	2.00	<1	2.00	<1	NDP	NDP	NDP
Dissolved Iron Low Level (ug/l)	1286.00	1576.00	3802.00	774.00	1389.00	870.00	165.00	292.00	430.00	1108.00	285.00	303.00	NDP	NDP	NDP
Dissolved Lead Low Level (ug/l)	1.00	<1	10.00	2.00	<1	<1	<1	1.00	<1	6.00	<1	<1	NDP	NDP	NDP
Dissolved Magnesium Low Level (ug/l)	207700.00	141400.00	189800.00	229500.00	254600.00	240700.00	69060.00	109000.00	108400.00	152700.00	35320.00	79160.00	NDP	NDP	NDP
Dissolved Manganese Low Level (ug/l)	505.00	979.00	767.00	676.00	407.00	714.00	1461.00	2673.00	1467.00	358.00	980.00	1929.00	NDP	NDP	NDP
Dissolved Nickel Low Level (ug/l)	106.00	112.00	170.00	85.00	55.00	40.00	22.00	53.00	38.00	111.00	9.00	21.00	NDP	NDP	NDP
Dissolved Zinc Low Level (ug/l)	57.00	51.00	46.00	125.00	71.00	37.00	229.00	107.00	32.00	55.00	14.00	16.00	NDP	NDP	NDP
Total Cyanide (mg/l)	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.05	0.05

APPENDIX VI
LANDFILL GAS
MONITORING RESULTS

CO2	Jan (%v/v)	Feb (%v/v)	Mar (%v/v)	April (%v/v)	May (%v/v)	June (%v/v)	July (%v/v)	Aug (%v/v)	Sep (%v/v)	Oct (%v/v)	Nov (%v/v)	Dec (%v/v)
GA1	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2
GA2	0.6	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.7
GA3	1.1	0.0	0.7	0.0	1.3	9.6	0.4	0.0	1.7	1.9	0.6	0.5
GA4	1.9	0.7	0.8	0.9	0.8	14.4	4.5	2.2	2.2	1.7	1.1	0.7
GA5	3.4	2.5	6.6	0.1	2.8	9.6	0.0	3.9	4.1	3.9	4.2	4.2
GA6	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	1.3
GA7	1.3	1.5	1.9	1.8	0.9	3.1	5.2	0.9	4.2	3.9	3.9	1.7
GA8	1.4	1.1	1.1	0.3	0.6	0.6	0.5	0.0	0.2	0.0	0.3	1.5
GA9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.8
GA10	0.3	0.4	0.4	0.2	0.3	0.6	0.6	0.9	0.7	0.6	0.6	0.6
GA11	0.2	0.0	0.2	0.0	0.1	2.2	3.5	1.0	1.4	2.8	2.0	1.8
GA12	0.1	0.1	0.2	0.3	0.5	0.0	1.3	0.0	0.7	0.7	0.7	0.7
GA13	0.1	0.5					8.9	0.4	0.3	6.0	0.2	0.2
MHL33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHL40	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.1
LMW4	7.6	4.4		3.8	4.1	4.2	6.8	3.0	4.9	3.8	4.5	3.3
LMW5	10.0	12.0	6.6	3.2	4.4	3.9	8.1	7.1	5.9	4.2	12.0	8.6
LMW10	0.0		1.5	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0
LMW14	0.0	33.0	35.0	26.9	37.0	36.0	39.0	38.0	37.0	36.0	35.0	37.0
LMW18	0.1	0.3	0.3	0.1	0.6	0.5	0.7	0.3	0.3	0.5	0.4	0.7

O2	Jan (%v/v)	Feb (%v/v)	Mar (%v/v)	April (%v/v)	May (%v/v)	June (%v/v)	July (%v/v)	Aug (%v/v)	Sep (%v/v)	Oct (%v/v)	Nov (%v/v)	Dec (%v/v)
GA1	20.8	20.9	21.5	20.9	21.4	20.6	21.2	21.1	21.3	20.6	20.5	21.0
GA2	20.6	20.6	21.2	21.0	21.1	20.6	21.1	20.8	21.3	20.5	20.3	20.7
GA3	17.5	20.9	19.0	20.8	17.9	0.9	20.2	20.8	16.5	15.5	19.0	19.8
GA4	14.9	18.6	18.3	18.6	17.4	8.0	10.2	16.2	15.7	16.6	17.5	19.3
GA5	0.0	2.7	1.0	20.3	3.5	3.0	20.9	1.5	0.7	0.9	2.3	0.7
GA6	21.1	21.0	21.0	20.8	20.7	20.5	20.6	20.5	20.7	20.4	20.6	20.0
GA7	18.5	17.3	15.1	18.1	17.8	11.4	9.8	19.0	15.2	13.9	13.9	17.2
GA8	19.6	19.5	19.3	20.5	19.2	19.6	20.1	20.5	20.7	20.5	20.5	19.4
GA9	20.9	21.0	21.5	20.9	21.2	20.6	19.7	18.1	21.0	18.8	20.1	19.9
GA10	20.6	20.6	20.5	20.9	20.1	20.1	19.9	19.0	19.9	20.0	20.3	20.0
GA11	20.2	21.0	20.1	21.0	20.2	17.4	13.3	17.3	16.2	12.4	12.9	14.3
GA12	20.8	21.1	20.7	20.8	20.0	20.9	19.0	20.4	19.8	19.9	20.5	19.9
GA13	20.5	20.3					7.2	21.1	20.5	8.7	21.1	21.1
MHL33	20.9	20.5	20.9	20.9	20.7	20.8	20.5	20.5	20.8	20.6	20.7	20.7
MHL40	20.9	21.0	20.9	21.1	20.1	21.0	20.6	20.4	20.8	20.4	21.0	20.6
LMW4	16.4	18.5		18.9	17.8	18.4	16.7	19.3	17.4	18.6	17.8	19.1
LMW5	11.6	12.0	15.0	18.8	17.3	17.6	14.5	15.0	15.3	16.1	11.0	13.5
LMW10	20.9		19.6	20.9	20.7	20.8	21.2	21.2	21.0	20.9	21.0	20.9
LMW14	34.0	0.4	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
LMW18	22.1	21.4	21.3	20.9	20.6	20.2	20.9	20.5	20.4	20.5	20.6	20.8

CH4	Jan (%v/v)	Feb (%v/v)	Mar (%v/v)	April (%v/v)	May (%v/v)	June (%v/v)	July (%v/v)	Aug (%v/v)	Sep (%v/v)	Oct (%v/v)	Nov (%v/v)	Dec (%v/v)
GA1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA3	12	0.0	0.3	0.0	0.3	71	0.2	0.0	24	32	0.2	0.0
GA4	0.0	0.0	0.0	0.0	0.0	0.0	0.9	11	0.0	0.0	0.0	0.0
GA5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA6	0.0	0.0	0.0	0.0	0.5	0.0	0.2	0.0	0.0	0.0	0.0	15
GA7	0.0	0.0	0.0	0.0	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA8	0.0	0.0	0.0	0.0	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA12	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GA13	0.9	0.9					62	0.1	0.0	33	0.0	0.0
MHL33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHL40	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMW4	10.4	6.5		4.4	6.1	5.5	9.1	4.3	6.7	5.2	6.5	4.6
LMW5	7.8	9.7	4.9	1.7	2.8	2.7	6.1	5.2	4.3	4.9	10.0	5.7
LMW10	0.0		2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMW14	63.0	66.0	65.0	39.2	63.0	65.0	61.0	62.0	63.0	65.0	64.0	62.0
LMW18	0.0	0.2	0.2	0.0	0.3	0.4	0.5	0.2	0.2	0.4	0.3	0.4

APPENDIX VI
STAFF STRUCTURE

Balleally Landfill – Waste Licence W0009-02:
Condition 2.2.1. Management Structure – 01st November 2008

TITLE	NAME	BASE	DUTIES AND RESPONSIBILITIES	QUALIFICATIONS	EXPERIENCE
Senior Engineer, Environment	Mr. J. Daly	HQ	Responsible for Waste Management Enforcement and Waste Infrastructure.	B.E. (Civil Engineering), 1986. M.Sc. Environmental Engineering, 1993. MIEI.	15 years Water Service and Waste Management experience. 14 years LA experience.
Senior Executive Engineer, Environment	Mr. M. Kiely	HQ	Responsible for Waste Infrastructure within the Environment Department.	B.E. (Civil Engineering) 1977, F.Á.S. Waste Management Training Course.	Approx.30 years LA experience including 18 years Waste Management experience. Joined the Environmental Services Department of FCC in Jul 2001.
Landfill Manager	Mr. Declan Howard,	Balleally Landfill	On-site supervision of landfill operations, licence conditions, engineering works and overall management of site staff. Landfill development and design works.	Diploma in Civil Engineering (NCEA) A. Eng. AMIEI, MIIS (Institute of Irish Surveyors). F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	34 years in Local Authority Service and 20 years in Environment Section.
Executive Engineer	Mr. Aidan Murphy	HQ	Supervision of external contracts. Liaison with consultants and contractors for development works and capping program.	B.E. (Mechanical Engineering), Eurlng, MIEI, Chartered Engineer. F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	10 years Engineer Officer, Defence Forces, 6 Years Project Management Construction Industry. Joined the Environmental Services Department in July 2004.
A/Environmental Scientist	Dr. Mortimer Loftus	HQ	Management of Waste Licence Compliance. Supervision of scientific monitoring; reporting and liaison with the Environmental Protection Agency.	Ph.D. Ecology, B.Sc. Environmental Science, Dip Environmental Impact Assessment Management, Dip Environmental Management, F.Á.S. Waste Management Training Course. F.Á.S. Managing Safely in Construction Training Course.	1996-2004 Soil Research and Mapping in Teagasc. Joined the Environmental Services Department in July 2004.
Landfill Foreman	Mr. John Lacey	Balleally Landfill	Deputy in the absence of the Landfill Manager, Waste Acceptance Manager, safety inspections and day to day supervision of staff.	Completed courses in Health and Safety (NIFAST), Manual Handling, Evasive Driving & Trenching. Also Fire Warden and Supervisors courses.	Over 30 years Local Authority Service. Assistant Foreman in Dunsink Landfill for 12 years before being appointed Foreman for Balleally Landfill in 1998.
A/Assistant Foreman	Mr. Mick Harford	Balleally Landfill	Assistant to Landfill Foreman, task management of site operatives for general works and capping program.	A/Assistant Foreman.	Working at Balleally Landfill Site since 1986.

Environmental Protection Agency

AER Returns Worksheet

Version 1.1.03

REFERENCE YEAR	2008

1. FACILITY IDENTIFICATION

Parent Company Name	Fingal County Council
Facility Name	Balleally Landfill
PRTR Identification Number	W0009
Licence Number	W0009-02

Waste or IPPC Classes of Activity

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

Address 1	Balleally
Address 2	Lusk
Address 3	Co. Dublin
Address 4	
Country	Ireland
Coordinates of Location	574700.000
River Basin District	IE-Eastern
NACE Code	382
Main Economic Activity	Waste treatment and disposal
AER Returns Contact Name	John Daly
AER Returns Contact Email Address	mortimer.loftus@fingalcoco.ie
AER Returns Contact Position	Senior Engineer
AER Returns Contact Telephone Number	01 8906261/ 01 8731415
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

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

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	
Have you been granted an exemption ?	
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4.1 RELEASES TO AIR

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR													
POLLUTANT		METHOD									QUANTITY		
			Method Used		Flare	BY01	BY02	BY03	BY04			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
02	Carbon monoxide (CO)	M	alt	Testo 350/454 MXL Flue Gas Analyser	0.419	12200.0	19400.0	12500.0	14000.0	58100.419	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	M	alt	Testo 350/454 MXL Flue Gas Analyser	6.44	10900.0	11000.0	8840.0	8660.0	39406.44	0.0	0.0
07	Non-methane volatile organic compounds (NMVOC)	M	SCC	Portable Signal 3030PM FID calibrated with Propane in accordance with EN1526:2002 non-methane hydrocarbon cutter	0.575	207.0	290.0	175.0	217.0	889.575	0.0	0.0
11	Sulphur oxides (SOx/SO2)	M	alt	Testo 350/454 MXL Flue Gas Analyser	15.7	72.0	85.0	180.0	62.0	414.7	0.0	0.0
86	Particulate matter (PM10)	M	SCC	Particulate Matter Measured in accordance with EN13284-1	0.0	722.0	1550.0	1070.0	861.0	4203.0	0.0	0.0
01	Methane (CH4)	C	SCC	GASSIM	14.8	15100.0	16100.0	11500.0	31400.0	120014.8	0.0	45900.0
03	Carbon dioxide (CO2)	C	SCC	GASSIM	23700.0	6168000.0	5280000.0	3970000.0	4730000.0	35471700.0	0.0	15300000.0

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

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR												
POLLUTANT		METHOD								QUANTITY		
			Method Used		Flare	BY01	BY02	BY03	BY05			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
80	Chlorine and inorganic compounds (as HCl)	M	SCC	Impinger train containing 0.1 molar sodium hydroxide and deionised water solution in accordance with EN1911 and EPA 26A	1.15	125.0	120.0	69.0	88.0	403.15	0.0	0.0
84	**Fluorine and inorganic compounds (as HF)**	M	SCC	Impinger train containing 0.1 molar sodium hydroxide and deionised water solution in accordance with EN1911 and EPA 26A	0.0212	6.78	7.2	4.0	5.16	23.1612	0.0	0.0

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

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

RELEASES TO AIR												
POLLUTANT		METHOD								QUANTITY		
			Method Used		Flare	BY01	BY02	BY03	BY05			
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	Emission Point 5	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
351	Total Organic Carbon (as C)	M	SCC	Portable Signal 3030PM FID calibrated with Propane in accordance with EN1526:2002 non-methane hydrocarbon cutter	0.512	9060.0	10800.0	6930.0	18900.0	45690.512	0.0	0.0

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

Additional Data Requested from Landfill operators

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

Landfill: Balleally Landfill

Please enter summary data on the quantities of methane flared and / or utilised			Method Used			
	T (Total) kg/Year	**M/C/E**	**Method Code**	**Designation or Description**	**Facility Total Capacity m3 per hour**	
Total estimated methane generation (as per site model)	7420000.0	C	SCC	GASSIM	N/A	
Methane flared	20300.0	C	SCC	GASSIM	3000.0	(Total Flaring Capacity)
Methane utilised in engine/s	6720000.0	M	OTH	FROM BPS POWER GENER	5000.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	1200000.0	C	SCC	GASSIM	N/A	

4.2 RELEASES TO WATERS

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

RELEASES TO WATERS											
POLLUTANT										QUANTITY	
			Method Used		swv1 and s3	error	error	error			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	Emission Point 3	Emission Point 4	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
79	Chlorides (as Cl)	M	alt	sls tm 097d epa methods 325.1 and 325.2	106000.0	0.0	0.0	0.0	106000.0	0.0	0.0
21	Mercury and compounds (as Hg)	M	alt	cen/tc 230/wg 1/tg 7 n33 sls tm 127d	0.00977	0.0	0.0	0.0	0.00977	0.0	0.0
12	Total nitrogen	M	alt	tm-0001 US-EPA Approved Method/HACH	3490.0	0.0	0.0	0.0	3490.0	0.0	0.0
18	Cadmium and compounds (as Cd)	M	alt	bs 6068 icp-oes (sls tm129d) & icp-ms (sls tm 152d)	0.0953	0.0	0.0	0.0	0.0953	0.0	0.0
20	Copper and compounds (as Cu)	M	alt	bs 6068 icp-oes (sls tm129d) & icp-ms (sls tm 152d)	1.47	0.0	0.0	0.0	1.47	0.0	0.0
23	Lead and compounds (as Pb)	M	alt	bs 6068 icp-oes (sls tm129d) & icp-ms (sls tm 152d)	0.242	0.0	0.0	0.0	0.242	0.0	0.0
22	Nickel and compounds (as Ni)	M	alt	bs 6068 icp-oes (sls tm129d) & icp-ms (sls tm 152d)	2.2	0.0	0.0	0.0	2.2	0.0	0.0
24	Zinc and compounds (as Zn)	M	alt	bs 6068 icp-oes (sls tm129d) & icp-ms (sls tm 152d)	5.62	0.0	0.0	0.0	5.62	0.0	0.0
13	Total phosphorus	M	alt	tm-0001 US-EPA Approved Method/HACH	23.1	0.0	0.0	0.0	23.1	0.0	0.0

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

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS								
POLLUTANT						QUANTITY		
			Method Used		SWV1 and S3			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0
					0.0	0.0	0.0	0.0
					0.0	0.0	0.0	0.0

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

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

RELEASES TO WATERS								
POLLUTANT						QUANTITY		
			Method Used		SWV1 and S3			
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
238	**Ammonia (as N)**	M	alt	standard methods 20th edition-4500-F, 4-108	1980.0	1980.0	0.0	0.0
303	BOD	M	alt	sls tm 083D	5050.0	5050.0	0.0	0.0
306	COD	M	alt	tm-0003 us-epa approved method / Hach	15400.0	15400.0	0.0	0.0
				bs 2690:Part 120:1981				
				AWWA standard methods for theexamination of water				
240	Suspended Solids	M	alt	and wastewater	18800.0	18800.0	0.0	0.0
343	Sulphate	M	alt	sls tm 098D	74300.0	74300.0	0.0	0.0
332	Ortho-phosphate (as PO4)	M	alt	sls tm 100	37.9	37.9	0.0	0.0
341	Sodium	M	alt	sls tm 083D	167000.0	167000.0	0.0	0.0
338	Potassium	M	alt	sls tm 083D	3420.0	3420.0	0.0	0.0
305	Calcium	M	alt	sls tm 152 by icpms	45200.0	45200.0	0.0	0.0
				bs 6068 icp-oes (sls tm129d) & icp-ms (sls tm				
357	Iron	M	alt	152d)	14.4	14.4	0.0	0.0
320	Magnesium	M	alt	sls tm 152 by icpms	33100.0	33100.0	0.0	0.0
321	Manganese (as Mn)	M	alt	sls tm 152 by icpms	194.4	0.0	0.0	0.0

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

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER								
POLLUTANT		METHOD			QUANTITY			
			Method Used		Swords WWTP and 9C Sewer			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
06	Ammonia (NH3)	M	alt	Standard methods 20th edition-4500-F, 4-108	44800.0	45276.0	476.0	0.0
79	Chlorides (as Cl)	M	alt	sls tm 097d epa methods 325.1 & 325.2	94000.0	94682.0	682.0	0.0
83	Fluorides (as total F)	M	alt	sls tm 104d	60.9	61.34	0.44	0.0
21	Mercury and compounds (as Hg)	M	alt	cen/tc 230/wg 1/tg 7 n33 sls tm 127d tm-0001 us-epa approved	0.00165	0.0016676	0.0000176	0.0
13	Total phosphorus	M	alt	method / hach	214.0	216.0	2.0	0.0
82	Cyanides (as total CN)	M	alt	sls tm 134	3.04	3.062	0.022	0.0

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

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER									
POLLUTANT		METHOD			QUANTITY				
			Method Used		Swords WWTP and 9C Sewer	error			
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
303	BOD	M	alt	sls tm 083d tm 003 us-epa approved	10300.0	0.0	10407.0	107.0	0.0
306	COD	M	alt	method /hach	96800.0	0.0	97697.0	897.0	0.0
343	Sulphate	M	alt	sls tm 098d	2190.0	0.0	2205.8	15.8	0.0
332	Ortho-phosphate (as PO4)	M	alt	sls tm 100 tm-0009 us-epa method /	581.0	0.0	585.2	4.2	0.0
327	Nitrate (as N)	M	alt	hach	3710.0	0.0	3718.54	8.54	0.0
341	Sodium	M	alt	sls tm 083d	57300.0	0.0	57714.0	414.0	0.0
338	Potassium	M	alt	sls tm 083d	33000.0	0.0	33238.0	238.0	0.0
240	**Suspended Solids**	M	alt	bs 2690:Part 120:1981 AWWA standard methods for the examination of water and wastewater	1340.0	0.0	1349.68	9.68	0.0

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

4.4 RELEASES TO LAND

SECTION A : PRTR POLLUTANTS

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

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

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO LAND							
POLLUTANT		METHOD				QUANTITY	
			Method Used				
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					0.0	0.0	0.0

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Transfer Destination	European Waste Code	Hazardous	Quantity T/Year	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Name and Licence / Permit No. of Recoverer / Disposer / Broker	Address of Recoverer / Disposer / Broker	Name and Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)	Licence / Permit No. of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	20 02 01	No	905.0	Green Waste Accepted from public and landscape gardeners	R13	M	Weighed	Offsite in Ireland	Bord Na Mona, W0198-01	Athy Co Kildare		
Within the Country	15 01 01	No	16.5	Cardboard	R13	E	Volume Calculation	Offsite in Ireland	Greenclean Waste Management Ltd, W0222-01)	Blakes Cross, Lusk Co Dublin		
Within the Country	20 01 01	No	9.3	Paper	R13	E	Volume Calculation	Offsite in Ireland	Greenclean Waste Management Ltd, W0222-01)	Blakes Cross, Lusk Co Dublin		
Within the Country	20 01 01	No	7.1	Newspaper and magazines	R13	M	Weighed	Offsite in Ireland	Irish Packaging Recycling, Waste Permit WPR021/2	Walkinstown, Dublin 12		
Within the Country	15 01 07	No	28.41	Glass Bottles and Jars	R13	C	Volume Calculation	Offsite in Ireland	Rehab Recycle, Waste Permit WPR 004	Ballymount Avenue, Ballymount Dublin 12		
Within the Country	15 01 04	No	0.4725	Drink Cans and Food tins	R13	C	Volume Calculation	Offsite in Ireland	Recoverable Resources, Waste Permit WPR015	Tallaght, Dublin 24		
Within the Country	15 01 04	No	0.463	Drink Cans and Food tins	R13	C	Volume Calculation	Offsite in Ireland	Glassco Recycling Ltd, Waste Permit 247/2006	Unit 4 Osberstown Business Park, Carragh Road, Naas Co Kildare		
Within the Country	20 01 40	No	97.0	Metal	R13	E	Volume Calculation	Offsite in Ireland	Barmmore Demolition, Waste Permit WPT129	Baldoyle Industrial Estate, Baldoyle, Dublin 13		
Within the Country	15 01 02	No	13.12	Plastic packaging	R13	M	Weighed	Offsite in Ireland	Recyclenet, Waste Permit 109/2003	Rathangan Co Kildare		
Within the Country	20 01 11	No	9.17	Clothes	R13	C	Volume Calculation	Offsite in Ireland	Textile Recycling Ltd, Waste Permit WPR014	Tallaght, Dublin 24		
Within the Country	20 01 38	No	258.5	Wood	R13	E	Volume Calculation	Offsite in Ireland	Barmmore Demolition, Waste Permit WPT129	Baldoyle Industrial Estate, Baldoyle, Dublin 13		
Within the Country	20 01 33	Yes	0.62	Small Batteries	R13	M	Weighed	Abroad	Returnbatt, Waste Permit 97/2002a	Kill Co Kildare	Accurec Recycling GmbH, Wiehagen 12-14, 45472 Mulheim	ZUUM-054-0499-45-41-1103
Within the Country	**20 01 33**	**Yes**	0.076	Small Batteries	R13	M	Weighed	Abroad	The Recycling Village Ltd, Waste Permit WP 2007/20	Monasterboice, Drogheda, Co Louth	G&P Batteries Ltd, Crescent Works, Willenhall Road, Darlaston, Walsall	SL 2035
Within the Country	16 06 01	Yes	4.066	Lead Acid Batteries	R13	M	Weighed	Abroad	Returnbatt, Waste Permit 97/2002a	Kill Co Kildare	HJ Enthoven & Sons, Darley Dale Smelter, South Darley, Matlock, Derbyshire, DE4 2LP, United Kingdom	BL55981R
Within the Country	16 06 01	Yes	3.968	Lead Acid Batteries	R13	M	Weighed	Abroad	The Recycling Village Ltd, Waste Permit WP 2007/20	Unit 4, Tinure Business Park, Tinure, Dunleer Co Louth	HJ Enthoven & Sons, Darley Dale Smelter, South Darley, Matlock, Derbyshire, DE4 2LP, United Kingdom	BL55981R
Within the Country	13 02 08	Yes	6.12	All Engine Oils - i.e. all 13 02 xx codes	R13	M	Volume Calculation	Offsite in Ireland	ENVA, W0184-01	Clonminam Industrial Estate, Portlaoise, Co Laois	ENVA, Clonminam Industrial Estate, Portlaoise, Co Laois	W0184-01
Within the Country	20 03 01	No	3967.0	Refuse and bulky waste brought to civic amenity	D1	E	Volume Calculation	Onsite in Ireland	Balleally Landfill, W0009-2	Balleally Lane Lusk Co Dublin		
Within the Country	15 01 05	No	0.75	Tetra-Pak	R13	E	Volume Calculation	Offsite in Ireland	Greenclean Waste Management Ltd, W0222-01)	Blakes Cross, Lusk Co Dublin		
Within the Country	20 01 23	Yes	32.0	Fridges / Freezers	R13	M	Weighed	Abroad	KMK Metals, W0113-02 on behalf of ERP	Tullamore Co Offaly	Viridor, Parr Industrial Estate, Cornwall Street, St Helens, Merseyside, Wa9 1QW UK	EAWM 50133/M02
Within the Country	20 01 36	No	73.475	White goods other than fridges	R13	M	Weighed	Offsite in Ireland	Immark, W0185-01 on behalf of ERP	Greenogue Business Park, Rathcoole Co Dublin		
Within the Country	20 01 36	No	42.442	WEEE other than CRT / White Goods / Fluorescent tubes	R13	M	Weighed	Offsite in Ireland	Immark, W0185-01 and Immark, W0233-01 on behalf of ERP	Greenogue Business Park, Rathcoole Co Dublin and Unit 5 1, Parkwest Industrial Estate, Nangor Road, Dublin 12		
Within the Country	20 01 35	Yes	32.813	TVs & Monitors	R13	M	Weighed	Offsite in Ireland	Immark, W0185-01 on behalf of ERP	Greenogue Business Park, Rathcoole Co Dublin	The Recycling Village Ltd, Unit 4, Tinure Business Park, Tinure, Dunleer Co Louth	Waste Permit WP 2007/20
Within the Country	20 01 35	Yes	3.242	TVs & Monitors	R13	M	Weighed	Offsite in Ireland	The Recycling Village Ltd, Waste Permit WP 2007/20, on behalf of ERP	Unit 4, Tinure Business Park, Tinure, Dunleer Co Louth	The Recycling Village Ltd, Unit 4, Tinure Business Park, Tinure, Dunleer Co Louth	Waste Permit WP 2007/21
Within the Country	20 01 21	Yes	0.18	Fluorescent tubes	R13	M	Weighed	Abroad	ENVA, W0184-01, on behalf of WEEE Ireland	Clonminam Industrial Estate, Portlaoise, Co Laois	DELA Recycling und Umwelttechnik GmbH Alte Landstr. 4 45329 Essen, Germany	E11315322

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