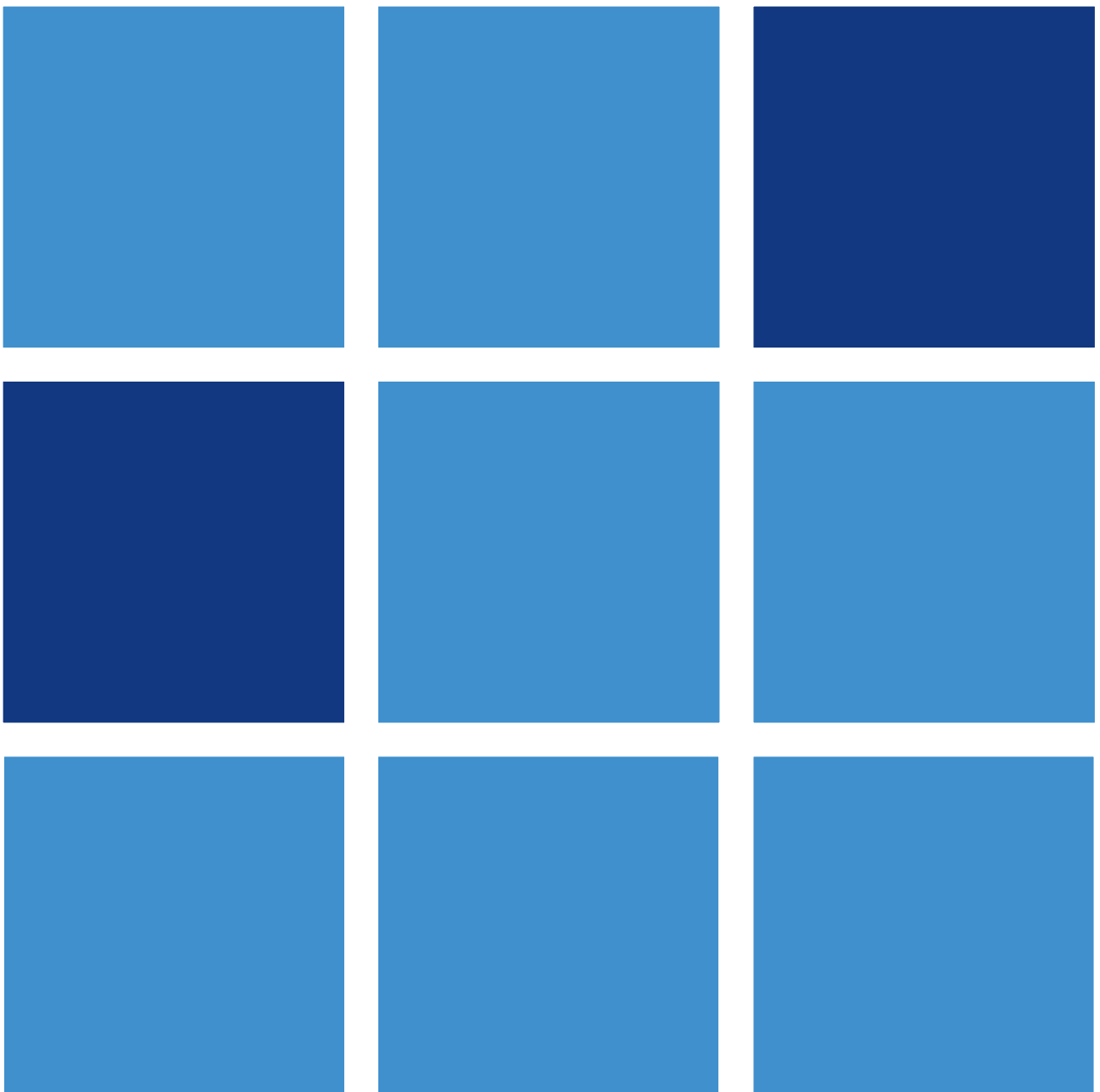




Pollboy Landfill

Annual Environmental Report (AER) 2011

March 2012



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1 REPORTING PERIOD

The reporting period is from the 1st January 2011 to the 31st December 2011.

The Waste Licence for Pollboy Landfill for the period 1st January 2011 to 31st December 2011 was Waste Licence Reg. No. W0027-02. This landfill facility closed for acceptance of waste on 31st December 2005.

2 WASTE ACTIVITIES CARRIED OUT AT THE FACILITY

Licensed Waste Disposal and Recovery Activities were carried out in accordance with the Third and Fourth Schedules of the Waste Management Act 1996 as per Part 1 Licensed Activities of Waste Licence W0027-02. The Civic Amenity Facility accepts waste for recovery on Tuesdays, Thursdays and Saturdays between 8.30am and 4.30pm.

3 QUANTITY AND COMPOSITION OF WASTE

Table 3.1 below outlines the categories and quantities which may be accepted for disposal and for recovery under Waste Licence W0027-02.

Table 3.1: Waste Categories and Quantities to be Accepted for Recovery

Waste Type	Maximum Quantity
Waste to be accepted for composting Waste to be accepted at Civic Waste Facility (Metal, electrical and electronic waste, glass, aluminium and tin cans, waste oils, fabrics, batteries, household hazardous, fluorescent tubes can all be accepted)	Maximum Quantity of biodegradable waste which can be processed = 1,000m ³ Tonnage to be agreed with the Agency.

Table 3.2 provides details on the quantity and composition of waste that was accepted for recovery in 2011 at Pollboy Landfill Civic Amenity Facility.

Table 3.2: Waste Accepted at Civic Waste Facility for Recovery in 2011

EWC Code	Quantity (tonnes)	Description of waste	Hazardous waste. (Yes/No)	Waste Treatment Operation
20 03 07	1.52	bulky waste	N	D1
15 01 02	0.05	plastic packaging	N	R3
13 02 08	2.2	other engine, gear and lubricating oils	Y	R6
16 01 07	0.09	oil filters	Y	R12
20 01 10	0.44	clothes	N	R13
20 01 40	27.0	metals	N	R13
20 01 99	30.65	other fractions not otherwise specified	N	R4
20 01 23	11.162	discarded equipment containing chlorofluorocarbons	Y	R4
20 01 36	27.853	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	N	R4
20 01 36	12.956	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	N	R4
20 01 21	0.232	fluorescent tubes and other mercury-containing waste	Y	R4
16 05 04	0.219	gases in pressure containers (including halons) containing dangerous substances	Y	R13
20 01 19	0.091	pesticides	Y	R13
20 01 27	22.446	paint, inks, adhesives and resins containing dangerous substances	Y	R10
15 01 04	0.793	metallic packaging	N	R13
15 01 04	0.298	metallic packaging	N	R13
15 01 07	3.651	glass packaging	N	R13
16 06 01	1.61	lead batteries	Y	R6
16 06 04	0.858	alkaline batteries (except 16 06 03)	N	R6
16 06 02	0.084	Ni-Cd batteries	Y	R6
19 07 03	19.825	landfill leachate other than those mentioned in 19 07 02	N	D8

4 SUMMARY OF EMISSIONS AND MONITORING

Drawings showing locations of monitoring points for leachate, gas, surface water and groundwater are contained in **Appendix A**. Quarterly monitoring results for leachate, groundwater and surfacewater are contained in **Appendices B - E**. A summary of emissions and monitoring during 2011 in accordance with the Waste Licence is provided in the following sections.

4.1 NOISE

There were no noise surveys carried out during 2011, due to the closure of the landfill on the 31st December 2005. Noise was generated in the most part by compaction and placement machinery which are no longer operational.

4.2 DUST

There were no dust surveys carried out during 2011, due to the closure of the landfill on the 31st December 2005.

4.3 LANDFILL GAS

4.3.1 Off Site Gas Migration Migratory Boreholes

Appendix A (Drawing No. DG0001–04 F07) shows the locations of boreholes used to monitor off-site gas migration as well as the results obtained for gas emissions from these boreholes during 2011.

The emission limit values for off-site gas migration in Waste Licence W0027-02 Schedule C are 20% LEL (1% v/v) for methane and 1.5% v/v for carbon dioxide. **Appendix B** shows that all the results obtained for monitoring of off-site gas migration were within these emission limit values for methane and carbon dioxide.

4.3.2 Landfill Gas Wells Within Waste

An active gas extraction system consisting of 19 no. gas extraction wells and collector pipes collects gas from the original landfill waste body. Gas collected by this system is

flared by the 1,250m³/hr AFS flare unit located in the flare compound close to the former composting facility. The gas main header pipe for this system which was installed in 2004 was replaced in 2008. **Appendix B** contains daily records of gas flaring rates, temperature, methane, oxygen, carbon dioxide and carbon monoxide levels during 2011.

An active gas extraction system consisting of 23 no. gas extraction wells and collector pipes collects gas from Cell 1. Gas collected by this system is flared by the 1,250m³/hr AFS flare unit also which is also located in the flare compound. The 850 m³/hr Hasse flare is retained as a back-up flare.

4.3.3 Buildings

In November 2003 a gas monitor was placed in the main control office of the administration building at the landfill which measures the concentration of methane and carbon dioxide in the air. Neither of these parameters were detected during the reporting period.

4.3.4 Flare Emissions

Landfill Gas Flare Emissions Monitoring was carried out on the AFS Flare by Odour Monitoring Ireland in October 2011. The results of this monitoring showed NO_x as NO₂, CO, TOC, HCL and HF emissions from the flare to be within the emission limit values specified in Waste Licence Reg. No. W0027-02.

A copy of the report for this monitoring is included in **Appendix C**.

4.4 LEACHATE

In 2011 three leachate sampling points were used for monitoring purposes; L19, CH1 and the leachate lagoon. In the second quarter a full suite of parameters was tested for at all three sampling points.

The samples taken at all leachate sample points were within the requirements as set out in Schedule C.5 of the Waste Licence W0027-02, with the exception of ammonia levels recorded at CH1 in Q2 of 2011. The level recorded here was 1,100 mg/l which exceeded the limit as set out under schedule C.5 of 800 mg/l.

Appendix D shows the location of these sampling locations on Drawing DG0001-07 F08. All results were forwarded to the EPA in the quarterly monitoring reports.

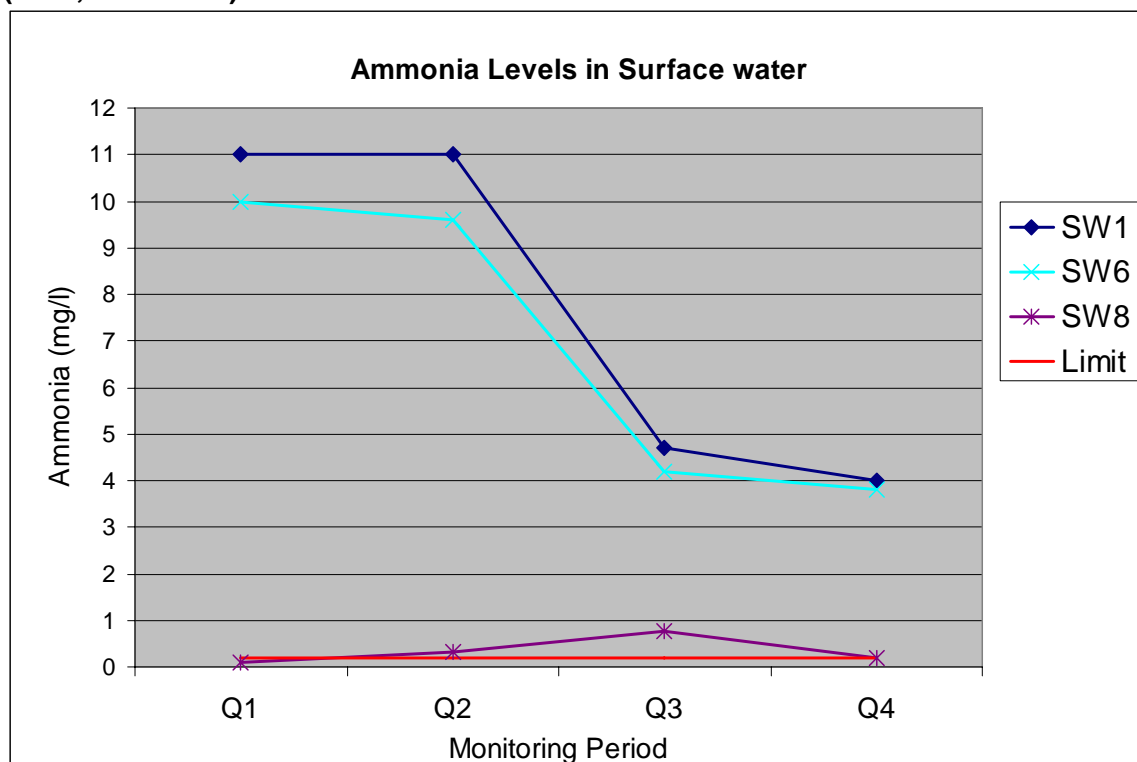
4.5 SURFACE WATER

Surface water monitoring results for 2011 at Pollboy Landfill are contained in **Appendix E**. Drawing No. DG0001-05 F02, in **Appendix A**, shows the positions of the six surface water sampling locations (SW1, SW3, SW4, SW5, SW6, SW8). These sampling points were chemically analysed by the EPA in each quarter of 2011. It should be noted that SW5 was not sampled in Q2, Q3 and Q4.

The results obtained were compared to standards as set out in SI 278 of 2007 – European Communities (Drinking Water) (No. 2) Regulations. Where there were no specified limits for tested parameters in SI 278 of 2007, results were compared to standards as set out in SI 294 of 1989 - European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989.

Figure 4.1 shows ammonia levels which exceeded the standard limits in surface water sampling points SW1, SW6 and SW8 during 2011.

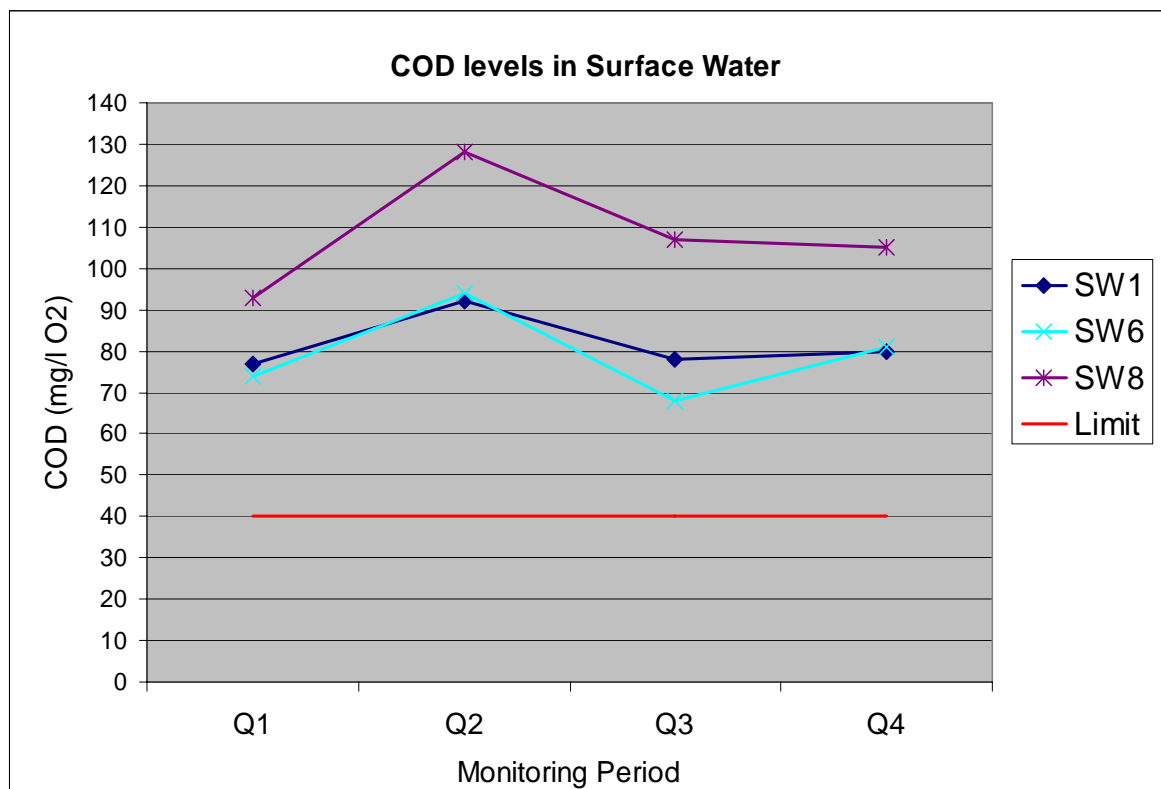
Figure 4.1 Elevated Ammonia Levels in Surface Water for the Reporting Period (SW1, SW6-SW8)



Levels of ammonia were above the required limit of 0.3mg/l (as set out in SI 278, 2007) at surface water sampling points SW1, SW6 and SW8, throughout the four sampling periods 2011. At SW1 and SW6 ammonia levels decreased from Q1 through to Q4. At SW6, levels were only slightly in excess of the limit in Q2 and Q3 and returned below the limit in Q4

Levels of COD were also above the required limit of 40mg/l O₂ (as set out in SI 294, 1989) at surface water sampling points SW1, SW6 and SW8, throughout the four sampling periods 2011. **Figure 4.2** shows the COD levels which exceeded the standard limits in surface water sampling points SW1, SW6 and SW8 during 2011.

Figure 4.2 Elevated COD Levels in Surface Water for the Reporting Period (SW1, SW6 and SW8)



Levels of pH, suspended solids, BOD, chloride, conductivity and dissolved oxygen were all within the required standard for each sampling quarter with the exception of SW1 which showed a slightly elevated level of BOD of 11 mg/l O₂ in Q3.

Surface water sampling and analysis for annual parameters in accordance with Table D.5.1 of Waste Licence W0027-02 was carried out at five surface water monitoring locations (SW1, SW3, SW4, SW6, SW8) in the second quarter of 2011. The results are

presented in **Appendix E**. The results obtained were compared to standards as set out in SI 278, 2007 – European Communities (Drinking Water) (No. 2) Regulations. Levels for Iron and manganese were found to be elevated in SW1, SW6 and SW8. Levels of Total Oxidised Nitrogen were found to be slightly elevated in SW3 and SW4.

4.6 GROUNDWATER

Groundwater monitoring results for 2011 at Pollboy Landfill are contained in **Appendix F**. Drawing No. DG0001-01 F08, in **Appendix A**, shows the locations of the 9 no. groundwater sampling points. Sampling and analysis was carried out during the year by the EPA. The monitoring results were forwarded to the EPA in the quarterly monitoring reports. In the second quarter, monitoring was carried out on all samples for a range of annual parameters including heavy metals, in accordance with the requirements of schedule D.5 of the waste licence.

The results obtained were compared to standards as set out in SI 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations. Where there were no specified limits for tested parameters in SI 9 of 2010, results were compared to Interim Guideline values set out in the EPA Document *“Towards Setting Guideline Values for the Protection of Groundwater in Ireland”*.

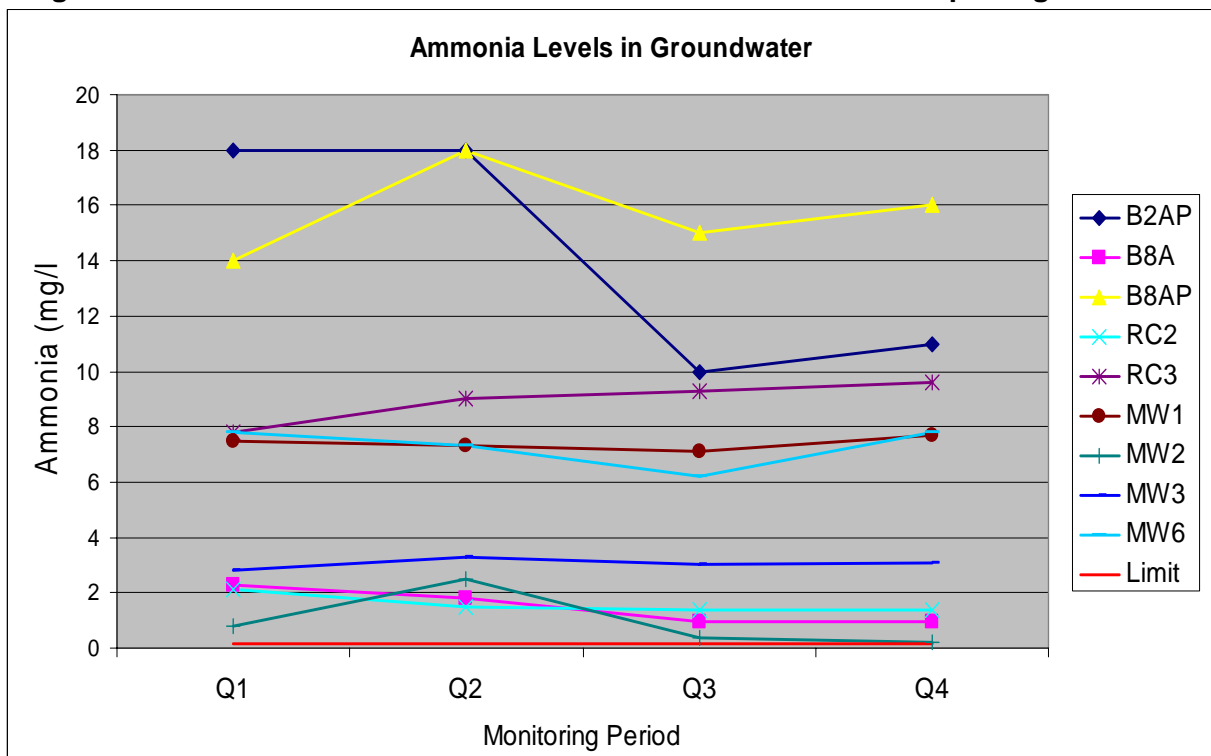
Levels of ammonia were found to be above the required limit of 0.3mg/l (as set out in SI 9, 2010) at all groundwater sampling points, throughout the four sampling periods in 2011. The most elevated levels of ammonia (16-18mg/l) were found at B2AP and B8AP. B2AP and B8AP sampling points are both located down gradient of the landfill. Sample point RC3, which also displayed elevated levels of ammonia (7.8-9.6mg/l), is located approximately 10 metres from the waste mass.

Ammonia levels have historically been high in the vicinity of Pollboy Landfill. The piezometric contours of the area indicate (established as part of the *EIS for Extension and Remediation of Pollboy Landfill*, RPS 2001) indicate that an overall groundwater flow in a northeast and south east direction. It should therefore be noted that monitoring points MW1, MW2, and MW3, which are upstream of the landfill showed levels of ammonia of up to 7.7 mg/l during 2011. It is therefore considered that there are other contributing sources (apart from the landfill) affecting the quality of the groundwater in this area. In general, ammonia levels in 2011 showed a slight decrease on 2010 levels

for B2AP and B8AP, and were consistent with 2010 levels for the remaining sampling locations.

Figure 4.3 shows the ammonia levels in groundwater which exceeded the standard limits in 2011.

Figure 4.3 Elevated Ammonia Levels in Groundwater for the Reporting Period



Levels of pH, temperature, conductivity, chloride and total organic carbon were found to be below the specified limits throughout the year, with the exception of slightly elevated chloride levels at location B8AP in the second quarter (Q2) and elevated total organic carbon at location RC3 in the second quarter (Q2). In both instances, levels returned to normal during Q3 and Q4.

Groundwater sampling and analysis for annual parameters in accordance with Table D.5.1 of Waste Licence W0027-02 was carried out at the 9 no. groundwater monitoring locations in the second quarter of 2011. The results are presented in **Appendix F**. The results obtained were compared to standards as set out in SI 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations. Where there were no specified limits for tested parameters in SI 9 of 2010, results were compared to Interim Guideline values set out in the EPA Document *“Towards Setting Guideline Values for the Protection of Groundwater in Ireland”*.

Slightly elevated levels of Orthophosphate were found at all sampling locations. Highly elevated total solids were found at B2AP, B8A, RC3, MW3 and MW6. There is no standard for total solids in the EPA Interim Report, but the total dissolved solids is given as 1000mg/l. MW3 which contained the highest level of total solids is located upstream of the general groundwater flow in the vicinity of the landfill, which would suggest that some other factor(s) are effecting the total solids levels. An elevated level of potassium was found in B8AP. Manganese was found to be elevated at all locations except B8A and RC2.

4.7 METEOROLOGICAL DATA

Approval was received from the EPA on the 15th July 2010 that the meteorological parameters required could be reduced to include the following parameters only:

- Precipitation Volume
- Temperature (min/max)
- Wind Force Direction
- Humidity

Approval was also received from the EPA on the 15th July 2010 that this weather data can be obtained from N6 Concessions who operate a weather station at Cappataggle, Ballinasloe. Meteorological data from Cappataggle is attached in **Appendix G**.

5 INSPECTION OF LAGOON STRUCTURES

In accordance with Condition 15.13.2 of Waste Licence W0027-02 in relation to the inspection and certification of the lagoon structures at Pollboy Landfill, a visual inspection of the leachate lagoon was undertaken on the 30th January 2012 by RPS. The visual inspection also involved discussion with Mr. Kevin Mulrennan, Galway County Council.

The findings of this inspection were forwarded to the Agency in January 2012. A copy of these findings is included in **Appendix H**.

6 RESOURCE AND ENERGY CONSUMPTION SUMMARY

105,400 kWh of electricity were used at the landfill during 2011.

7 LEACHATE VOLUMES PRODUCED AND TRANSPORTED OFF SITE

Table 7.1 shows the quantities of leachate pumped off-site to Ballinasloe Waste Water Treatment Plant during 2011.

Table 7.1: Quantity of Leachate Discharged via Rising Main to WWTP

Month	Quantity of leachate discharged (m ³)
January	827.5
February	1,336
March	589
April	1,246.3
May	2,258
June	1,851
July	1,957
August	1,288
September	2,235.5
October	1,695
November	2,828
December	1,713.7
Total Volume	19,825

8 REPORT ON RESTORATION OF COMPLETED CELLS AND FINAL LEVELS

The Restoration and Aftercare Plan for Pollboy Landfill was submitted to the EPA in February 2003.

9 SITE SURVEY

The most recent topographical survey, which is contained in **Appendix I**, was carried out in September 2011.

QUANTITY OF LANDFILL GAS

A Gas Utilisation Feasibility Study for Pollboy Landfill was prepared in August 2005. As part of this study the total quantity of landfill gas generated was estimated using the GasSim Model. For comparison purposes, an estimate was also made using the “Rule of Thumb” method contained in the EPA Landfill Site Design Manual. This assumes that a tonne of waste produces 6m³ of landfill gas per year from the time of emplacement. Results are shown in **Figures 10.1** and **10.2**, for each modelling exercise.

Figure 10.1: Total Bulk Landfill Gas 1998 to 2035 at the 50th Percentile

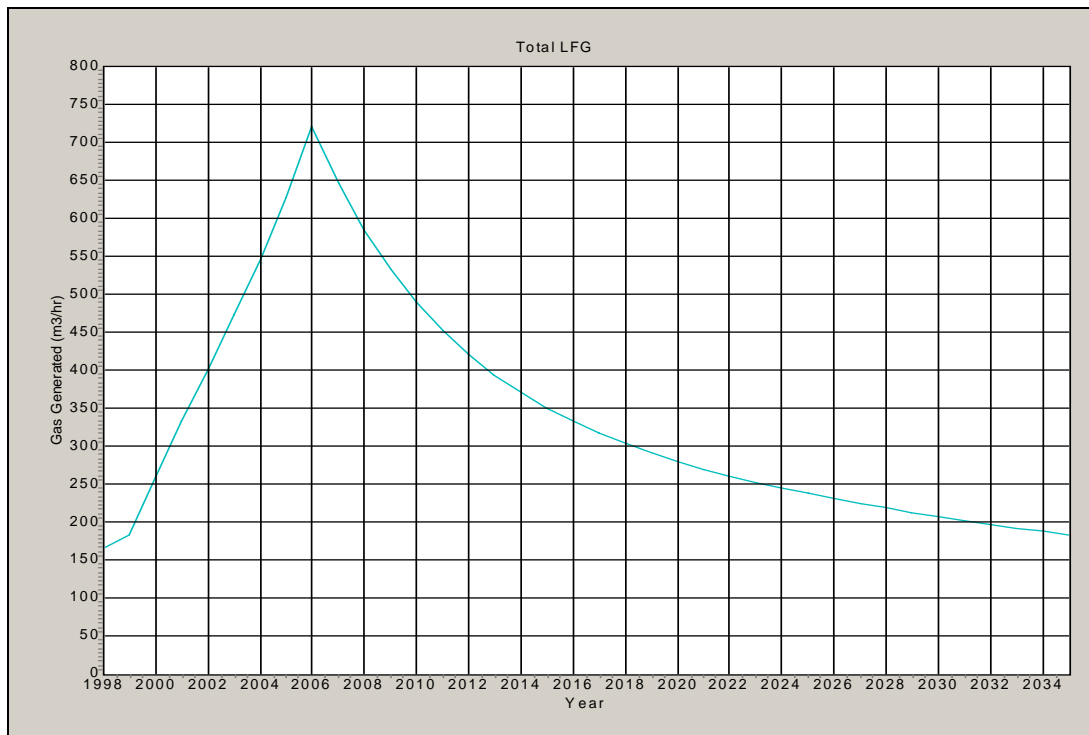
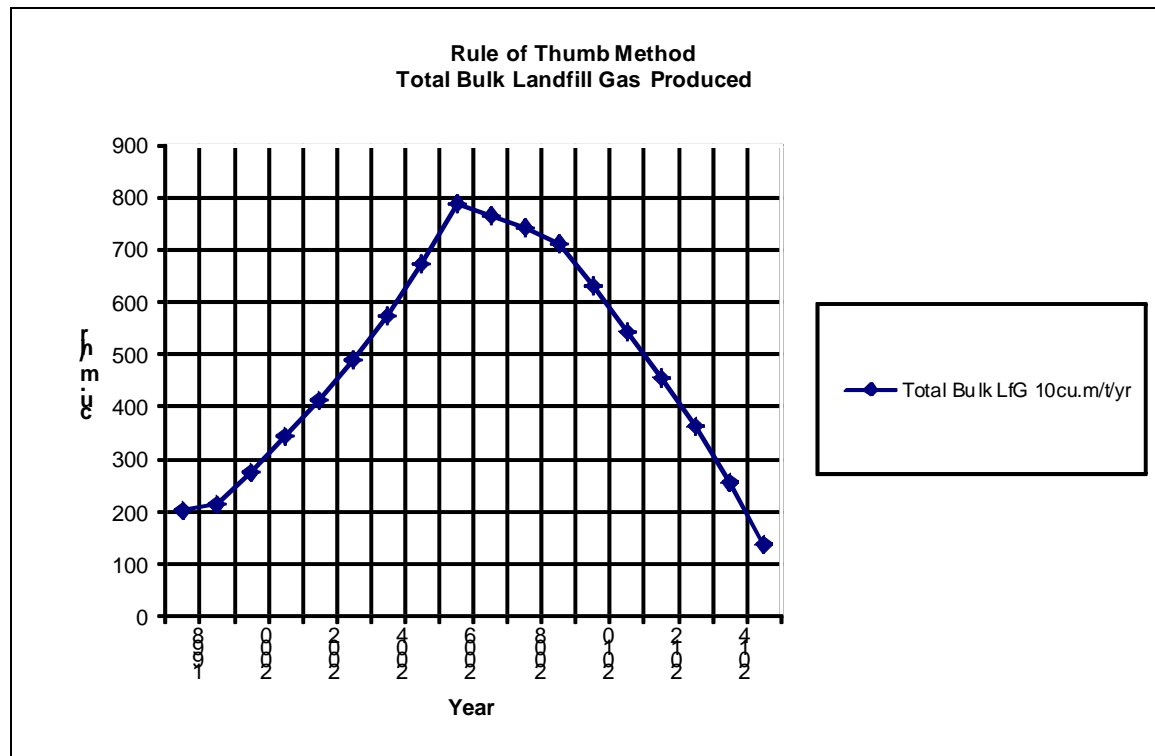


Figure 10.2: Estimation of Landfill Gas Potential using Rule of Thumb Method, 1998-2015



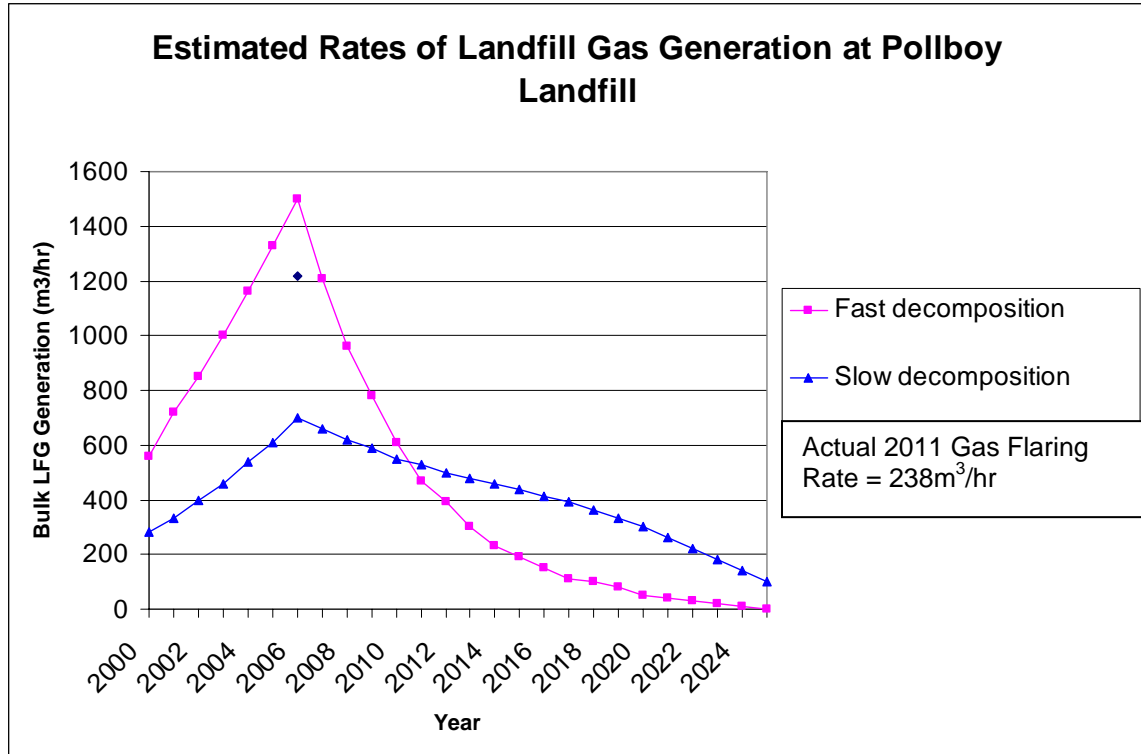
For 2011, a generation rate of 450 m³/hr of landfill gas was estimated using the GasSim Model and 600 m³/hr was estimated using the Rule of Thumb method.

The above results are theoretical rates of landfill gas production and should be viewed with caution. Some models can over predict the quantities of gas to be generated while others can underestimate.

A landfill gas pumping trial was carried out in 2005 to demonstrate the extracted landfill gas quantity and quality that could be obtained through active gas extraction from the existing wells using the available flare on site. This trial was carried out as part of the study into the feasibility of power generation at the landfill. Estimates of future landfill gas generation rates were made by the pumping trial contractor, based on waste input data, the results of monitoring carried out during the trial and using his own in-house model. Estimates were made based on fast decomposition and slow decomposition of the waste as shown in **Figure 10.3**. This figure demonstrates the possible variation in generation rates. Based on this model, the landfill gas generation rate at the facility in 2011 could vary between 550m³/hr and 610m³/hr.

Based on monitoring results, the mean rate of gas flaring at the facility for 2011 was 238m³/hr.

Figure 10.3: Estimated Rates of Landfill Gas Generation at Pollboy Landfill



10 WATER BALANCE CALCULATION

Factors which affect the rate of generation of leachate include precipitation, surface run-off, evapotranspiration, moisture released and absorbed in waste, moisture used during decomposition and vapour contained in gas. Of these, precipitation, surface run-off and evapotranspiration are the major contributors.

The model of the water balance for leachate generation can be represented mathematically as follows:

$$L_o = [(ER.A) + LIW + IR] - [aW + MCW]$$

where:

- L_o = Free leachate produced
- ER = Effective rainfall i.e. actual rainfall minus [potential evapotranspiration plus soil moisture deficit]
- A = Area of cell
- LIW = Liquid Industrial Waste (e.g. sludge)
- IR = Infiltration (from restored areas only)
- aW = Absorption capacity of waste
- MCW = Moisture Consumption of Waste

For the purposes of this estimation, the contributions due to Liquid Industrial Waste, Absorption Capacity of Waste and the Moisture Consumption of Waste have been ignored.

Capping of a landfill typically reduces rainwater infiltration into the waste by up to 90%. For the purposes of this estimation, a reduction of 85% has been assumed. Based on an annual precipitation of 923mm/year and an annual evapotranspiration of 454mm/year, leachate generation from the landfill was estimated for the current landfill scenario of old landfill (unlined) and Phase 1 (lined) cells – both are capped.

The Water Balance Calculation is contained in **Appendix J**.

11 ENVIRONMENTAL MANAGEMENT

11.1 REVIEW OF OBJECTIVES AND TARGETS SET OUT FOR 2011

Objective 1: Restoration and Aftercare of the Landfill

Reason for Undertaking Project: To protect the surrounding environment and integrate the site with the surrounding landscape.

Target: To ensure completion of topsoiling and landscaping works.

Responsibility: The Landfill Facility Manager is responsible for the implementation of this project.

Progress: The landscaping along the front boundary of the Civic Amenity Facility was completed in March 2011.

These works involved:

- Preparation and removal of existing grass
- Removal of 5.5m of stone between the gates
- Placement of a band of topsoil along the fence line
- Planting of hawthorn hedging at 300mm centres.

Objective 2: Landfill Gas Management

Reason for undertaking project: To further improve landfill gas and odour control at the facility.

Target: To install / replace redundant landfill gas boreholes where required.

Summary: Wells providing low/no gas to the system will be disconnected and new wells will be installed.

Responsibility: The Landfill Facility Manager is responsible for the implementation of this project.

Progress: 3 no. gas wells were installed in September 2011 and connected to the landfill gas main in December 2011.

Objective 3: Leachate Management Upgrade

Reason for undertaking project: To improve the efficiency of leachate management.

Target: Explore additional storage capacity options and upgrade telemetry system to reduce pumping, operational and staff overtime costs.

Summary:

1) Leachate Sampling

Extensive sampling of leachate from CH1, CH2, CH6, the leachate lagoon and WWTP influent and effluent has been carried out. This sampling was required for the treatment process modelling at the WWTP. Preliminary treatment process modelling for the Waste Water Treatment Plant has also been completed. This process is necessary to determine the optimum treatment regime and to allow recommendations to be made with regard to additional storage and pre-treatment options.

2) Additional Leachate Storage

Additional leachate storage is required for the contaminated groundwater currently being collected and pumped from the leachate interceptor drain around the perimeter of the old landfill cell. Options for providing additional leachate storage capacity at the landfill to be explored.

3) Telemetry

Existing telemetry system to be upgraded to reduce pumping, operational and staff overtime costs.

Responsibility: The Landfill Facility Manager is responsible for the implementation of this project.

Progress: The pumping chamber located close to the former composting facility was connected to the SCADA system in January 2012.

High level alarms were installed on the leachate lagoon and leachate pumping chambers in January 2012. The associated GSM units, power supply units, antennas, level control floats, GSM software, associated wiring and controls were supplied, installed and commissioned by Michael Colohan, Mechanical and Electrical Contractor.

11.2 SCHEDULE OF OBJECTIVES AND TARGETS FOR 2012

Objective 1: Landfill Gas Management

Reason for undertaking project: To further improve landfill gas and odour control at the facility.

Targets:

- 1 Fusion welded caps will be provided to all wellheads which are currently capped using duct tape.
- 2 Where possible, level of landfill gas main to be regraded to encourage drainage of condensate towards the existing knockout pots.
- 3 Reduce the level of a number of wellheads in Cell 1 so that the gas carrier pipes can be laid either at a gradient towards the gas main or towards the gas well, thereby removing sags in the pipework and preventing the build up of condensate
- 4 Install a new section of gas main close to Gas Well No. 2A to bypass the old defunct knockout pot which appears to be a source of positive pressure.
- 5 Regrade the gas main between Gas Wells No. 37 and No. 24 on Cell 1 allowing condensation to flow to pump sump 1 at the bottom of the hill which will then be pumped into the lagoon. Should additional knockout pots be deemed necessary, their location and arrangement will be notified to the Agency prior to installation.
- 6 It is proposed that AFS Ltd. will carry out balancing of the gas field on a weekly basis. They will also be responsible for repairs to the system on an on-going basis

Summary: Wells providing low/no gas to the system will be disconnected and new wells will be installed. The north eastern area of the old landfill cell has been identified as one such location.

Responsibility: The Landfill Facility Manager is responsible for the implementation of this project.

Timescale: Works to be completed in the first quarter of 2012.

Objective 2: Leachate Management Upgrade

Reason for undertaking project: To improve the efficiency of leachate management

Summary: A Leachate Management System Review report is currently (end of March 2012) being prepared by RPS on behalf of Galway County Council and Ballinasloe Town Council which is scheduled to be forwarded to the Agency in April 2012. This report will provide recommendations for upgrading the existing leachate telemetry system, increased pumping of leachate and the provision of additional leachate storage.

Responsibility: Ballinasloe Town Council/Galway County Council will be responsible for the implementation of the recommendations of this project.

Timescale: A timescale for execution of any works will be agreed with the Agency following approval of the Leachate Management System Review report.

12 SUMMARIES OF REPORTED INCIDENTS & COMPLAINTS

Complaints

There was one complaint registered with the Agency in 2011 relating to scavenging at the Civic Amenity Facility. A copy of this complaint is included in **Appendix K**.

Non-compliances

A total of three non-compliances were issued to facility based on an EPA Audit carried out on 10th November 2011. A copy of this Audit Report is included in **Appendix K**.

Incidents Reported

A copy of all incidents reported to the Agency in 2011 is included in **Appendix K**.

13 REVIEW OF NUISANCE CONTROLS

13.1 ODOUR

Odour management at the facility has significantly improved since 2005, as a result of the following works being carried out:

- Installation of temporary clay capping immediately following cessation of filling.
- Installation of permanent capping system incorporating, inter alia, an LLDPE membrane and landfill gas drainage geocomposite layer.
- Installation of additional landfill gas collection wells in Cell 1.
- Use of a landfill gas flare for gas management and control.
- Reinstatement of gas management system on old landfill.
- Replacement of redundant gas collection wells.

13.2 VERMIN

Currently there is no evidence of vermin present on the site. Pestguard Environmental Services, Rathcoole, Co. Dublin are contracted to control the vermin on the site. External bait boxes are located around the facility and internal bait boxes are located in the office buildings. The bait boxes are checked on a six weekly basis and more frequently when required.

13.3 FIRES

An Emergency Response Procedure has been prepared in consultation with the Assistant Chief Fire Officer and approved by the EPA. A risk assessment of environmental pollution caused by contaminated firewater has been carried out. Fire safety and awareness, fire fighting and first aid training is provided for staff on site. Any fires will be treated as an incident and will be reported to the fire station immediately.

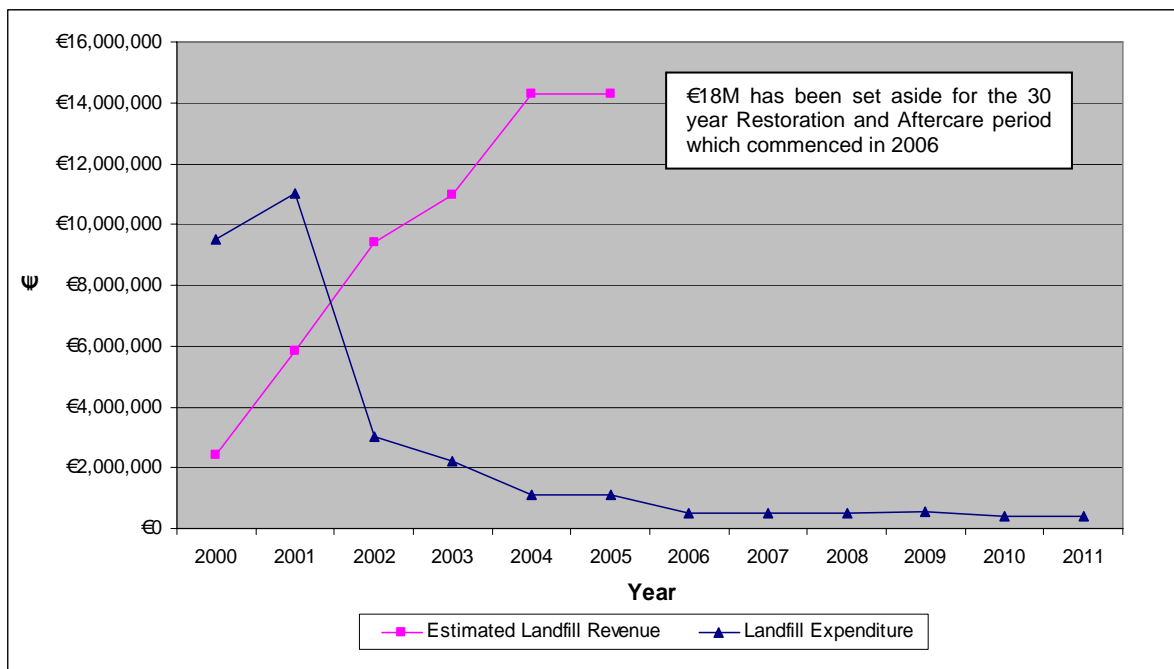
14 REPORT ON FINANCIAL PROVISIONS

Figure 15.1 provides a graphical representation of estimated landfill revenue compared to landfill operational cost over the period 2000-2008.

This graph confirms that Ballinasloe Town Council can meet the costs associated with the operation and management of the landfill and that there are sufficient funds available for future restoration and aftercare works at the facility. A total of €18 million (ex. VAT) has been set aside for the 30 year restoration and aftercare of Pollboy Landfill from 2006 onwards.

Landfill Expenditure in 2011 was €381,935.74 (ex. VAT). Operating Costs for the Civic Amenity Facility in 2011 were €98,467 (ex. VAT).

Figure 15.1: Estimated Landfill Revenue V's Landfill Cost (ex. VAT)



15 MANAGEMENT STRUCTURE

The management structure at Pollboy Landfill is as follows:

Mr. Tony McInerney: Senior Executive Engineer, Environment Section, Galway County Council, with overall responsibility for management of Pollboy Landfill.

Mr. Kevin Mulrennan: Kevin Mulrennan, Environment Section, Galway County Council manages operations at Pollboy Landfill.

16 PROGRAMME FOR PUBLIC INFORMATION

The Communication Procedure outlines the programme for public information.

All details of the Community Liaison Committee will be provided and kept on file and will include details of meetings (dates of meetings, actions arising etc.) between the licensee and representatives of local residents.

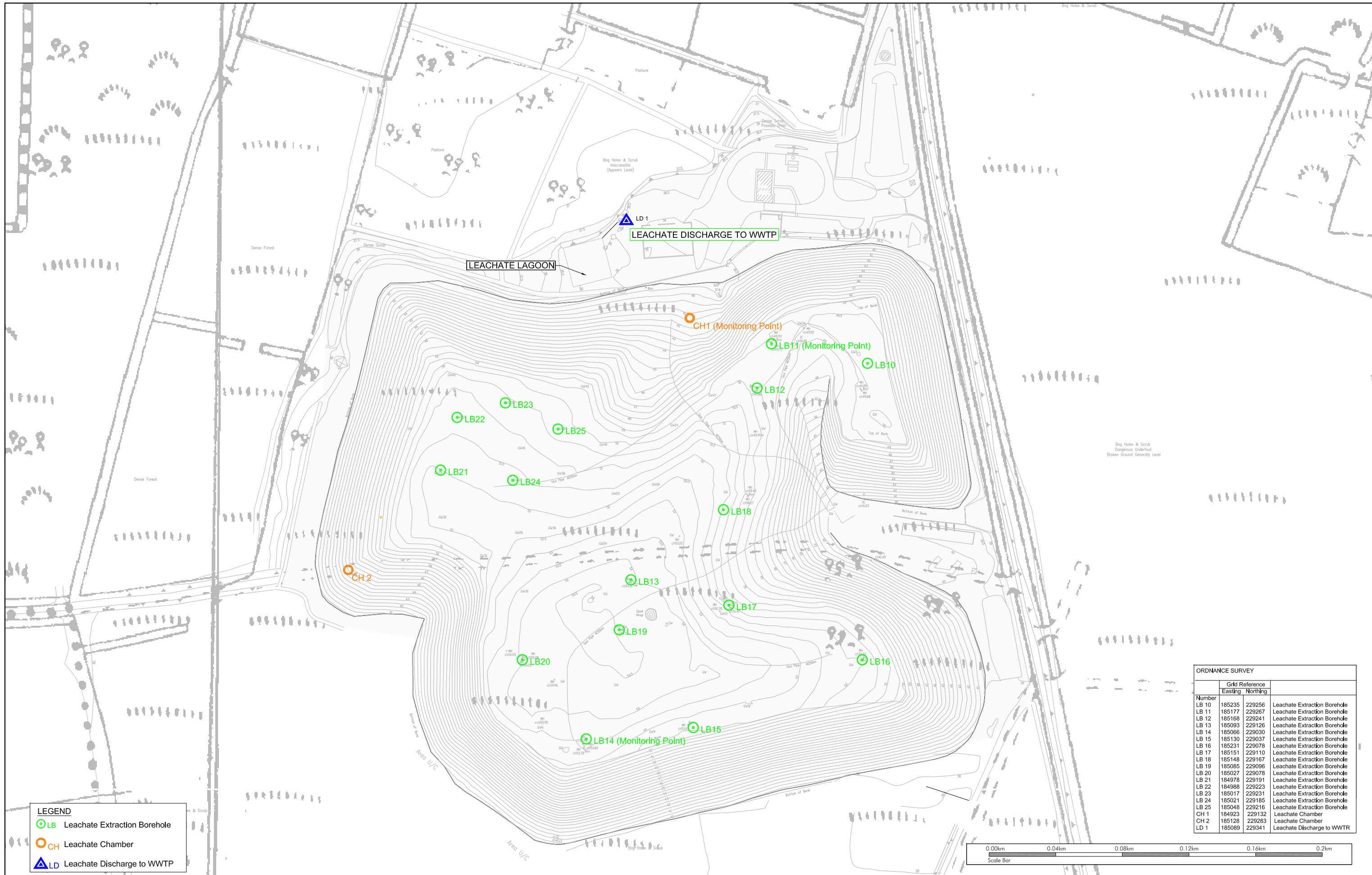
The Council will also ensure that access to environmental information on the landfill facility will be readily available in accordance with Council Directive 90/313/EEC on Freedom of Access to Information on the Environment, which came into effect in Ireland in May 1993.

17 ENVIRONMENTAL MANAGEMENT PLAN

In accordance with Condition 2.3.2.2 of Waste Licence W0027-02, an Environmental Management Plan (EMP) for the facility is included in **Appendix L**.

Appendix A

Drawings of Monitoring Points



LEGEND

- LB Leachate Extraction Borehole
- CH Leachate Chamber
- ▲ LD Leachate Discharge to WWTP

ORDNANCE SURVEY			
Number	Grid Reference		
	Easting	Northing	
LB 10	185235	229256	Leachate Extraction Borehole
LB 11	185177	229267	Leachate Extraction Borehole
LB 12	185168	229241	Leachate Extraction Borehole
LB 13	185093	229126	Leachate Extraction Borehole
LB 14	185066	229030	Leachate Extraction Borehole
LB 15	185130	229037	Leachate Extraction Borehole
LB 16	185231	229078	Leachate Extraction Borehole
LB 17	185151	229110	Leachate Extraction Borehole
LB 18	185148	229167	Leachate Extraction Borehole
LB 19	185085	229096	Leachate Extraction Borehole
LB 20	185027	229078	Leachate Extraction Borehole
LB 21	184978	229191	Leachate Extraction Borehole
LB 22	184988	229223	Leachate Extraction Borehole
LB 23	185017	229231	Leachate Extraction Borehole
LB 24	185021	229185	Leachate Extraction Borehole
LB 25	185048	229216	Leachate Extraction Borehole
CH 1	184923	229132	Leachate Chamber
CH 2	185128	229283	Leachate Chamber
LD 1	185089	229341	Leachate Discharge to WWTR

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No.	Date	App	Amendment / Issue
F08	06.11.09	W.M.	AER 2008

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 Civic Offices, Ballinasloe.

Drawn By: C.N. Checked By: S.A. Approved By: W.M. Date: MAR. '04

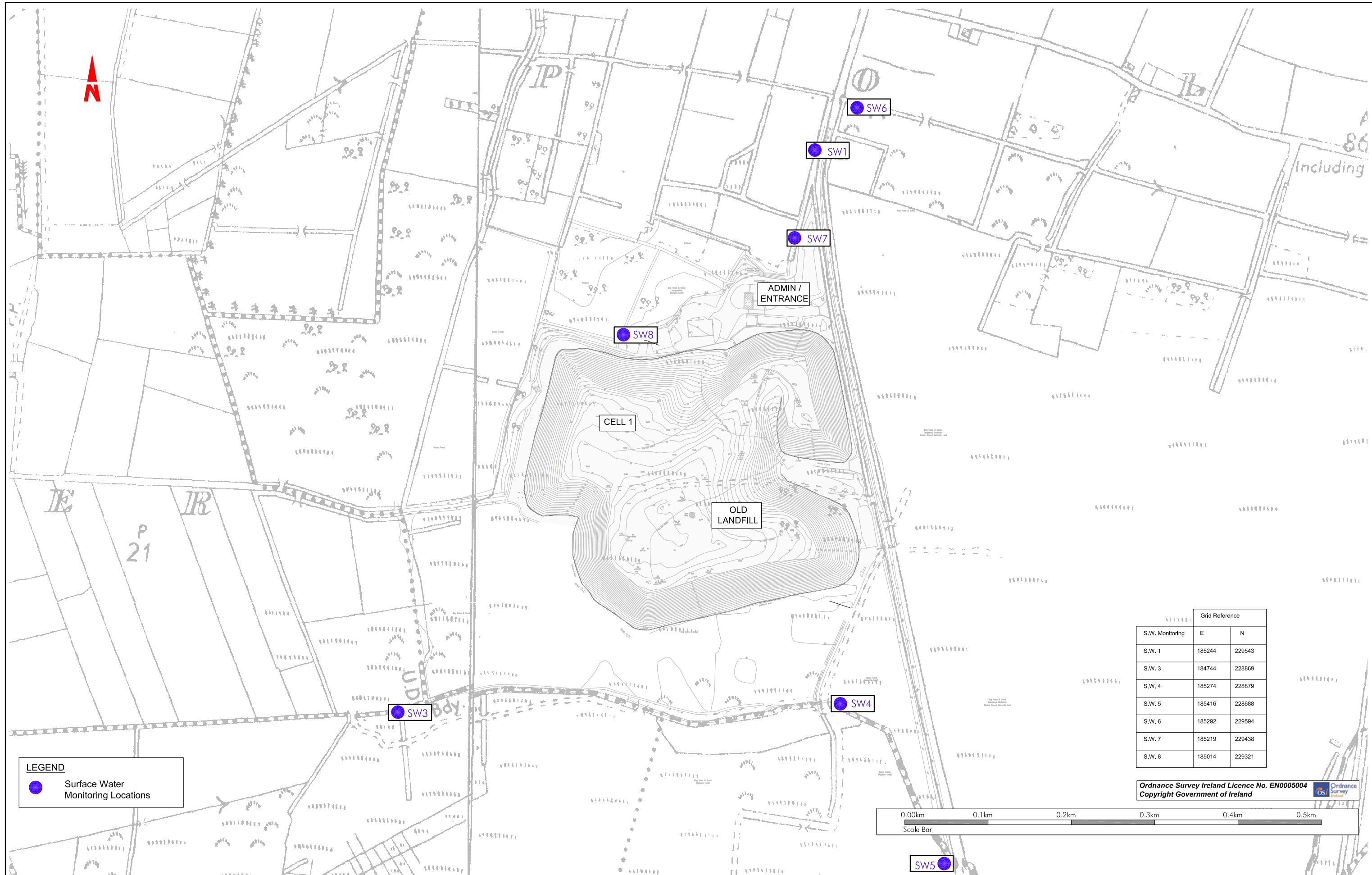
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Drawing Number: **MGE0029 / DG0001-07** Rev: **F08**

Title: **LOCATIONS OF LEACHATE MONITORING POINTS**



LEGEND
 Surface Water Monitoring Locations

S.W. Monitoring	Grid Reference	
	E	N
S.W. 1	185244	229543
S.W. 3	184744	228869
S.W. 4	185274	228879
S.W. 5	185416	228688
S.W. 6	185292	229594
S.W. 7	185219	229438
S.W. 8	185014	229321

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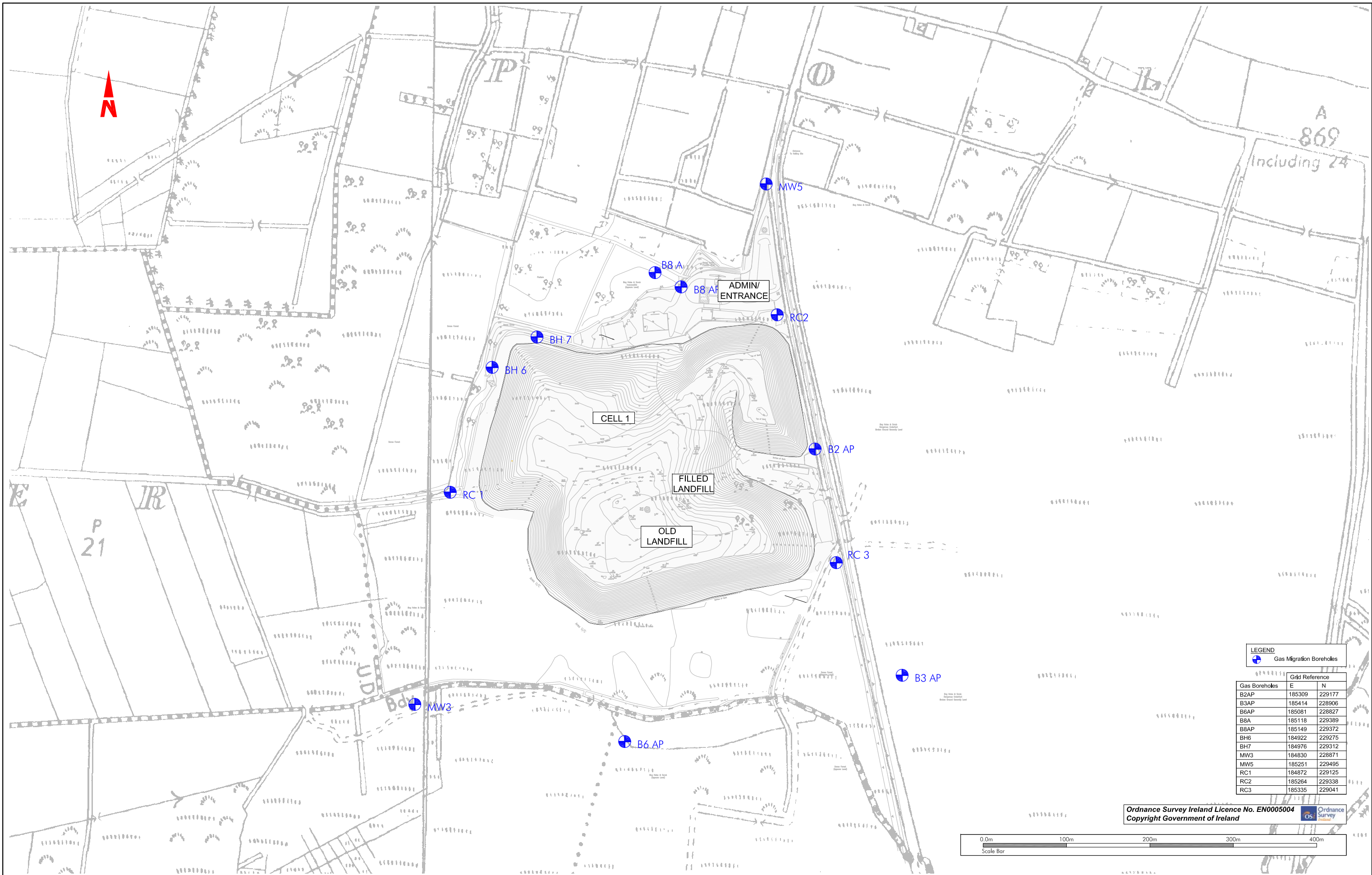
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No.	Date	Amendment / Issue	App
F02	06.11.09	AER 2008	W.M.
F01	22.04.04	Final Issue	W.M.

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Drawing Number: **MGE0029 / DG0001-05**
 Rev: **F02**
 Title: **SURFACE WATER MONITORING LOCATIONS**



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No.	Date	By	App	Amendment / Issue
F07	06.11.09	W.C.	W.M.	AER 2008

No.	Date	By	App	Amendment / Issue
F07	06.11.09	W.C.	W.M.	AER 2008

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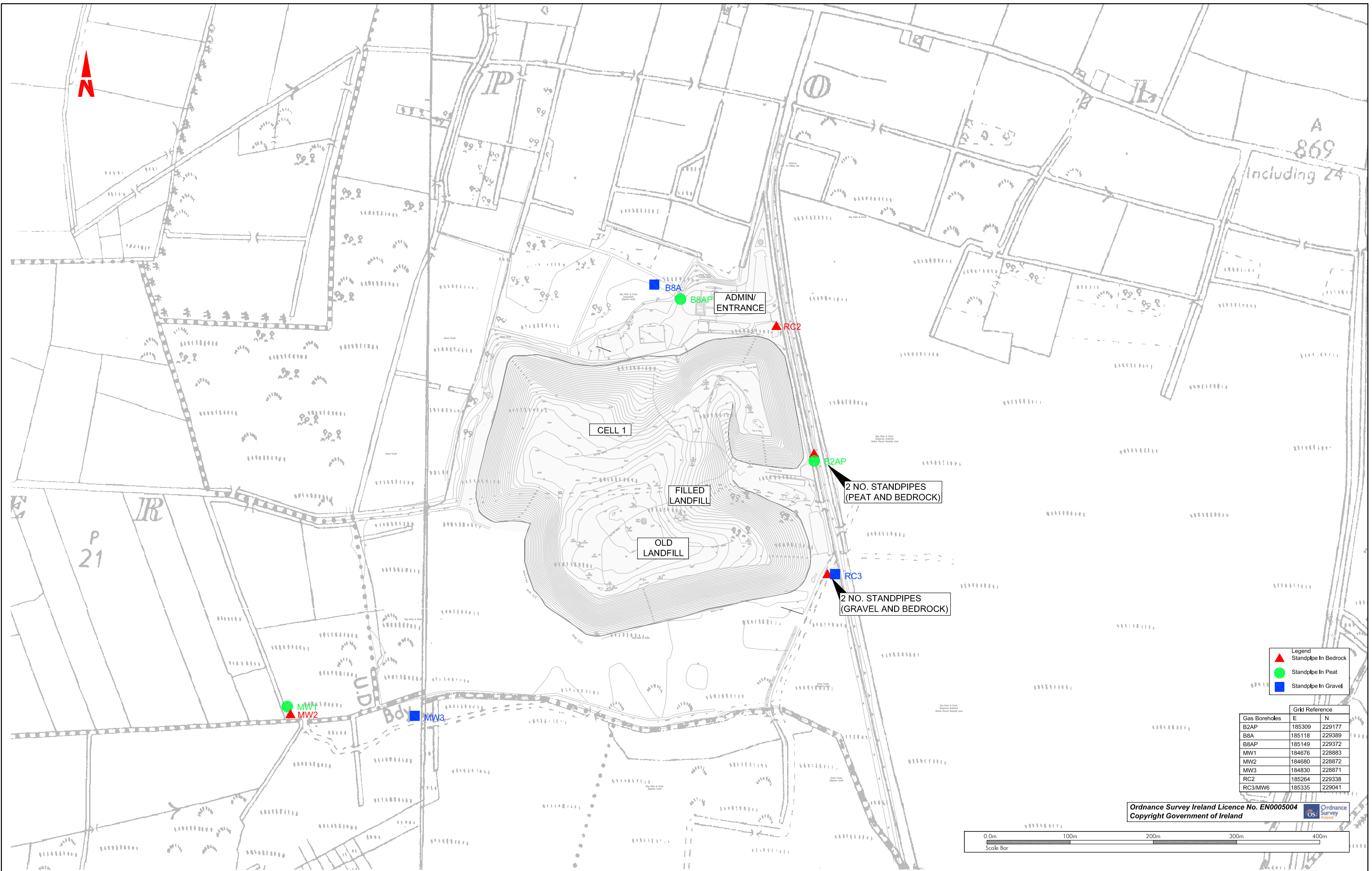
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Drawing Number: MGE0029 / DG0001-04
Rev: F07

Title: LOCATIONS OF GAS MIGRATION BOREHOLES



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No.	Date	By	Amendment / Issue	App
F08	06.11.09	W.M.	AER 2008	W.M.
F07	31.01.05	W.M.	Final Issue	W.M.

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Date: MAR. '04

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Drawing Number: MGE0029 / DG0001-01
Rev: F08

Title: LOCATIONS OF GROUND WATER MONITORING BOREHOLES

Appendix B

Offsite Gas Migration Borehole Results and Flare Records

Offsite Gas Migration Borehole Monitoring Results - 2011

Sample Station	CH ₄ Limit	CO ₂ Limit	CH ₄	CO ₂	O ₂	CH ₄	CO ₂	O ₂	CH ₄	CO ₂	O ₂	CH ₄	CO ₂	O ₂	CH ₄	CO ₂	O ₂
Sampling period			17.01.11			14.02.11			11.03.11			10.05.11			20.06.11		
Number	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)
B2AP	1.0	1.5	0	0.4	20.2	0	0.2	20.1	0	0.3	20.5	0	0.4	20.3	0	0.4	20.3
B6AP	1.0	1.5	0	0.1	20.1	0	0	20.3	0	0.1	20.2	0	0.2	20.1	0	0.2	20.1
B8A	1.0	1.5	0	0	21.3	0	0	21.2	0	0	21	0	0	20.3	0	0	20.3
BH6	1.0	1.5	0	0.3	20.3	0	0.3	20.3	0	0.3	20.1	0	0.3	20.4	0	0.3	20.4
BH7	1.0	1.5	0	0.6	19.8	0	0.7	19.9	0	0.8	20.2	0	0.5	19.8	0	0.5	19.8
MW5	1.0	1.5	0	0	20.2	0	0	20.2	0	0	19.8	0	0	20	0	0	20
RC2	1.0	1.5	0	0.1	20.4	0	0.2	20.2	0	0.1	20.3	0	0.3	20.2	0	0.3	20.2

Sample Station	CH ₄ Limit	CO ₂ Limit	CH ₄	CO ₂	O ₂	CH ₄	CO ₂	O ₂	CH ₄	CO ₂	O ₂	CH ₄	CO ₂	O ₂
Sampling period			16.09.11			08.10.11			10.11.11			19.12.11		
Number	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)	(% v/v)
B2AP	1.0	1.5	0	0.1	20.1	0	0.2	20.5	0	0.4	20.2	0	0.4	20
B6AP	1.0	1.5	0	0	20.2	0	0.1	20.3	0	0	20.5	0	0.1	20.1
B8A	1.0	1.5	0	0.1	21.1	0	0.1	21.3	0	0.1	21.1	0	0.1	20.1
BH6	1.0	1.5	0	0.1	20.3	0	0.4	20	0	0.7	20.3	0	0.2	20.4
BH7	1.0	1.5	0	0.4	20.2	0	0.5	20.5	0	0.5	20.9	0	0.4	19.9
MW5	1.0	1.5	0	0.3	20.7	0	0.2	20.4	0	0.1	20.5	0	0	20
RC2	1.0	1.5	0	0	20.1	0	0	20.6	0	0	20.4	0	0.3	20.3

FLARE DETAILS RECORD SHEET 2011

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: 4/1/2011			
Gas Flow Rate (m ³ /hr)	335	335	
Flare Temperature (°C)		1025	
Carbon Dioxide (%)		34	
Carbon Monoxide (ppm)		10	
Methane (%)		72	
Oxygen (%)		0	
Date: 6/1/2011			
Gas Flow Rate (m ³ /hr)		335	
Flare Temperature (°C)		1020	
Carbon Dioxide (%)		34	
Carbon Monoxide (ppm)		10	
Methane (%)		71.5	
Oxygen (%)		0	
Date: 12/1/2011			
Gas Flow Rate (m ³ /hr)		245	
Flare Temperature (°C)		1013	
Carbon Dioxide (%)		31	
Carbon Monoxide (ppm)		9.0	
Methane (%)		56	
Oxygen (%)		0.3	
Date: 17/1/2011			
Gas Flow Rate (m ³ /hr)		221	Pump 6 = 4295
Flare Temperature (°C)		1021	P3 = 6173
Carbon Dioxide (%)		30	P2 = 7270
Carbon Monoxide (ppm)		6	
Methane (%)		59	
Oxygen (%)		0.2	
Date: 31/1/2011			
Gas Flow Rate (m ³ /hr)	335	325	
Flare Temperature (°C)		1014	P6 = 4380
Carbon Dioxide (%)		17	P3 = 5458
Carbon Monoxide (ppm)		30	P2
Methane (%)		33	
Oxygen (%)		1.1	
Date: 2/2/2011			
Gas Flow Rate (m ³ /hr)		240	
Flare Temperature (°C)		1040	P6 = 4635
Carbon Dioxide (%)		30	P3 = 5065
Carbon Monoxide (ppm)		19	P2 =
Methane (%)		59	
Oxygen (%)		0.2	
Date: 7/2/2011			
Gas Flow Rate (m ³ /hr)		202	
Flare Temperature (°C)		1013	P6 = 4639
Carbon Dioxide (%)		30	P3 = 6337
Carbon Monoxide (ppm)		0	P2 =
Methane (%)		59	
Oxygen (%)		0.2	

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: 1/2/2011			
Gas Flow Rate (m ³ /hr)		232	
Flare Temperature (°C)		1007	P2 =
Carbon Dioxide (%)		30	P3 = 6174
Carbon Monoxide (ppm)		32	P6 = 4479
Methane (%)		59	
Oxygen (%)		0.2	
Date: 14/2/2011			
Gas Flow Rate (m ³ /hr)		232	
Flare Temperature (°C)		1007	P3 = 6103
Carbon Dioxide (%)		31	P6 = 4321
Carbon Monoxide (ppm)		32	
Methane (%)		59	
Oxygen (%)		0.2	
Date: 18/2/2011			
Gas Flow Rate (m ³ /hr)		232	
Flare Temperature (°C)		1017	
Carbon Dioxide (%)		31	
Carbon Monoxide (ppm)		32	
Methane (%)		59	
Oxygen (%)		0.3	
Date: 28/2/2011			
Gas Flow Rate (m ³ /hr)		232	
Flare Temperature (°C)		1007	
Carbon Dioxide (%)		30	
Carbon Monoxide (ppm)		32	
Methane (%)		59	
Oxygen (%)		0.2	
Date: 2/3/2011			
Gas Flow Rate (m ³ /hr)		232	
Flare Temperature (°C)		1007	P6 = 4479
Carbon Dioxide (%)		30	P3 = 6174
Carbon Monoxide (ppm)		32	
Methane (%)		59	
Oxygen (%)		0.2	
Date: 7/3/2011			
Gas Flow Rate (m ³ /hr)		237	
Flare Temperature (°C)		1020	P6 = 5403
Carbon Dioxide (%)		30	P3 = 5142
Carbon Monoxide (ppm)		10.5	
Methane (%)		58	
Oxygen (%)		0	
Date: 9/3/2011			
Gas Flow Rate (m ³ /hr)		235	
Flare Temperature (°C)		1026	P3 = 5262
Carbon Dioxide (%)		30	P6 = 5057
Carbon Monoxide (ppm)		0	
Methane (%)		58	
Oxygen (%)		0.1	

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: <u>11/3/2011</u>			
Gas Flow Rate (m ³ /hr)	236	236	
Flare Temperature (°C)	1036	1036	P 6 = 5057
Carbon Dioxide (%)		30	P 3 = 5262
Carbon Monoxide (ppm)		0	
Methane (%)		58	
Oxygen (%)		0.1	
Date: <u>Wed 23/3/2011</u>			
Gas Flow Rate (m ³ /hr)		236	
Flare Temperature (°C)		1035	
Carbon Dioxide (%)		31	
Carbon Monoxide (ppm)		0	
Methane (%)		57	
Oxygen (%)		0.1	
Date: <u>Mon 4/4/2011</u>			
Gas Flow Rate (m ³ /hr)		238	
Flare Temperature (°C)		1017	P 3 = 5260
Carbon Dioxide (%)		29.6	P 6 = 5057
Carbon Monoxide (ppm)		46.9	
Methane (%)		57.2	
Oxygen (%)		0.1	
Date: <u>Tue 4/4/2011</u>			
Gas Flow Rate (m ³ /hr)		288	
Flare Temperature (°C)		1028	P 3 = 5052
Carbon Dioxide (%)		27	P 6 = 4226
Carbon Monoxide (ppm)		38	
Methane (%)		45	
Oxygen (%)		0.3	
Date: <u>Fri 29/4/2011</u>			
Gas Flow Rate (m ³ /hr)		277	
Flare Temperature (°C)		1028	P 3 = 4201
Carbon Dioxide (%)		27	P 6 = 3132
Carbon Monoxide (ppm)		67	
Methane (%)		46	
Oxygen (%)		0.2	
Date: <u>Thur 5/5/2011</u>			
Gas Flow Rate (m ³ /hr)		267	
Flare Temperature (°C)		1017	P 3 = 4410
Carbon Dioxide (%)		28	P 6 = 2990
Carbon Monoxide (ppm)		27	
Methane (%)		51	
Oxygen (%)		0.3	
Date: <u>Fri 6/5/2011</u>			
Gas Flow Rate (m ³ /hr)		258	
Flare Temperature (°C)		1025	P 3 = 3970
Carbon Dioxide (%)		26	P 6 = 3325
Carbon Monoxide (ppm)		0	
Methane (%)		47	
Oxygen (%)		0.4	

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: 12/5/2011			
Gas Flow Rate (m ³ /hr)		255	
Flare Temperature (°C)		1017	
Carbon Dioxide (%)		29	P3 = 4357
Carbon Monoxide (ppm)		24	P6 = 4156
Methane (%)		55	
Oxygen (%)		0.1	
Date: Mon 10/5/2011			
Gas Flow Rate (m ³ /hr)		214	
Flare Temperature (°C)		1023	
Carbon Dioxide (%)		20	P3 = 3724
Carbon Monoxide (ppm)		0	P6 = 2144
Methane (%)		47	
Oxygen (%)		0.3	
Date: 10/11/2011			
Gas Flow Rate (m ³ /hr)		282	
Flare Temperature (°C)		1005	
Carbon Dioxide (%)		26	P3 = 4330
Carbon Monoxide (ppm)		0	P6 = 3244
Methane (%)		46	
Oxygen (%)		0.9	
Date: Thu 26/5/11			
Gas Flow Rate (m ³ /hr)		200	
Flare Temperature (°C)		1012	P3 = 4040
Carbon Dioxide (%)		26	P6 = 3457
Carbon Monoxide (ppm)		0	
Methane (%)		43	
Oxygen (%)		1.8	
Date: Saturday 4/7/2011			
Gas Flow Rate (m ³ /hr)		272	
Flare Temperature (°C)		1013	
Carbon Dioxide (%)		33	
Carbon Monoxide (ppm)		10	
Methane (%)		71	
Oxygen (%)		0	
Date: Mon 11/7/2011			
Gas Flow Rate (m ³ /hr)		235	
Flare Temperature (°C)		1022	
Carbon Dioxide (%)		23	P3 = 5255
Carbon Monoxide (ppm)		10	P6 = 4560
Methane (%)		43	
Oxygen (%)		0.1	
Date: Thu 14/7/2011			
Gas Flow Rate (m ³ /hr)		246	
Flare Temperature (°C)		1016	P2 = 3568
Carbon Dioxide (%)		27	P3 = 4573
Carbon Monoxide (ppm)		21	P6 = 2635
Methane (%)		44	
Oxygen (%)		0.3	

23/5/2011

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: <u>Thu 21/1/2011</u>			
Gas Flow Rate (m ³ /hr)		242	
Flare Temperature (°C)		1028	
Carbon Dioxide (%)		22	P2 = 3057
Carbon Monoxide (ppm)		0	P3 = 4220
Methane (%)		41	P6 = 3356
Oxygen (%)		0.9	
Date: <u>Tue 26/7/2011</u>			
Gas Flow Rate (m ³ /hr)		232	
Flare Temperature (°C)		1021	P2 = 5413
Carbon Dioxide (%)		24	P3 = 4489
Carbon Monoxide (ppm)		0.9	P6 = 4704
Methane (%)		42	
Oxygen (%)		0.5	
Date: <u>Wed 3/8/2011</u>			
Gas Flow Rate (m ³ /hr)		230	
Flare Temperature (°C)		1025	P2 = 4295
Carbon Dioxide (%)		22	P3 = 4767
Carbon Monoxide (ppm)		23	P6 = 3309
Methane (%)		38	
Oxygen (%)		0.4	
Date: <u>4/8/2011</u>			
Gas Flow Rate (m ³ /hr)		196	
Flare Temperature (°C)		1015	P2 = 3768
Carbon Dioxide (%)		23	P3 = 4513
Carbon Monoxide (ppm)		15	P6 = 1957
Methane (%)		38	
Oxygen (%)		0.6	
Date: <u>5/8/2011</u>			
Gas Flow Rate (m ³ /hr)		217	
Flare Temperature (°C)		1023	
Carbon Dioxide (%)		21	
Carbon Monoxide (ppm)		21	
Methane (%)		36	
Oxygen (%)		0.5	
Date: <u>10/8/2011</u>			
Gas Flow Rate (m ³ /hr)		222	
Flare Temperature (°C)		1025	
Carbon Dioxide (%)		21	P3 = 4613
Carbon Monoxide (ppm)		21	P6 = 4318
Methane (%)		36	
Oxygen (%)		0.6	
Date: <u>11/8/2011</u>			
Gas Flow Rate (m ³ /hr)		205	
Flare Temperature (°C)		1023	P2 = 4026
Carbon Dioxide (%)		22	P3 = 4185
Carbon Monoxide (ppm)		0	P6 = 3523
Methane (%)		38	
Oxygen (%)		0.5	

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: 12/8/2011			
Gas Flow Rate (m ³ /hr)		218	P2 = 5398
Flare Temperature (°C)		1015	P3 = 4515
Carbon Dioxide (%)		22	P6 = 4420
Carbon Monoxide (ppm)		9	
Methane (%)		37	
Oxygen (%)		1.3	
Date: 11/8/2011			
Gas Flow Rate (m ³ /hr)		214	
Flare Temperature (°C)		1034	P2 = 4553
Carbon Dioxide (%)		20	P3 = 4356
Carbon Monoxide (ppm)		66	P6 = 3666
Methane (%)		37	
Oxygen (%)		0.7	
Date: Thu 1/9/2011			
Gas Flow Rate (m ³ /hr)		220	
Flare Temperature (°C)		1018	P2 = 5683
Carbon Dioxide (%)		21	P3 = 4824
Carbon Monoxide (ppm)		12	P6 = 4764
Methane (%)		36	
Oxygen (%)		0.4	
Date: Mon 5/9/2011			
Gas Flow Rate (m ³ /hr)		190	
Flare Temperature (°C)		1011	
Carbon Dioxide (%)		20	P2 = 4879
Carbon Monoxide (ppm)		6.7	P3 = 4219
Methane (%)		35	P6 = 4187
Oxygen (%)		0.2	
Date: 7/9/2011			
Gas Flow Rate (m ³ /hr)		194	
Flare Temperature (°C)		1008	P2 = 5313
Carbon Dioxide (%)		20	P3 = 4410
Carbon Monoxide (ppm)		11.8	P6 = 4613
Methane (%)		37	
Oxygen (%)		0.4	
Date: 9/9/2011			
Gas Flow Rate (m ³ /hr)		211	
Flare Temperature (°C)		1022	P2 = 4953
Carbon Dioxide (%)		30	P3 = 4381
Carbon Monoxide (ppm)		0	P6 = 3966
Methane (%)		52	
Oxygen (%)		0.1	
Date: 12/9/2011			
Gas Flow Rate (m ³ /hr)		201	
Flare Temperature (°C)		1016	P2 = 4272
Carbon Dioxide (%)		28	P3 = 4088
Carbon Monoxide (ppm)		14	P6 = 3386
Methane (%)		49	
Oxygen (%)		0.3	

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: 13/9/2011			
Gas Flow Rate (m ³ /hr)		255	P2 = 4264
Flare Temperature (°C)		1020	P3 = 4205
Carbon Dioxide (%)		25	P6 = 3376
Carbon Monoxide (ppm)		53	
Methane (%)		48	
Oxygen (%)		0.1	
Date: Thu 22/9/2011			
Gas Flow Rate (m ³ /hr)		210	
Flare Temperature (°C)		1021	P2 = 4737
Carbon Dioxide (%)		26	P3 = 4903
Carbon Monoxide (ppm)		0	P6 = 3331
Methane (%)		40	
Oxygen (%)		0.1	
Date: Mon 26/9/2011			
Gas Flow Rate (m ³ /hr)		186	
Flare Temperature (°C)		1001	P2 = 4418
Carbon Dioxide (%)		26	P3 = 5027
Carbon Monoxide (ppm)		8.5	P6 = 3512
Methane (%)		41	
Oxygen (%)		0.1	
Date: Fri 30/9/2011			
Gas Flow Rate (m ³ /hr)		216	
Flare Temperature (°C)		1019	P2 = 6101
Carbon Dioxide (%)		27	P3 = 5224
Carbon Monoxide (ppm)		7	P6 = 5216
Methane (%)		41	
Oxygen (%)		0.1	
Date: Mon 3/10/2011			
Gas Flow Rate (m ³ /hr)		202	
Flare Temperature (°C)		1023	P2 = 5856
Carbon Dioxide (%)		26	P3 = 5430
Carbon Monoxide (ppm)		8	P6 = 5197
Methane (%)		43	
Oxygen (%)		0	
Date: Wed 5/10/2011			
Gas Flow Rate (m ³ /hr)		199	
Flare Temperature (°C)		1024	P2 = 4756
Carbon Dioxide (%)		27	P3 = 5435
Carbon Monoxide (ppm)		6	P6 = 3851
Methane (%)		43	
Oxygen (%)		0	
Date: Thu 13/10/2011			
Gas Flow Rate (m ³ /hr)		188	
Flare Temperature (°C)		1019	P2 = 5946
Carbon Dioxide (%)		27	P3 = 5762
Carbon Monoxide (ppm)		1.5	P6 = 4844
Methane (%)		44	
Oxygen (%)		0	

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: Tues 18/10/2011			
Gas Flow Rate (m ³ /hr)		297	
Flare Temperature (°C)		1025	P2 = 6089
Carbon Dioxide (%)		27	P3 = 5467
Carbon Monoxide (ppm)		21	P6 = 5108
Methane (%)		45	
Oxygen (%)		0	
Date: Tues 25/10/11			
Gas Flow Rate (m ³ /hr)		341	
Flare Temperature (°C)		1022	P2 = 6152
Carbon Dioxide (%)		24	P3 = 5940
Carbon Monoxide (ppm)		9	P6 = 5035
Methane (%)		38	
Oxygen (%)		0	
Date: Wed 26/10/11			
Gas Flow Rate (m ³ /hr)		288	
Flare Temperature (°C)		1019	P2 = 4868
Carbon Dioxide (%)		23	P3 = 5344
Carbon Monoxide (ppm)		14	P6 = 3329
Methane (%)		37	
Oxygen (%)		0	
Date: Fri 4/11/11			
Gas Flow Rate (m ³ /hr)		253	
Flare Temperature (°C)		1017	
Carbon Dioxide (%)		25	
Carbon Monoxide (ppm)		10	
Methane (%)		39	
Oxygen (%)		0	
Date: Wed 9/11/11			
Gas Flow Rate (m ³ /hr)		281	
Flare Temperature (°C)		1012	P2 = 6310
Carbon Dioxide (%)		22	P3 = 5446
Carbon Monoxide (ppm)		1.2	P6 = 4649
Methane (%)		36	
Oxygen (%)		0	
Date: Tues 15/11/2011			
Gas Flow Rate (m ³ /hr)		248	
Flare Temperature (°C)		1020	P2 = 4890
Carbon Dioxide (%)		24	P3 = 5446
Carbon Monoxide (ppm)		4.8	P6 = 4557
Methane (%)		39	
Oxygen (%)		0	
Date: 17/11/2011			
Gas Flow Rate (m ³ /hr)		237	
Flare Temperature (°C)		1024	P2 = 5005
Carbon Dioxide (%)		24	P3 = 4606
Carbon Monoxide (ppm)		16	P6 = 4094
Methane (%)		41	
Oxygen (%)		0	

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks			
Date: <u>Wed 23/11/2011</u>			(LAST TUNING)	(IN MEANS) PUMPS PUT ON	(IMMEDIATELY AFTER TURNING OFF PUMPS)	(2 DAYS LATER)
Gas Flow Rate (m ³ /hr)		246				
Flare Temperature (°C)		1029	P2 =	6350	4323	6419
Carbon Dioxide (%)		24	P3 =	5762	5294	5564
Carbon Monoxide (ppm)		0	P6 =	5013	4473	3388
Methane (%)		40				4660
Oxygen (%)		0				
Date: <u>Tues 29/11/2011</u>			(When logs in full later in day)			
Gas Flow Rate (m ³ /hr)		170	P2 =	6636	= 5225	6696
Flare Temperature (°C)		1029	P3 =	5776	= 5468	5572
Carbon Dioxide (%)		24	P6 =	4625	= 4595	4510
Carbon Monoxide (ppm)		15				
Methane (%)		46				
Oxygen (%)		0.3				
Date: <u>Thu 1/12/11</u>			(Before pumps on)	(After pumps off)		
Gas Flow Rate (m ³ /hr)		185	P2 =	6771	= 5303	= 1.35 below surf
Flare Temperature (°C)		1023	P3 =	5790	= 5839	= 0.87
Carbon Dioxide (%)		24	P6 =	4819	= 4705	= 1.96
Carbon Monoxide (ppm)		19				
Methane (%)		44				
Oxygen (%)		0.4				
Date: <u>Mon 5/12/11</u>						
Gas Flow Rate (m ³ /hr)		185				
Flare Temperature (°C)		1007	P2 =	4387	} pumps off	
Carbon Dioxide (%)		23	P3 =	5722		
Carbon Monoxide (ppm)		19	P6 =	3538		
Methane (%)		43				
Oxygen (%)		0.5				
Date: <u>Fri 16/12/2011</u>						
Gas Flow Rate (m ³ /hr)		250	+ no gas wells have been connected			
Flare Temperature (°C)		1013				
Carbon Dioxide (%)		22				
Carbon Monoxide (ppm)		0				
Methane (%)		42				
Oxygen (%)		0.2				
Date: <u>Mon 19/12/2011</u>						
Gas Flow Rate (m ³ /hr)		290				
Flare Temperature (°C)		1018	P2 =	6521		
Carbon Dioxide (%)		22	P3 =	5710		
Carbon Monoxide (ppm)		0	P6 =	4617		
Methane (%)		38				
Oxygen (%)		0.8				
Date:						
Gas Flow Rate (m ³ /hr)						
Flare Temperature (°C)						
Carbon Dioxide (%)						
Carbon Monoxide (ppm)						
Methane (%)						
Oxygen (%)						

FLARE DETAILS RECORD SHEET 2010

	FLARE 1 (Old Cell)	FLARE 2 (New Cell)	Remarks
Date: 4/1/2011			
Gas Flow Rate (m ³ /hr)		277	P1 = 0 P2 = 5375 P3 = 6043 P6 = 4804 } PUMPS TO LAGOON JUST TURNED OFF
Flare Temperature (°C)		1003	
Carbon Dioxide (%)		26	
Carbon Monoxide (ppm)		0	
Methane (%)		60	
Oxygen (%)		0.1	
Date: 5/1/2011		277	
Gas Flow Rate (m ³ /hr)		208	P2 = 6570
Flare Temperature (°C)		1021	P3 = 5977
Carbon Dioxide (%)		22	P6 = 4540
Carbon Monoxide (ppm)		0	
Methane (%)		47	
Oxygen (%)		0.2	
Date: 9/1/2011			
Gas Flow Rate (m ³ /hr)		270	
Flare Temperature (°C)		1026	P1 = 0
Carbon Dioxide (%)		23	P2 = 6667
Carbon Monoxide (ppm)		0	P3 = 5868
Methane (%)		44	P6 = 4621
Oxygen (%)		0.3	
Date:			
Gas Flow Rate (m ³ /hr)			
Flare Temperature (°C)			
Carbon Dioxide (%)			
Carbon Monoxide (ppm)			
Methane (%)			
Oxygen (%)			
Date:			
Gas Flow Rate (m ³ /hr)			
Flare Temperature (°C)			
Carbon Dioxide (%)			
Carbon Monoxide (ppm)			
Methane (%)			
Oxygen (%)			
Date:			
Gas Flow Rate (m ³ /hr)			
Flare Temperature (°C)			
Carbon Dioxide (%)			
Carbon Monoxide (ppm)			
Methane (%)			
Oxygen (%)			

Appendix C

Flare Emissions Monitoring Report



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**TITLE: AIR EMISSION TESTING OF ONE LANDFILL FLARE LOCATED IN POLLBOY LANDFILL FACILITY,
 POLLBOY, BALLINASLOE, CO. GALWAY**

PREFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF GALWAY COUNTY COUNCIL

PREPARED BY:	Dr. John Casey
ATTENTION:	Mr. Kevin Mulrennan
LICENCE NUMBER:	WL027-02
LICENCE HOLDER:	Galway County Council
FACILITY NAME:	Pollboy Landfill Facility
DATE OF MONITORING VISIT:	18 th Oct. 2011
NAME AND ADDRESS OF CLIENT ORGANISATION:	Pollboy, Ballinsloe, Co. Galway
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	05 th Jan 2012
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	201207(1)
REVIEWERS:	Dr. Brian Sheridan


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Document Amendment Record

Client: Galway County Council

Project: Air emission testing of one enclosed Landfill flare located in Pollboy Landfill, Pollboy, Ballinsloe, Co. Galway.

Project Number: 201207(1)			Document Reference:		
201207(1)	Document for review	B.A.S.	JWC	B.A.S	05/01/2012
Revision	Purpose/Description	Originated	Checked	Authorised	Date
					

Signing sheet



Brian Sheridan Ph.D Eng

For and on behalf of Odour Monitoring Ireland

1. Executive Summary

The results of the monitoring exercise are contained in Section 2 of this report.

- NO_x as NO₂, CO, TOC and HCL/HF emissions from Flare 1 were within the emission limit values specified in Waste licence W027-02;

1.1 Monitoring Objectives

This report has been prepared by Odour Monitoring Ireland and contains the results of emission testing carried out on 1 No. Enclosed ground flare at Pollboy Landfill, Ballinsloe, Co. Galway. The monitoring was carried out at this facility as part of compliance monitoring with the requirements of Waste licence W0027-02. The emission testing was carried out by Odour Monitoring Ireland on behalf of Galway County Council.

1.2 Special Monitoring Requirements

There were no special monitoring requirements for this campaign.

1.3 The substances to be monitored at each emission point

The parameters listed in *Table 1.1* were monitored using the appropriate instrumentation as illustrated in *Table 1.1*. All monitoring was carried out in accordance with Environmental Protection Agency Office of Environmental Enforcement (OEE) Air Emission Monitoring Guidance Note 2 (AG2).

Table 1.1. Monitored parameters and techniques

Sample location	Parameter	Analytical method
Landfill Flare	Volumetric airflow rate & Temperature (⁰ C)	Pitot in accordance with EN13284-1 where possible. MGO coated K type thermocouple and PT100 Volumetric airflow rate theoretical calculated for Landfill flare.
Landfill Flare	Oxides of nitrogen (NO _x as NO ₂), Carbon monoxide (CO), Carbon dioxide (CO ₂), Sulphur dioxide (SO ₂), and Oxygen (O ₂)	Horiba PG250 All analytes, Oxygen EN14789, Oxides of Nitrogen Chemiluminescence, Carbon Monoxide EN15085.
Landfill Flare	Hydrogen chloride (HCL)	Impinger train containing high purity deionised water solution in accordance ISEN 1911:2010
Landfill Flare	Hydrogen fluoride (HF)	Impinger train containing 0.10 molar sodium hydroxide ISEN 15713:2006
Landfill Flare	Total Organic Carbon (TOC)	TOC analyser in accordance with EN12619:2002

This report presents details of this monitoring programme. This environmental monitoring was carried out Dr. John Casey, Managing Partner, Odour Monitoring Ireland on the 18th Oct. 2011. Methodology, Results, Discussion and Conclusions are presented herein.

2. Monitoring Results

This section will present the results of the monitoring exercise.

2.1 Operating Information

Emission Point Reference	Date	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load
Flare 1	18/10/2011	Landfill flare	Continuous	Landfill Gas	N/A	None	Landfill Gas

2.2 Monitoring Result Reference Conditions

Emission Point Reference	Temperature (K)	Pressure	Moisture Correction	Oxygen Correction (%)
Flare 1	K	101.3	Yes	3

2.3 Sampling Location Summary

Comment	Yes/No
Recommended 5 hydraulic diameters straight length before sampling plane	Yes
Recommended 2 hydraulic diameters straight length after sampling plane	Yes
Ports number <1.5m - 2 ports >1.5m - 4 ports	1 port on the flare
Appropriate port size	Yes
Suitable working platform	Yes

Note: Temperature and airflow rate traverse measurements were performed across the stack in one plane only. Only one plane was possible due to access port issues.

2.4. Sampling run times for the monitoring

Parameter	Approx. Sampling period for landfill flare
Inlet CH ₄	30 minutes
Inlet O ₂	30 minutes
Volumetric air flow rate	Theoretically calculated
SO ₂	40 minutes
NO _x	40 minutes
CO	40 minutes
O ₂	40 minutes
CO ₂	40 minutes
Stack gas temp	40 minutes
TOC	40 minutes
HCL	35 minutes
HF	35 minutes

2.5. Characteristics of raw inlet gas to enclosed Landfill flare

Parameter	Compound loading Flare1	Units
CH ₄	43.7	%
CO ₂	25.5	%
O ₂	0.5	%
Volumetric flow rate	289	m ³ /hr
Total chloride	45	mg/Nm ³
Total fluoride	<1.2	mg/Nm ³
Total sulphur	19	mg/Nm ³

2.6. Theoretically calculated landfill gas exhaust volume and physical characteristics from the Landfill flare.

Parameter	Flare 1
Total Volumetric methane loading (m ³ /hr)	126
Total Volumetric Oxygen loading (m ³ /hr)	1.4
Ratio to complete combustion of methane assuming no excess Oxygen	9.57
Oxygen concentration level in flue gas (%)	11.6
Flue gas temperature (Kelvin) ²	1,375
Theoretical calculated Volumetric exhaust airflow rate (m ³ /h)	3,362
Normalised average exhaust airflow rate (Nm ³ h ⁻¹) ³	667

- Notes:**
- ¹ denotes data from 18/10/2011.
 - ² denoted converted from degrees Celsius to Kelvin ($^{\circ}\text{C} + 273.15$);
 - ³ denotes normalised to 273.15 Kelvin and 101.3 kPa.

Table 2.7. Emission value results for landfill gas Flare 1.

Flare 1	Conc.	Normalised (mgN/m ³)	Oxygen corrected emission concentration to flare (mgN/m ³) 3% ref.	Kg/hr	Expanded uncertainty as percentage of limit value (%) ¹	Emission limit Values	Operating Status
Total NOx [as NO ₂] (ppm)	24	49.2	94.70	0.03	10.5	<150 mg/Nm ³	As Normal
CO (ppm)	1	1.25	2.41	0.001	8.41	<50 mg/Nm ³	As Normal
Total Organic Carbon (mg/m ³)	1.8	2.88	5.86	0.002	15.62	<10 mg/Nm ³	As Normal
Average Hydrogen Chloride (mg/m ³)	0.91	1.25	2.53	0.0008	-	<50 mg/Nm ³ (at mass flow > 0.30 kg/hr)	As Normal
Average Hydrogen Fluoride (mg/m ³)	0.31	0.42	0.85	0.0003	-	<5 mg/Nm ³ (at mass flow > 0.050 kg/hr)	As Normal
SO ₂ (ppm)	2	5.7	10.97	-	-	-	As Normal
O ₂ (%)	11.6	-	-	-	-	-	As Normal
Temperature (degrees)	1,102	-	1,375K	-	-	>1273K	As Normal
CO ₂ (%)	5.33	-	-	-	-	-	As Normal
Volumetric Airflow (m ³ /hr)	-	-	328.50	-	-	<3,000	As Normal
Efficiency (%)	>99.98	-	-	-	-	-	As Normal

Notes: ¹ denotes that expanded uncertainty is elevated as the equation has not been validated for use with high temperature sources.

Leak check results for Horiba = <2%

Leak check results for Signal = <2%

Span (<2% range) and drift values within acceptable tolerance (<1%) for Horiba.

Span (<2% range) and drift values within acceptable tolerance (<1%) for Signal.

3. Discussion of results

Tables 2.1 to 2.7 present the results of the emission monitoring carried out on the landfill flare located in Pollboy Landfill.

There was very little variation at one traverse in oxygen and flue gas temperature profiles across the stack during the monitoring exercise (i.e. less than 15% as recommended by the Environment Agency, UK (Environment Agency, 2002)).

A high temperature Inconel 625 and ceramic probe (Testo, Germany) was used to prevent variations in CO emissions data. Normal stainless steel probes when subjected to temperatures above 600^oC can release CO from within the structure of the material and cause the recording of erroneous results (Environment Agency, 2002).

Correction of data to 3% oxygen was performed. Due to possible inaccuracies in airflow rate measurement, it was not possible to determine the oxygen intake of the flare through the louver system using measurement. Since the volume of intake air required for complete combustion was known and the oxygen concentration in the exhaust flue gas was known, the volume of intake excess fuel air could be theoretically calculated through numerous iterations using the Solver program (i.e. Microsoft Excel). This allows for the calculation of the volume of intake excess air through the louver landfill flare intake system (Environment Agency, 2002).

4. Conclusion

The following conclusions can be drawn from this study:

1. A theoretically exhaust flue gas volume was calculated for the landfill flare.
2. NO_x as NO₂, SO₂, CO, O₂, TOC, HCL and HF monitoring and analysis was carried out in accordance with specified requirements;
3. All data was standardised to 273.15 Kelvin, 101.3 kPa;
4. All data is presented as Oxygen corrected to 3% (v/v) using the appropriate equations;
5. NO_x as NO₂, CO, TOC, HCL and HF emissions from Flare 1 were within the emission limit values specified in Waste licence W027-02.

5. References

1. Environment Agency. (2002). Guidance for Monitoring Enclosed Landfill Gas Flares. www.environment-agency.co.uk
2. Environmental Protection Agency. (2009). Air Emissions Monitoring Guidance Note 2 (AG2).
3. I.S. EN 13284-1:2002. Stationary source emissions. Measurement of velocity and volume flow rate of gas streams in ducts.
4. IS EN13526:2002-Stationary source emissions-Determination of the mass concentration of total gaseous organic carbon in flue gases from solvent using processes-Continuous flame ionisation detector method.
5. IS EN12619:1999-Stationary source emissions-Determination of the mass concentration of total gaseous organic carbon at low concentrations in flue gases-Continuous flame ionisation detector method.
6. I.S. EN 13284-1:2002. Stationary source emissions. Determination of low range mass concentration of dust. Manual gravimetric method.

6. Appendix I-Sampling, analysis

6.1.1 Location of Sampling

Pollboy Landfill, Pollboy, Ballinsloe, Co. Galway.

6.1.2 Date & Time of Sampling

18th Oct. 2011

6.1.3 Personnel Present During Sampling

Dr. John Casey, Odour Monitoring Ireland, Trim, Co. Meath.
MCERTS: MM0674

6.1.4 Instrumentation check list

Federal Method 2 S type pitot and MGO coated thermocouple;
L type pitot tube
Testo 400 handheld and appropriate probes.
Ceramic and Inconel 625 sampling probes.
TCR Tecora Iso-kinetic Particulate and gas sampling train
Portable Signal 3030PM FID calibrated with Propane with non-methane hydrocarbon cutter.
SKC sample pumps and Bios Primary calibrator
Horiba PG250.

Appendix D

Leachate Monitoring Results

Quarterly Leachate Monitoring Results- 2011

Monitoring point		L19				CH1				Leachate Lagoon			
Sampling Period	Licence Limit	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Temperature (°C)	-	nm	19.3	-	-	-	16.5	-	-	6.6	13.1	14.8	9.8
pH (pH units)	pH 6-9	6.9	7	-	-	-	7.4	-	-	6.9	7.3	7.5	8.6
Conductivity (µS/cm)	-	1310	4730	-	-	-	15130	-	-	3310	5490	4310	4270
Biochemical Oxygen Demand (mg/l O2)	2,500	21	35	-	-	-	56	-	-	11	30	17	13.5
Chemical Oxygen Demand (mg/l O2)	3,000	46	449	-	-	-	1630	-	-	221	359	214	322
Ammonia (mg/l N)	800	28	240	-	-	-	1100	-	-	140	290	170	280
Chloride (mg/l Cl)	-	38	370	-	-	-	1500	-	-	290	760	580	540

Annual Leachate Monitoring Results- Q2 of 2011

Monitoring point			L19	CH1	Leachate Lagoon
Parameter	Units	Licence Limits	Q2	Q2	Q2
Temperature	°C		19.3	16.5	13.1
pH	pH units	6-9	7	7.4	7.3
Conductivity	µS/cm		4730	15130	5490
Biochemical Oxygen Demand	mg/l O2	2,500	35	56	30
Chemical Oxygen Demand	mg/l O2	3,000	449	1630	358
Ammonia	mg/l N	800	240	1100	290
Ortho-Phosphate (as P)	mg/l P		1.33	3.11	0.417
Total Oxidised Nitrogen (as N)	mg/l N		<0.4	0.4	0.7
Chloride	mg/l Cl		370	1500	760
Cyanide	mg/l CN		<0.05	<0.05	<0.05
Fluoride	mg/l F		0.24	<0.03	0.18
Sulphate	mg/l SO4		15	5	27
Boron	µg/l		1388	4099	819
Sodium	mg/l		370	1300	450
Magnesium	mg/l		47	83	56
Potassium	mg/l		100	570	140
Calcium	mg/l		257	76	156
Chromium	µg/l		17	140	16
Iron	µg/l		2926	8609	1644
Manganese	µg/l		1900	1600	1100
Nickel	µg/l		6	190	26
Copper	µg/l		4	2	<0.5
Zinc	µg/l		33	13	5
Cadmium	µg/l		<0.1	<0.1	<0.1
Mercury	µg/l		<0.05	<0.06	<0.05
Lead	µg/l		<1	2	<0.5

Appendix E

Surface water Monitoring Results

Quarterly Surface Water Monitoring Results - 2011

Monitoring point		SW1				SW3				SW4			
Sampling Period	Limits	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Temperature (°C)	25	2.7	15	14.6	7	6.1	14.8	14.2	8.3	5.8	14.4	13.9	8.7
Dissolved Oxygen (% Saturation)	>60%	34	54	19	37	91	108	82	88	90	108	75	84
pH (pH units)	5.5-8.5	7	7.5	7.1	7.1	7.8	8.2	7.9	7.6	7.9	8.2	7.8	7.7
Conductivity (µS/cm)	1000	805	828	788	620	752	735	784	721	739	732	772	707
Biochemical Oxygen Demand (mg/l O2)	5	2	3.6	11	1.4	<1.0	<1.0	1.5	<1.0	1	<1.0	1	<1.0
Chemical Oxygen Demand (mg/l O2)	40	77	92	78	80	<25	<25	27	<25	<25	<25	33	<25
Suspended Solids (mg/l)	60	<8.0	<16	40	<8	<8	<8	<8	<8	<8	<8	<8	<8
Ammonia (mg/l N)	0.2	11	11	4.7	4	0.03	0.05	<0.03	0.08	<0.03	0.04	<0.03	0.06
Chloride (mg/l Cl)	250	60	64	46	40	26	23	21	18	26	23	21	20

Monitoring point		SW5				SW6				SW8			
Sampling Period	Limits	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Temperature (°C)	25	5.5	-	-	-	2.4	15.8	14.5	7	1.3	10.7	14.1	6.4
Dissolved Oxygen (% Saturation)	>60%	88	-	-	-	40	65	27	38	39	22	30	40
pH (pH units)	5.5-8.5	7.9	-	-	-	7.1	7.5	7.4	7.1	7.2	7.2	7	7.2
Conductivity	1000	692	-	-	-	798	604	786	624	413	435	565	478
Biochemical Oxygen Demand (mg/l O2)	5	<1.0	-	-	-	1	3.6	2.5	<1.0	1.1	1.9	3.1	<1.0
Chemical Oxygen Demand (mg/l O2)	40	25	-	-	-	74	94	68	81	93	128	107	105
Suspended Solids (mg/l)	60	<8	-	-	-	<8	13	10	<8	<8	<8	<8	<8
Ammonia (mg/l N)	0.2	0.03	-	-	-	10	9.6	4.2	3.8	0.09	0.31	0.77	0.2
Chloride (mg/l Cl)	250	25	-	-	-	59	61	43	38	20	20	25	21

Annual Surface Water Monitoring Results- Q2 of 2011								
Monitoring point				SW1	SW3	SW4	SW6	SW8
Sampling Period		SI 294 of 1989	SI 278 of 2007	Q2	Q2	Q2	Q2	Q2
Parameter	Units	Limits	Limits					
Ortho-Phosphate (as P)	mg/l P	0.5		0.052	0.036	0.038	0.052	0.037
Total Oxidised Nitrogen (as N)	mg/l N	1		<0.4	1.3	1.3	<0.4	<0.4
Sulphate	mg/l SO4	200		22	21	21	11	7.7
Alkalinity-total (as CaCO3)	mg/l CaCO3	-		316	336	348	312	188
Boron	µg/l	2000	1000	67	<50	<50	63	<50
Sodium	mg/l	-		40	12	13	38	11
Magnesium	mg/l	-		9	9.3	9.3	8.9	4.2
Potassium	mg/l	-		8.3	1.9	1.8	7.8	0.8
Calcium	mg/l	-		90	121	120	91	71
Chromium	µg/l	0.05	50	1	<1	<1	1	<1
Iron	µg/l	200	200	3209	125	193	3875	872
Manganese	µg/l	50	50	390	15	20	320	180
Nickel	µg/l	-	20	<0.5	<0.5	<0.5	<0.5	<0.5
Copper	mg/l	0.05 (o)	2	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/l	3		2	2	2	3	2
Cadmium	µg/l	0.005	5	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury	µg/l	0.001	1	<0.05	<0.05	<0.05	<0.05	<0.05
Lead	µg/l	0.05	25	<0.5	<0.5	<0.5	<1	<0.5

Appendix F

Groundwater Monitoring Results

Quarterly Groundwater Monitoring Results- 2011

Monitoring point	Trigger Levels (EPA IGV)	S.I. 9 2010 GW Regs	B2AP				B8A				B8AP			
Sampling Period	Limits	Limits	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Temperature (°C)	25	-	10.4	12	12.5	11.3	10.8	11.5	13	10.9	6.7	10.9	13.8	10.7
pH (pH units)	≥ 6.5 and ≤ 9.5	-	7.1	7.3	7.2	7.1	7.3	7.4	7.3	7.3	6.9	7.1	6.8	6.9
Conductivity (µS/cm)	1000	800-1875	1356	1230	1112	1135	640	634	650	642	1183	1788	1577	1396
Ammonia (mg/l N)	0.15	0.065 - 0.175	18	18	10	11	2.3	1.8	0.94	0.96	14	18	15	16
Chloride (mg/l Cl)	30	24 - 187.5	180	160	150	160	31	24	19	18	92	220	160	160
Total Organic Carbon (mg/l C)	No Abnormal Change	No Abnormal Change	10	9	8	6	<3	3	<3	2	15	20	18	16

Monitoring point	Trigger Levels (EPA IGV)	S.I. 9 2010 GW Regs	RC2				RC3				MW1			
Sampling Period	Limits	Limits	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Temperature (°C)	25	-	10.1	11.5	15.6	10.2	10.2	11.2	11.9	10.1	9.5	13.9	12.2	9.8
pH (pH units)	≥ 6.5 and ≤ 9.5	-	7.3	7.4	7.3	7.3	6.8	6.9	6.9	6.9	7.5	7.6	7.3	7.4
Conductivity (µS/cm)	1000	800-1875	600	598	611	610	1315	1568	1190	1268	571	586	615	586
Ammonia (mg/l N)	0.15	0.065 - 0.175	2.1	1.5	1.4	1.4	7.8	9	9.3	9.6	7.5	7.3	7.1	7.7
Chloride (mg/l Cl)	30	24 - 187.5	22	19	18	19	78	100	80	85	16	18	16	19
Total Organic Carbon (mg/l C)	No Abnormal Change	No Abnormal Change	4	4	4	2	12	388	9	8	6	5	8	5

Monitoring point	Trigger Levels (EPA IGV)	S.I. 9 2010 GW Regs	MW2				MW3				MW6			
Sampling Period	Limits	Limits	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Temperature (°C)	25	-	5.2	14.5	14.6	7.9	8.7	13.4	14	10.4	9	11.4	13.2	9.2
pH (pH units)	≥ 6.5 and ≤ 9.5	-	7.3	7.1	6.9	6.9	7.1	7.1	7	7	6.9	6.9	6.8	6.8
Conductivity (µS/cm)	1000	800-1875	596	655	799	728	659	626	713	645	1140	1316	1437	1222
Ammonia (mg/l N)	0.15	0.065 - 0.175	0.78	2.5	0.37	0.23	2.8	3.3	3	3.1	7.8	7.3	6.2	7.8
Chloride (mg/l Cl)	30	24 - 187.5	14	19	12	14	21	19	20	19	38	28	26	34
Total Organic Carbon (mg/l C)	No Abnormal Change	No Abnormal Change	28	18	33	32	19	18	19	20	12	16	17	15

Appendix G

2011 Meteorological Data

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
01/01/2011	0.857746	86.098592	7.6	2.4	5.402817	206.591549	1.1	1.3
01/02/2011	1.28169	76.873239	2.6	0.2	1.666197	75.535211	0	1.3
01/03/2011	0.654545	76.848485	2.8	-1.6	0.393939	198.833333	0	0
01/04/2011	3.516667	83.361111	5.9	-1.2	3.765278	249.777778	4.9	4.1
01/05/2011	2.408333	84.083333	7.4	-0.2	2.959722	253.180556	0	4.1
01/06/2011	0.914085	85.084507	4.1	-3.4	0.819718	211.915493	0	0
01/07/2011	1.742623	85.770492	1.3	-3.9	-0.819672	68.704918	1.4	1.3
01/08/2011	3.222535	84.971831	4.5	-2.2	1.287324	261.197183	1.2	2
01/09/2011	2.197183	82.633803	5.9	-0.5	2.153521	241.042254	0	2
01/10/2011	1.183099	92.901408	7.6	1.5	4.83662	151.112676	14.7	10.5
01/11/2011	2.2375	85.708333	6.7	2.4	4.459722	231.930556	23.6	21.7
01/12/2011	3.009859	90.619718	11.7	7.1	10.949296	241.408451	10.8	24.5
01/13/2011	2.598611	87.458333	11.7	8.9	10.651389	230.5	5.77	11
01/14/2011	3.807042	81.028169	10.2	6.2	8.211268	239.098592	6.77	5.4
01/15/2011	4.75	88.236111	12.4	8.7	11.359722	235.125	28.4	21.1
01/16/2011	4.529167	76.861111	11.5	5.1	8.633333	245.666667	2.4	23.1
01/17/2011	1.433333	86.375	8.2	1.4	3.386111	248.958333	0	0.6
01/18/2011	1.838028	84.507042	7.3	-1.6	2.430986	254.211268	0	0
01/19/2011	0.562295	88.95082	5.4	-3.9	-0.080328	180.639344	0	0
01/20/2011	0.364706	94.294118	-0.6	-5.8	-3.133824	195.808824	0	0
01/21/2011	0.394366	90.014085	5.8	-3.3	-0.129577	242.098592	0	0
01/22/2011	0.709859	93.422535	3.4	-3.7	0.870423	204.366197	0	0
01/23/2011	0.459155	95.873239	2	-1.3	0.176056	238.084507	0	0
01/24/2011	1.894444	86.444444	6.7	2.1	4.456944	278.111111	0	0.1
01/25/2011	2.705634	87.774648	9.5	5.7	7.98169	275.056338	1.7	2.2
01/26/2011	1.998611	78.305556	8.1	0.4	4.927778	93.541667	0	2.2
01/27/2011	2.179167	77.722222	4.9	-1	2.372222	80.833333	0	0
01/28/2011	0.611111	74.097222	3.5	-1.7	0.965278	146.333333	0	0
01/29/2011	1.05	73.819444	3.8	-0.7	1.902778	84.013889	0	0
01/30/2011	0.911111	74.819444	4.2	-0.8	1.398611	231.777778	0	0
01/31/2011	1.709722	84.944444	8.8	-1.5	4.552778	216.611111	2.5	2.4
02/01/2011	3.429167	85.194444	10.4	5.3	8.229167	252.694444	0.2	2.5
02/02/2011	5.867606	79.042254	11.9	3.7	8.611268	247.873239	5	4
02/03/2011	5.814706	83.058824	10.3	1.5	5.954412	239.470588	3.73	4.6

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
02/04/2011	11.684722	81.527778	13	7.4	11.423611	255.5	2.7	4.1
02/05/2011	2.021429	89.4	9.5	6.4	7.8	246.857143	13.1	11.2
02/06/2011	1.104167	91.416667	8.8	6	6.452778	161.902778	54.93	40.4
02/07/2011	3.665278	81.722222	10.8	0.6	6.513889	256.625	5.8	46.7
02/08/2011	2.082857	85.542857	10.5	-0.7	4.531429	159.928571	2.3	3.3
02/09/2011	1.515942	86.710145	10.5	6.5	9.192754	227.492754	5	5.5
02/10/2011	1.198611	88.930556	9	-0.4	4.194444	169.305556	0	5.5
02/11/2011	1.851389	86.763889	11.1	2.5	7.434722	203.777778	4.47	4.2
02/12/2011	1.837143	84.914286	7.9	-0.7	4.412857	202.514286	8.43	7.1
02/13/2011	1.136765	86.73913	8.7	2.2	4.695714	232.661765	2.2	7.1
02/14/2011	2.526087	80.318841	5.9	1.3	3.230435	219.647059	0.1	2.2
02/15/2011	3.036111	85.319444	6.6	1.6	4.8625	154.666667	5.6	7.6
02/16/2011	1.895833	82.152778	8.9	-0.3	4.645833	128.916667	0.07	7.6
02/17/2011	0.890278	91.5	5.3	2.3	4.138889	130.056338	0	0
02/18/2011	2.181944	89.861111	8.8	2.1	6.272222	143.472222	7.5	8.9
02/19/2011	1.349296	85.873239	11.3	3.3	7.243662	197.253521	0	8.9
02/20/2011	2.712857	85.704225	10.6	6.8	8.484507	141.485714	10.5	14.1
02/21/2011	0.906944	83.916667	12.1	4.3	7.877778	208.722222	0.1	14.2
02/22/2011	1.628169	89.873239	11	6.8	9.023944	208.704225	1.5	1.7
02/23/2011	3.169014	84.943662	13.4	9.2	10.947887	239.084507	2.7	5
02/24/2011	2.509722	80.375	13.7	6.1	10.827778	211.083333	0	0.4
02/25/2011	3.780556	77.763889	12.9	7.5	10.733333	236.972222	1.3	2.3
02/26/2011	2.765278	77.583333	9.8	3.3	6.381944	271.166667	2.1	0.6
02/27/2011	2.190278	75.625	10.2	2.7	6.122222	273.722222	1.9	1.9
02/28/2011	0.6875	77.472222	10.4	-1.8	4.601389	244.263889	0	0
03/01/2011	0.784722	73.902778	10.8	1.4	5.469444	177.472222	0	0
03/02/2011	0.616901	78.957746	8.9	-2	2.884507	190.84507	0	0
03/03/2011	0.475	80.097222	10.9	-2.6	3.563889	192.75	0	0
03/04/2011	0.811268	86.140845	10.4	-0.9	4.53662	115.084507	0	0
03/05/2011	1.133333	79.125	10.2	5.8	7.597222	101.305556	0	0
03/06/2011	1.034286	77.042254	7.8	3.6	6.394366	154.128571	0	0
03/07/2011	0.425	82.444444	10	-0.5	4.140278	203.430556	0.8	1.3
03/08/2011	3.706944	82.875	10	-0.7	5.216667	244.277778	0.03	1.3
03/09/2011	6.843056	73.416667	10.4	4	7.676389	266.916667	0	0.4

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
03/10/2011	5.898592	73.704225	10.3	2.8	7.211268	267.56338	0.7	0.4
03/12/2011	1.342254	89.873239	5.7	-0.6	1.905634	219.591549	18.1	49.5
03/13/2011	2.288732	83.197183	6.7	-1.6	2.847887	231.521127	4	3.3
03/14/2011	1.006944	81.305556	7.5	0.6	3.476389	160.625	8.63	4.8
03/15/2011	0.56087	88.826087	2.9	0.5	1.382609	238.521739	0	4.8
03/16/2011	1.288235	72.941176	10.8	4.5	6.417647	248.176471	0	0
03/17/2011	1.359155	72.5	8.8	1.7	6.094444	272.014085	2.2	2.3
03/18/2011	1.923611	75.944444	9.7	-1.3	4.773611	240.805556	0.03	0.6
03/19/2011	1.681944	80.694444	10.4	-0.2	5.486111	189.791667	8.97	9.9
03/20/2011	3.170833	85.277778	11.7	7.8	9.75	244.958333	2.7	11.8
03/21/2011	2.630357	81.928571	14	7.9	11.175	245.696429	0	1.6
03/22/2011	0.909231	72.78125	16	4	10.573438	190.907692	0	0
03/23/2011	0.723611	69.347222	16.3	4.4	10.573611	169.972222	0	0
03/24/2011	1.135211	71.676056	16.6	-0.1	8.721127	150.760563	0	0
03/25/2011	2.068056	72.263889	14.2	2.6	8.126389	85.291667	0	0
03/26/2011	1.357143	76.814286	10.7	0.7	6.294286	147.014286	0	0
03/27/2011	1.634426	74.098361	12.3	0.6	6.772131	108.245902	0	0
03/28/2011	1.257813	69.1875	13.6	5.2	9.16875	146.65625	0	0
03/29/2011	1.195775	82.450704	12	7.3	9.383099	143.394366	0	0.6
03/30/2011	3.533333	74.444444	13.8	7.4	10.840278	215.166667	7.03	4.6
03/31/2011	6.533333	73.472222	14.8	9.4	12.063889	240.222222	2.8	8
04/01/2011	4.427778	81.25	14.5	11.9	12.836111	223.611111	1.9	2
04/02/2011	2.470833	83.625	12.4	5.4	8.611111	245.111111	13.9	8.4
04/03/2011	2.809722	72.347222	11.3	3.1	7.043056	250.083333	0	8.4
04/04/2011	4.633333	79.263889	14.9	4.8	10.205556	235.5	6.43	7.7
04/05/2011	5.461972	86.070423	16.2	11.7	13.357746	246.816901	9.33	10.1
04/06/2011	3.719444	77.319444	18	11.1	13.668056	242.041667	3	10.4
04/07/2011	2.381944	81.75	16.2	8	12.070833	235.597222	0	0.1
04/08/2011	1.035714	77.942857	19.5	3.5	11.025714	173.671429	0	0.1
04/09/2011	1.998611	70.930556	17.5	6.4	12.543056	138.666667	0	0
04/10/2011	1.997222	81.902778	17.7	9.1	12.643056	226.097222	0	0
04/11/2011	3.620833	71.305556	12.5	4.5	9.802778	270.472222	1.7	1.5
04/12/2011	3.194444	68.555556	12.5	3	8.030556	256.041667	0.6	1.5
04/13/2011	2.505714	82.814286	14.7	6.4	10.244286	228.714286	14.4	14.7

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
04/14/2011	1.265278	79.416667	12.8	8.8	10.665278	240.791667	0.03	1.8
04/15/2011	2.356944	75.736111	14.6	4.1	10.111111	254.680556	0.3	0.2
04/16/2011	1.415278	72.597222	13.7	7.3	10.163889	260.555556	0.2	0.8
04/17/2011	0.915493	70.43662	16.2	2.7	10.046479	180.732394	0	0
04/18/2011	1.309722	69.097222	17.4	3.4	10.868056	159.152778	0	0
04/19/2011	1.249296	65.943662	18.9	4.1	11.842254	144.915493	0	0
04/20/2011	0.726389	72.375	17.4	5.2	11.223611	216.958333	1.4	2.4
04/21/2011	1.502778	69.958333	22	9.2	14.906944	150.888889	0	2.4
04/22/2011	2.213889	73.652778	19.3	9	13.597222	167.597222	0.7	0.5
04/23/2011	2.438889	66.208333	15	6.3	10.368056	274.180556	0	0.5
04/24/2011	1.529577	74.521127	15.7	5.3	10.211268	233.140845	4.17	2.8
04/25/2011	1.615493	64.055556	14.3	7.5	10.584722	116.239437	0	2.8
04/26/2011	2.219444	64.083333	14.9	7.7	11.1625	82.569444	0	0
04/27/2011	1.186111	73.416667	17.2	8.7	12.809722	139.847222	0.07	0.2
04/28/2011	1.331944	63.305556	18.9	6.5	12.958333	128.611111	0	0.1
04/29/2011	2.583333	66.222222	18.7	2.9	11.816667	108.791667	0	0
04/30/2011	3.644444	66.236111	17.4	8.2	12.872222	76.638889	0	0
05/01/2011	4.05	57.458333	16.8	8.1	12.6625	84.388889	0.1	0.3
05/02/2011	4.913889	49.652778	16.9	8.5	12.6125	93.388889	0	0.3
05/03/2011	3.307143	60.642857	13.7	6.2	9.678571	121.628571	0	0
05/04/2011	2.645833	80.166667	11.8	5.9	9.741667	128.604167	8.4	15.2
05/05/2011	2.545161	76.532258	16.9	10.5	13.309677	153.935484	10.1	20.5
05/06/2011	2.415094	75.188679	16.9	11	13.824528	174.584906	7.83	10.7
05/07/2011	2.925	81.069444	17.4	10.2	13.6	133.930556	12.7	13.7
05/08/2011	3.266667	73.347222	15.8	8.4	12.665278	156.888889	9.3	5.4
05/09/2011	2.945714	76.171429	15	10.9	12.527143	188.1	8.03	12.9
05/10/2011	4.180597	73.731343	14.4	10.4	11.967164	235.104478	3.63	6.6
05/11/2011	4.723611	78.75	13	8.7	10.561111	252.430556	0.97	2.3
05/12/2011	5.048611	74.680556	13.7	9	10.836111	266.375	4.9	2.8
05/13/2011	3.356944	80.222222	12.1	7.6	9.273611	262.375	9.47	9.2
05/14/2011	3.151389	72.875	13.3	7.1	10.043056	278.527778	5.97	9.2
05/15/2011	5.008571	83.5	12.8	7.1	11.007143	268.542857	0	4.2
05/16/2011	7.226531	79.734694	13.4	11.5	12.44898	266.653061	0.07	0
05/17/2011	5.067606	85.277778	15.8	11.5	12.897222	260.84507	0.47	0.2

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
05/18/2011	4.61831	70.690141	13.1	7.4	10.592958	269.633803	0	0.4
05/19/2011	3.120833	73.763889	12.4	4.1	9.068056	250.027778	0.53	1.2
05/21/2011	3.475	81.444444	14.1	6.4	10.454167	214.083333	14.7	15.7
05/22/2011	5.747222	69.708333	13.9	8	10.725	257.291667	4.13	18.1
05/23/2011	8.341667	70.263889	12.5	7.7	10.570833	254.291667	6.53	6.9
05/24/2011	4.7625	62.847222	13.6	7.4	10.518056	261.722222	0	0.4
05/25/2011	3.941667	75.833333	14.5	9.7	11.554167	220.430556	2.7	3.7
05/26/2011	3.6	77.028169	13.1	7	10.519718	299.591549	9.9	8
05/27/2011	4.734722	79.055556	12	4.9	9.773611	263.513889	0	5.6
05/28/2011	5.343056	75.583333	13.2	9.5	11.009722	263.166667	0.2	0.6
05/29/2011	5.822222	70.902778	13.8	9.3	11.894444	261.680556	0.1	1
05/30/2011	2.727778	73.611111	12.6	6.1	9.0625	269.375	3.4	3.7
05/31/2011	3.808333	70.583333	14.1	4.9	10.3125	261.708333	0.3	3.9
06/01/2011	4.988889	81.805556	15.3	11.5	13.375	254.861111	0	0.5
06/02/2011	1.111111	72.819444	22.3	11.8	16.184722	220.916667	0	0
06/03/2011	1.168571	69.098592	24.4	9.4	16.94507	170.647887	0	0
06/04/2011	1.881944	73.402778	17.8	10	13.6	70.527778	0	0
06/05/2011	2.002778	78.915493	14.4	6.7	10.304167	245.847222	4.07	4.6
06/06/2011	2.002817	83.450704	12.4	4.4	9.219718	248.338028	3.3	4.6
06/07/2011	2.614085	80.56338	14.5	6.8	10.528169	244.267606	3.6	5.3
06/08/2011	3.319444	78.569444	13.7	7.2	10.473611	287.708333	4.1	5.4
06/09/2011	2.780282	70.380282	10.8	5.7	8.301408	269.830986	3.8	4
06/10/2011	1.823944	70.859155	13.7	3.7	8.832394	240.394366	0.07	2
06/11/2011	1.715278	63.472222	15.2	3.6	10.384722	235.083333	0	0.5
06/12/2011	2.576389	85.875	11.5	5.7	9.291667	112.555556	22.3	23.3
06/13/2011	2.83662	70.619718	17	9.6	13.004225	277.338028	0.03	23.4
06/14/2011	1.952113	71.408451	18.6	4.2	12.230986	170.985915	4.4	4.4
06/15/2011	3.601389	68.208333	16.4	10.1	13.873611	248.013889	2.3	5.8
06/16/2011	2.630556	73.555556	15	7.4	10.873611	235.5	4.07	4.5
06/17/2011	3.0875	75.680556	15.5	8.7	11.986111	226.763889	14	18
06/18/2011	2.777778	79.916667	15.6	9.8	12.031944	269.708333	5.43	5.1
06/19/2011	2.432353	72.058824	16	8.5	12.466176	273.073529	0	5.1
06/20/2011	1.664789	78.197183	17.5	5.6	11.680282	160.253521	11.1	12.9
06/21/2011	1.826389	85.805556	15.9	10.7	12.819444	199.597222	10.4	16.3

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
06/22/2011	2.713889	77.236111	16.8	10.5	12.873611	284.291667	5.67	10
06/23/2011	2.808333	68.75	15.8	8.7	12.055556	275.180556	0.03	2.9
06/24/2011	1.919718	85.760563	14.9	7.3	10.790141	195.816901	33.2	36.3
06/26/2011	2.576389	73.013889	21.5	12.2	16.173611	244.902778	0	3
06/27/2011	1.4875	71.777778	16.2	8.9	12.541667	257.402778	2.2	1.4
06/28/2011	2.6125	69.916667	16.2	5.8	11.373611	254.069444	0.93	1.4
06/29/2011	2.8375	74.291667	15.6	7.6	11.631944	266.111111	3.7	4.2
06/30/2011	2.669444	73.180556	15.7	8.7	12.472222	272.152778	0.07	4.2
07/01/2011	1.248611	67.263889	18.7	10.1	14	245.791667	0	0
07/02/2011	1.543662	67.957746	19.9	9.2	14.746479	224.450704	0	0
07/03/2011	1.085507	67.571429	20.5	9.3	15.472857	215.202899	0	0
07/04/2011	2.038889	67.569444	20.4	11.9	15.997222	189.319444	1.1	0.8
07/05/2011	2.911111	78.111111	18.6	11.7	14.848611	213.027778	4.2	6.8
07/06/2011	1.804167	82.75	15.5	7.4	11.708333	156.555556	22.5	23.1
07/07/2011	2.291549	86.521127	14.5	10.8	12.297183	219.408451	27.8	26.9
07/08/2011	1.422222	88.361111	16.8	11.5	13.297222	204.208333	26.9	41.5
07/09/2011	1.656522	77.347826	18.8	10	14.257971	281.666667	1.4	17
07/10/2011	1.320833	76.708333	17.8	11.1	14.4375	269.208333	0	1.1
07/11/2011	0.912857	71.914286	18.8	11.4	14.832857	152.414286	0	0
07/12/2011	1.45	65.971831	20.8	10.8	15.914085	121.771429	0	0
07/13/2011	1.391304	62.768116	22.3	11.7	16.881159	167.971014	0	0
07/14/2011	2.198611	72.597222	19.1	12.1	15.886111	253.972222	0	0
07/15/2011	2.2375	79.847222	17.4	12.9	14.844444	234.583333	0	0.2
07/16/2011	4.906944	82.277778	16.4	12.1	13.729167	270.652778	4.07	4
07/17/2011	4.106944	85.305556	13.9	11.8	12.722222	285.416667	0.47	4.8
07/18/2011	3.651389	83.944444	15.2	11.5	12.656944	285.15493	1.1	1.4
07/19/2011	2.145833	75.708333	16.8	11.4	13.554167	280.194444	0	1.4
07/20/2011	1.265278	69.569444	16.6	10.9	13.336111	85.098592	0	0
07/21/2011	1.194366	71.943662	15.6	10	13.004225	181.929577	0	0
07/22/2011	1.177778	69.486111	18	7	12.755556	268.263889	0	0
07/23/2011	1.197222	72.861111	19.2	9.4	14.2	261.791667	0	0
07/24/2011	1.234722	86.902778	20.8	13.9	16.498611	253.083333	2.5	2.5
07/25/2011	1.544444	88.75	19.7	14.3	16.45	275.013889	3.2	2.5
07/26/2011	1.493056	76.555556	20.9	12.7	15.913889	287.791667	0.3	1.9

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
07/27/2011	0.898592	90.112676	16.9	8.7	14.078873	227.887324	4.97	3.6
07/28/2011	1.530986	76.957746	16.7	12.6	14.464789	99.915493	0	3.8
07/29/2011	1.334722	78.236111	16.9	11.7	14.445833	93.486111	0.1	0.3
07/31/2011	2.801389	85.666667	18	14.4	15.701389	242.208333	0.57	3.6
08/01/2011	0.955882	77.26087	18.7	12.4	15.284058	217.985294	0.5	0.3
08/02/2011	1.538889	66.513889	17.8	11.6	14.5625	278.402778	0	0.1
08/03/2011	1.636111	77.197183	18.2	10.2	14.740845	147.760563	0.07	0.2
08/04/2011	2.388889	82.666667	19.6	11.3	15.926389	241.194444	3.63	3.1
08/05/2011	1.9	79.958333	16.1	8.7	12.784722	248.056338	0	3.1
08/06/2011	1.450725	83.871429	17.2	10.7	12.742857	230.130435	4.3	7.2
08/07/2011	1.176056	82.305556	17.5	8.2	12.798611	220.583333	0.67	7.2
08/08/2011	2.652778	80.388889	18.1	10.2	13.594444	289.513889	3.6	3.1
08/09/2011	2.064789	70.112676	17.5	9.8	13.457746	273.323944	0.57	3.1
08/10/2011	4.378873	89.239437	17.4	12.2	15.674648	244.338028	22.8	17.5
08/11/2011	4.533333	89.055556	17.6	14.8	15.904167	262.555556	3.1	18.7
08/12/2011	2.622535	88.690141	18.3	13.6	15.556338	238.253521	7.17	9.9
08/13/2011	3.908333	82.277778	16.9	12.9	14.615278	255.444444	0.43	10
08/14/2011	3.993056	75.625	16.9	11.3	14.022222	261.944444	0	0.7
08/15/2011	1.727778	87.097222	15.7	8.7	12.876389	215.541667	19.9	19.5
08/16/2011	2.506944	76.180556	18.1	9.4	14.405556	265.958333	0	19.6
08/17/2011	0.814493	74.884058	17.3	4.9	12.069565	195.869565	0	0.1
08/18/2011	0.870833	79.138889	17.7	9.9	13.165278	187.388889	0	0
08/19/2011	2.404286	84.7	15.7	8.7	12.184286	221.5	9.9	8.3
08/20/2011	1.605882	75.911765	18.8	9.7	14.058824	239.544118	0	8.3
08/21/2011	2.104167	77.847222	19.4	11.1	14.777778	259.055556	0.5	1.3
08/22/2011	0.654167	67.111111	17.7	12.2	14.570833	233.027778	0	0.3
08/23/2011	1.0875	71.069444	17.4	10.9	14.198611	208.013889	0.6	0.7
08/24/2011	1.823611	80.291667	15.9	8.8	12.4	217.791667	4	3.4
08/25/2011	1.545833	81.125	17.6	7.7	11.680556	127.694444	13.1	7
08/26/2011	1.519718	81.676056	17	6.2	11.528169	273.830986	8.97	7
08/27/2011	3.019697	82.151515	15.9	9.7	12.412121	276.727273	0.2	4.8
08/28/2011	2.216176	76.573529	16.4	9.6	12.385294	285.573529	1.666667	1.2
08/29/2011	1.738028	79.680556	14.4	7	10.934722	279.253521	0.03	1
08/30/2011	0.954167	67.847222	15.5	10.5	12.695833	247.625	0	0.3

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
08/31/2011	1.219444	73.166667	17.1	11	13.741667	146.708333	0	0
09/01/2011	1.422222	77.569444	18	8	14.083333	165.694444	0	0
09/03/2011	2.875714	81.171429	16.3	8.6	13.681429	248.371429	9.4	24.7
09/04/2011	2.509722	81.638889	16	7.4	11.022222	197.736111	9.87	5.6
09/05/2011	3.9125	85.152778	15.6	8.7	12.425	255.375	14.8	15.9
09/06/2011	7.258571	78.785714	15.5	12.2	13.575714	263.985714	4.17	17.1
09/07/2011	4.840278	84.375	14.2	11	12.304167	264.055556	3.9	3.5
09/08/2011	2.148611	86.194444	16.5	11.1	14.173611	236.111111	5.7	5.7
09/09/2011	3.01194	84	21.3	14.6	17.268657	209.507463	0.2	3
09/10/2011	3.711429	76.929577	18.7	12.4	16.173239	205.5	3.6	2.6
09/11/2011	4.43662	83.652778	15.5	11.6	13.011111	229.972222	4.43	5.5
09/12/2011	9.595833	77.5	17	12.7	14.266667	256.083333	1.1	6.5
09/13/2011	5.527778	74.208333	14.9	9.7	11.968056	262.625	2.9	0.6
09/14/2011	3.028169	79.690141	15.2	9	11.778873	266.239437	0	0.6
09/15/2011	1.547222	78.347222	16.6	7.8	12.201389	159.888889	0	0
09/16/2011	3.715493	85.816901	15.9	11.7	13.080556	203.647887	5.73	2.7
09/17/2011	3.815942	85.144928	14.4	9.9	11.628986	267.913043	5.1	5.2
09/18/2011	2.822222	81.319444	16.3	10.9	12.934722	270.958333	4.47	7.3
09/19/2011	3.740845	90.732394	15.7	10.9	13.488732	251.450704	9.93	10.2
09/20/2011	2.875	82.263889	14	8.1	11.111111	245.777778	3.37	2.4
09/21/2011	5.040278	80.236111	14.4	9.7	11.893056	253.444444	3.7	4.9
09/22/2011	2.683333	84.854167	15.1	7.2	10.789583	238.4375	0.03	1.6
10/07/2011	2.744444	72.666667	13.8	9	10.837037	275.259259	0	0
10/08/2011	5.118571	89.585714	15.6	9.2	13.794286	265.442857	0	0
10/09/2011	7.688889	90.263889	15.7	14.4	15.020833	257.597222	1.5	0.8
10/10/2011	8.359722	89.736111	15.7	14.6	15.229167	257.861111	2.9	1.5
10/11/2011	6.255556	91.708333	15.4	14.4	14.783333	261.597222	0.73	2.1
10/12/2011	2.931429	90.357143	15.8	11.9	14.197143	262.414286	2.3	1.5
10/13/2011	0.912676	87.830986	17.2	10.6	13.307042	202.126761	0	0.1
10/14/2011	1.723611	86.361111	15.6	12.6	14.044444	178.486111	0.1	0.3
10/15/2011	1.55	89.25	14.4	6.3	12.118056	215.5	3.1	2.9
10/16/2011	2.429577	82.323944	13.4	6.6	10.385915	236.788732	0.3	2.9
10/17/2011	4.140845	83.338028	12.6	5.2	8.983099	253.492958	2.6	3.6
10/18/2011	3.76338	77.197183	10.9	5	7.611268	269.408451	2	3.8

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
10/19/2011	2.644444	78.222222	10.6	4.3	6.694444	275.25	0.53	2.2
10/20/2011	2.265278	87.366197	11.4	3.9	7.897183	242.638889	0.67	0.5
10/21/2011	3.156944	82.833333	13.9	11.3	12.286111	230.083333	0	0.5
10/22/2011	2.573611	87.180556	12.7	7.8	10.863889	222.152778	21.2	21.2
10/23/2011	2.380556	90.180556	14.7	7.1	10.631944	135.916667	21.3	22.1
10/24/2011	2.168056	88.805556	15	8.4	11.568056	175.236111	6.73	23.4
10/25/2011	0.729167	88.236111	12.2	4.2	8.379167	213.708333	1.9	5.4
10/26/2011	1.428169	85	11.4	1.6	6.46338	176.112676	0	2.3
10/27/2011	1.790278	84.083333	12.1	4.8	8.3375	251.069444	0.07	0.1
10/28/2011	2.340278	83.944444	12.6	4.7	9.265278	219.444444	5.23	3.8
10/29/2011	3.958333	84	14.9	12.1	13.254167	232.486111	8.17	8.1
10/30/2011	2.332	87.52	16.1	10.3	13.606667	209.933333	5.3	2.6
10/31/2011	2.198611	86.777778	15.6	7.3	12.161111	217.263889	7.13	9.4
11/01/2011	2.277143	81.785714	13.1	5.5	9.154286	201.257143	0.07	9.4
11/02/2011	4.337143	84.542857	14	13.1	13.471429	150.585714	5.57	7.1
11/03/2011	1.844444	87.472222	14.8	8.7	12.013889	158.208333	17.1	14.4
11/04/2011	1.351389	86.569444	12.1	4.5	7.702778	246.472222	0	14.4
11/05/2011	1.211111	84.375	11	2.1	5.6875	253.291667	0	0
11/06/2011	0.470423	83.802817	12.4	0	5.083099	166.690141	0	0
11/07/2011	1.0625	85.625	10.2	0.5	5.084722	136.694444	0	0
11/08/2011	2.038889	92.402778	10.7	7.9	9.590278	116.75	3.2	1.8
11/09/2011	2.235211	86.309859	13.1	9	11.25493	157	2	2.6
11/10/2011	2.118056	85.208333	14.1	7.4	10.191667	128.777778	0	2.6
11/11/2011	4.351389	80.625	14.5	11.2	12.622222	145.736111	12.2	10.1
11/12/2011	2.026389	81.277778	12.4	6.7	10.0125	167	0	10.1
11/13/2011	3.629577	79.732394	15.8	11	13.923944	118.126761	0	0
11/14/2011	2.761972	85.098592	14.2	9.5	12.343662	117.676056	0	0
11/15/2011	2.176389	83.125	11.7	7.2	9.997222	120.152778	0	0
11/16/2011	1.723944	88.619718	14	6.6	9.659155	151.661972	7.77	7.1
11/17/2011	3.273611	88.722222	13.6	4.6	10.247222	183.666667	14.6	15.1
11/18/2011	2.694286	85.9	13.6	12.3	12.847143	185.342857	9.13	15.2
11/19/2011	1.108333	91.986111	12.6	6.3	10.644444	166.027778	7.23	15
11/20/2011	1.215493	91.929577	12.4	6.6	9.939437	162.43662	4.1	1.8
11/21/2011	1.151389	91.375	10.8	5.6	8.261111	252.583333	8.5	8.9

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
11/22/2011	1.572222	86.347222	9.6	1.2	5.955556	233.388889	0	8.9
11/23/2011	3.004478	87.820896	12.3	9.1	11.222388	238.940299	2.5	4.1
11/24/2011	4.166667	84.069444	12.6	7	11.020833	236.736111	6.83	9.3
11/25/2011	3.955556	79.513889	8.8	5.2	7.302778	254.430556	6.1	9.5
11/26/2011	6.3375	84.56338	13.5	8.8	11.8375	246.486111	1	5.3
11/27/2011	3.923611	76.847222	13.5	5.1	7.965278	257.513889	0.2	2
11/28/2011	3.148611	81.194444	12.6	7.3	10.241667	219.527778	6.4	8.4
11/29/2011	3.814286	85.732143	12.3	2.1	7.523214	253.125	21.6	23.3
11/30/2011	3.746269	83.910448	10	4.6	7.585075	227.731343	8.63	10
12/01/2011	1.675	87.138889	7.2	0.5	3.7125	249.555556	0.53	8.6
12/02/2011	3.752778	90.833333	10.7	0.8	5.663889	256.25	8.37	8.5
12/03/2011	4.150725	76.681159	9.7	5.4	7.456522	273.391304	0	8.5
12/04/2011	3.502778	84.263889	6.1	0.7	4.183333	271.138889	5.37	4.8
12/05/2011	3.759722	86.319444	4.8	1.5	2.713889	266.777778	3.9	5.9
12/06/2011	4.301587	83.746032	8.2	2.3	5.219048	261.126984	1.2	1.6
12/07/2011	4.030645	78.370968	7	3.2	5.135484	267.354839	3.2	2.3
12/08/2011	6.764286	80.385714	11.4	1.5	6.69	259.914286	0.87	1.9
12/09/2011	2.811111	82.097222	5.2	0.6	2.490278	266.75	1.666667	1.9
12/10/2011	2.010448	90	7.5	-0.7	3.589552	244.61194	0.57	0.4
12/11/2011	1.995775	88.901408	7.1	1.9	4.507042	245.323944	12.2	8.1
12/12/2011	3.627778	85.25	9	2.9	5.277778	234.013889	14.4	13.9
12/13/2011	7.772581	72.015873	5.5	1.6	3.853968	257.825397	2.3	15.1
12/14/2011	3.071642	84.985075	4.8	-0.6	2.202985	235.716418	0.57	2.2
12/15/2011	3.023611	83.916667	5.4	-2.2	2.741667	260	1	0.9
12/16/2011	3.031429	87.571429	5.2	-2.3	2.044286	269.928571	2.2	1.3
12/17/2011	2.661111	80.819444	5.7	0.6	2.861111	272.138889	0	1.3
12/18/2011	2.751429	88	5.7	0.9	2.712857	261.442857	0	0.1
12/19/2011	2.902899	88.985714	10.3	2.7	7.627143	261.742857	6.13	3.6
12/20/2011	2.552778	89.652778	11	5.1	7.554167	255.75	10.1	9.8
12/21/2011	6.526389	88.986111	11.7	10.2	10.990278	264.652778	0	9.8
12/22/2011	3.442	82.92	12.6	9.2	11.554	240.32	0	0
12/23/2011	2.957971	83.202899	9.8	2.9	5.666667	271.73913	0.53	2.5
12/24/2011	5.31129	86.951613	10.4	3.3	8.033871	248.080645	1.4	3.2
12/25/2011	6.565789	87.552632	13.1	10.5	11.739474	249.5	0	3.2

Date	Mean Wind Speed (m/s)	Mean Relative Humidity (%)	Max Air Temp (°C)	Min Air Temp (°C)	Mean Air Temp (°C)	Mean Wind Direction (°)	Rain Intensity Daily Total	Precipitation Amount (mm)
12/26/2011	5.764	80.76	12.7	9.9	12.192	245.32	0	0.3
12/27/2011	2.228889	88.622222	10.1	7.1	8.748889	161.222222	1.8	2.1
12/28/2011	6.118182	76.159091	8.4	4.2	6.029545	265.477273	0.03	5.1
12/29/2011	6.10678	83.9	9.2	6.1	8.018333	274.5	9.9	4.7
12/30/2011	4.608163	92.22449	12.2	7.6	10.053061	252.938776	3.3	5.5
12/31/2011	5.338462	89.046154	12.1	8.9	10.833846	251.707692	3.87	3.2

Appendix H

Lagoon Inspection Report



Mr. Tony McInerney,
Senior Executive Engineer,
Environment Section,
Galway County Council,
Centrepoint,
Liosbaun Business Park,
Liosbaun,
Tuam Road,
Galway.

14th February 2012

Our Ref: MGE0029LT0077GAL
File Ref: 310

Re: Pollboy Landfill – Certification of Lagoon Structure

Dear Mr. McInerney,

We refer to condition 15.13.2 of the waste licence in relation to the inspection and certification of the lagoon structures at Pollboy Landfill.

A visual inspection and the leachate lagoon was undertaken on the 30th January 2012 by RPS. The visual inspection also involved discussion with Mr. Kevin Mulrennan, Galway County Council.

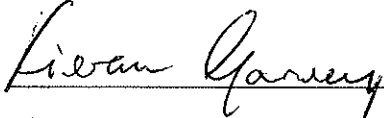
The findings of the visual inspection are as follows:

- The leachate lagoon is generally in a good state of repair and there are no indications of obvious defects in the integrity of the lagoon.
- A quantity of silt is accumulating in the base of the lagoon but we understand that this is being removed from the lagoon and sump area by the operator every 6 months.
- The anchorage of the lagoon appears to be in a good condition and the lagoon liner is perfectly functional.
- The surface aerators operating in the lagoon appear to be in good working order.

I hereby certify the leachate lagoon structure at Pollboy Landfill as required under condition 5.13.2 of Waste Licence No. W0027-02.

We trust this is satisfactory. Please do not hesitate to contact the undersigned if you have any queries.

Yours sincerely,



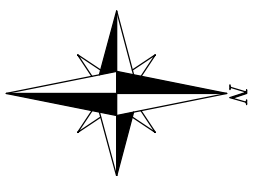
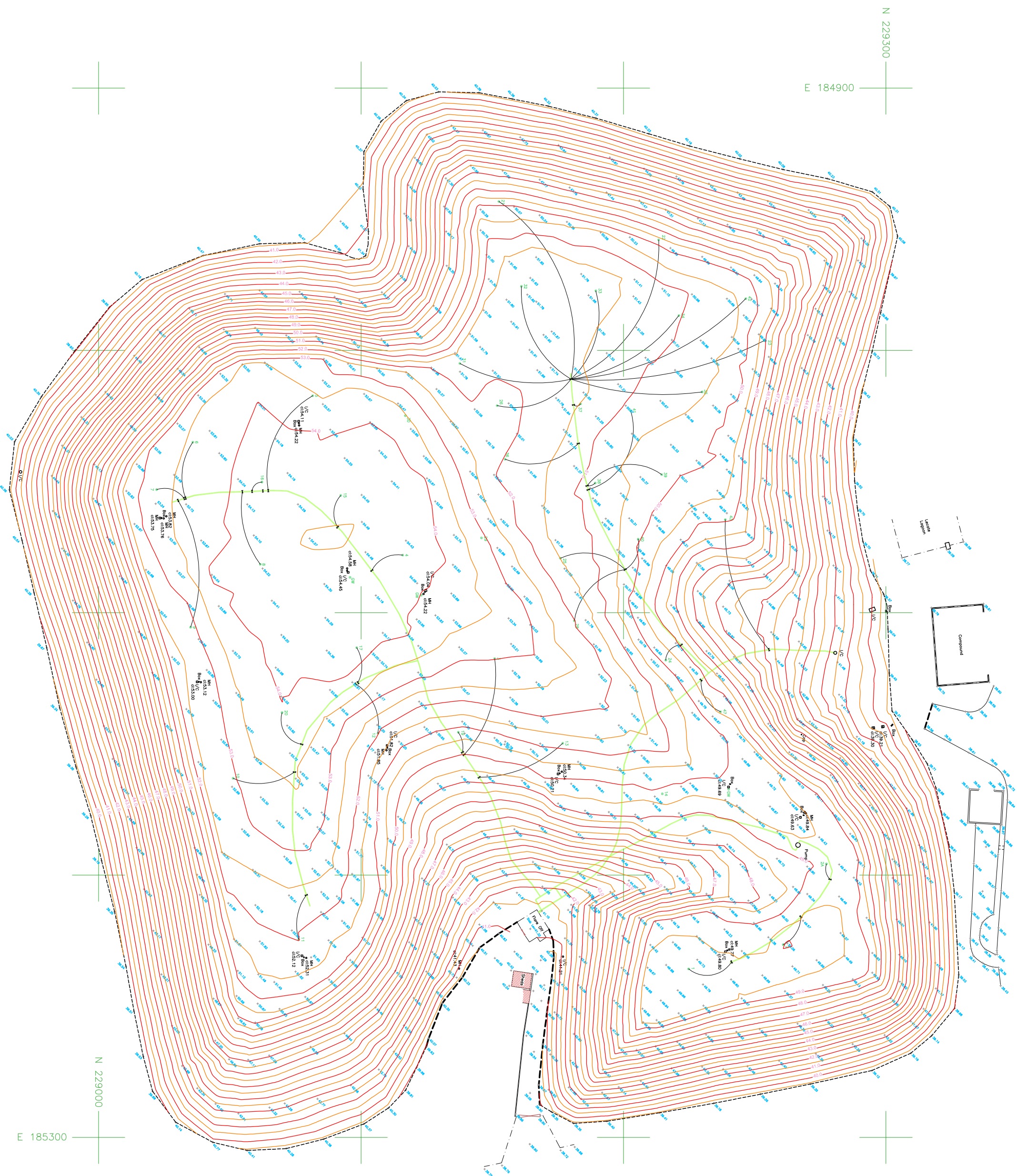
Kieran Garvey BE CEng MIEI PMP PMI
Senior Design Engineer
For RPS Consulting Engineers

dc/kg

cc: Mr. Kevin Mulrennan, Environment Section, Galway County Council

Appendix I

Topographical Survey



P.K. SURVEYS Ltd.
 Tooreen West
 Killeolgan
 Co. Galway
 Tel: 091 637904



Location: **Pollboy Landfill**
 Ballinasloe, Co. Galway

Client: **Galway County Council**

Date: **12-09-2011**

Ref No: **1264-2D.DWG**

Scale: **(A0) 1:500**

Datum: **O.S. Mean**

Appendix J

Water Balance Calculation

Year	Year	Active Cell	Active area	Annual Rainfall	PE	A.E.	Effective Rainfall	Active area Infiltration	Restored Phase No.	Liquid Waste	Restored Area	Infiltration to restored area	Restored area infiltration (m3)	Annual Leachate
			m2	mm	mm	mm	mm	m3		m3	m2	(%)	m3	m3
2003	1	OL+1	86400	928	563	450.4	478	41265	OL	0	0	20	0	41265
2004	2	1	36000	928	563	450.4	478	17194	OL	0	61400	20	5,865	23059
2005	3	1	36000	928	563	450.4	478	17194	OL	0	61400	20	5865	23059
2006	4	none		928	563	450.4	478	0	OL & 1	0	61400	20	8635	8635
2007	5	none		928	563	450.4	478	0	OL & 1	0	90400	20	8635	8635
2008	6	none		928	563	450.4	478	0	OL & 1	0	90400	20	8635	8635
2009	7	none		928	563	450.4	478	0	OL & 1	0	90400	20	8635	8635
2010	8	none		928	563	450.4	478	0	OL & 1	0	125400	20	8635	8635
2011	9	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2012	10	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2013	11	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2014	12	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2015	13	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2016	14	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2017	15	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2018	16	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2019	17	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2020	18	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2021	19	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2022	20	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2023	21	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2024	22	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2025	23	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2026	24	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2027	25	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2028	26	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2029	27	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2030	28	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2031	29	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2032	30	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635
2033	31	none		928	563	450.4	478	0	OL & 1	0	150400	20	8635	8635

Annual Rainfall (mm)	923
Potential Evapotranspiration (mm)	563
Actual Evapotranspiration (mm) (assumed to be 80% PE)	454
Effective Rainfall (mm)	469
Waste Density (tonne/m3)	0.8
Landfill Cell areas: [61,400 (old cell) + 36,000 (Cell 1)]m ² = 97,400m²	

Appendix K

Reported Incidents, Complaints and Non-Compliances

FILE

Ms. Helen Boyce,
Office of Environmental Enforcement,
E.P.A.,
John Moore Rd.,
Castlebar,
Co. Mayo

7th April 2011

Re: W0027-02/Gen28HB.docx

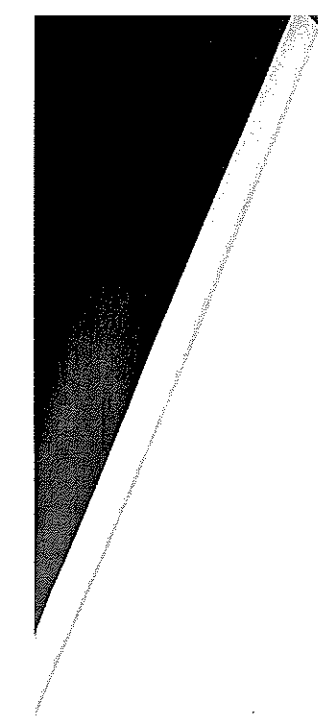
A Chara,

I refer to your letter of the 28th March, 2011 in relation to a complaint received from WEEE Ireland regarding scavenging of WEEE at Pollboy Civic Amenity Site, Ballinasloe, Co. Galway.

A meeting was held on the 9th February, 2011 between WEEE Ireland and Mr. Tony McInerney, Senior Executive Engineer, Galway County Council. The following were present at this meeting:

- | | |
|---------------------------|----------------------------|
| • Mr. Tony McInerney, SEE | Galway County Council |
| • Mr. Michael Joyce | Connaught Waste Management |
| • Mr. Kai Mayer | KMK Metals |
| • Mr. Conor Leonard | WEEE Ireland |
| • Mr. Laurence Kieran | WEEE Ireland |

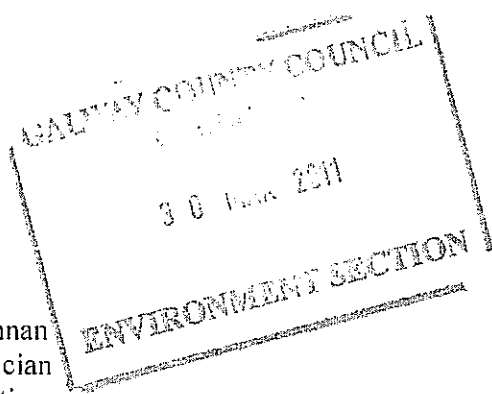
At this meeting it was agreed between Galway County Council and WEEE Ireland that WEEE Ireland will provide containers for the collection of WEEE items at the Civic Amenity Site. This item was included in the minutes of the meeting and these minutes were sent to Mr. Conor Leonard of WEEE Ireland following this meeting. Galway County Council intends to further secure these containers by placing concrete barriers in front of these containers at the end of each working day. These measures will prevent any future scavenging.



No prosecutions are pending by An Garda Siochana in relation to any previous scavenging and it is expected that the measures outlined above will prevent any future scavenging.

Mise le meas,

Kevin Mulrennan,
Executive Technician Pollboy Landfill,
Environment Section,
Galway County Council,
Aras an Chontae,
Prospect Hill,
Galway.
087-6851937



Mr Kevin Mulrennan
Executive Technician
Environment Section
Galway County Council
Aras an Chontae
Prospect Hill
Galway
Co. Galway

Environmental Protection Agency
Regional Inspectorate, John Moore Road
Castlebar, County Mayo, Ireland
Cigireacht Réigiúnach, Bóthar Sheán de Mórdha
Caisleán an Bharraigh, Contae Mhaigh Eo, Éire
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W: www.epa.ie
LoCall: 1890 33 55 99

28th March 2011

Our Ref: W0027-02/Gen28HB.docx

Dear Mr Mulrennan

Please find enclosed details of a complaint received from WEEE Ireland in relation scavenging of Waste Electrical and Electronic Equipment at your facility at Pollboy, Ballinasloe, Co. Galway; W0027-02. The contents of the enclosed have been noted and may be subject to further action by the Agency.


You should provide a response to the complainant and the Agency **by Friday 15th April 2011**. The following points should be addressed in your response:

- Security measures on site to prevent scavenging
- Any evidence from on-site CCTV footage of scavenging of WEEE
- Details of any referrals of such scavenging to An Garda Síochana
- Measures currently being taken and future proposed measures to be taken to prevent scavenging.

You should be aware that failure to comply with the conditions of a Waste licence may lead to further enforcement action by the Agency.

Please quote the above reference in future correspondence in relation to this matter.

Yours sincerely


Helen Boyce, Inspector
Office of Environmental Enforcement



RECORD OF COMPLAINT

Reg. No: W0027-02 *Date:* 20/01/2011

Facility Name: Ballinasloe Town Council

Complainant: Ms Elizabeth O'Reilly

Address: WEEE Ireland, Suite 18,
The Mall, Beacon Court,
Sandyford, Dublin 18
Dublin

Complaint:

Ms O'Reilly complained to the EPA regarding ongoing scavenging of WEEE at Ballinasloe civic amenity site. Photographs taken on 16/11/2010 are attached. WEEE Ireland notified the Local Authority however did not receive a response.

Comment: Scavenging at the facility is prohibited by Condition 5.7.4 of Waste Licence W0021-02

Complaint taken by: Helen Boyce

ENFORCEMENT DATABASE HAS BEEN UPDATED.

HB

Dr. Michael Henry,
Office of Environmental Enforcement,
E.P.A.,
John Moore Rd.,
Castlebar,
Co. Mayo

8th March 2011

Re: Test Report – Pollboy Landfill

Michael,

For your information, I attach copies of first quarter sampling which was carried out at Pollboy Landfill on the 20/1/2011.

Sample Location SW1: On the 11th January, 2011 I informed the EPA that sampling carried out by the E.P.A. at sample location SW1 throughout 2010 gave elevated ammonia readings in each of the four periods sampled. I also informed the EPA that sampling carried out by Galway County Council staff on the 14/12/2010 also gave elevated ammonia results. **However, I wish to report that the ammonia result at SW1 taken on the 20/1/2011 by the EPA shows a slightly improved ammonia reading of 11mg/l compared to the samples taken in 2010.**

Sample Location SW6: On the 11th January, 2011 I informed the EPA that sampling carried out by the E.P.A. at SW6 throughout 2010 gave elevated ammonia readings in two of the three periods sampled. I also informed the EPA that sampling carried out by Galway County Council staff at SW6 on the 14/12/2010 also gave elevated ammonia results. **However, I wish to report that the ammonia result at SW6 taken on the 20/1/2011 by the EPA shows a slightly improved ammonia reading of 10mg/l compared to the samples taken in 2010.**

Suspended Solids: The last quarter results at SW1 in 2010 had shown an elevated suspended solids figure of 268mg/l. It was my opinion that this elevated figure for suspended solids was due to run-off from a field which was

been filled approx. 150 metres upstream from SW1 as part of the N6 roadworks. **However, I now wish to report that the suspended solids result at SW1 taken on the 20/1/2011 by the EPA shows a vastly improved suspended solids reading of <8mg/l which is within the value set out in the license for the landfill.**

B2AP & B8AP: The groundwater samples at B2AP & B8AP have elevated ammonia results of 18mg/l & 14mg/l respectively. **However, these results are traditionally high due to these sample points close proximity to the landfill.**

Mise le meas,

Kevin Mulrennan,
Executive Technician,
Environment Section,
Galway County Council,
Aras an Chontae,
Prospect Hill,
Galway.
087-6851937

Ms. Annette Jordan,
Office of Environmental Enforcement,
E.P.A.,
John Moore Rd.,
Castlebar,
Co. Mayo

13th April 2011

Re: W0027-02/(11)Gen37AJ.docx

Annette,

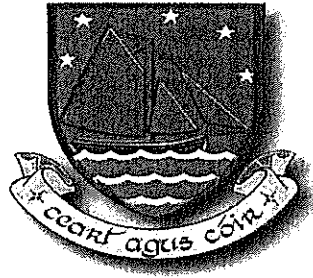
Having reviewed the analysis of sampling carried out at Pollboy Landfill I wish to make the following comments.

The surface water ammonia result of 8.3mg/l at SW1 for this quarter is slightly elevated, However, this result is an improvement from the 11mg/l reading for the first quarter of 2011.

The groundwater ammonia result for this quarter at B2AP had a slightly elevated result of 13mg/l. However, this result is an improvement from the 18mg/l reading for the first quarter of 2011. However, the result at this point is traditionally high due to this sample points close proximity to the landfill.

Mise le meas,

Kevin Mulrennan,
Executive Technician,
Environment Section,
Galway County Council,
Aras an Chontae,
Prospect Hill,
Galway.
087-6851937



THE ENVIRONMENT SECTION
GALWAY COUNTY COUNCIL
COUNTY HALL
PROSPECT HILL
GALWAY

TEL: (091) 476402

FAX: (091) 769590

FAX

TO:	<u>MICK HENRY, EPA</u>
ADDRESS:	<u>CASTLEBAR</u>
DATE:	<u>6/12/2011</u>
FROM:	<u>KEVIN MURRENNAN, POLLBOY LANDFILL, GALWAY</u>

MESSAGE:

MICK,
The flare went off @ Pollboy landfill today. This was due to a fault in the air-line that keeps open the slam-shut valve. This has been repaired. Flare was down for approx. $\frac{1}{2}$ hour due to this fault.

NOTE: AFS are on site tomorrow (Wed, 7th Dec) to fit well-heads on 4 newly drilled wells and also to weld saddles back on 2 existing wells connected to the main trunk main which has become loose this week.

Regards

Kevin Murren, Pollboy landfill.

NO. OF PAGES INCLUDING THIS ONE: 1

GALWAY COUNTY COUNCIL
RF:

22 DEC 2011

ENVIRONMENT SECTION



West/North West Region
Environmental Protection Agency
Regional Inspectorate, John Moore Road
Castlebar, County Mayo, Ireland

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Mr. Kevin Mulrennan
Environment Section
Ballinasloe Town Council
Galway County Council
County Buildings
Prospect Hill
Galway

21/12/11

Our Ref: W0027-02/ANC

Notification of Non-compliance with Waste licence

Dear Mr. Mulrennan

The non-compliances with Waste Licence Register No. W0027-02 as detailed in the attached audit report have been noted by the Agency.

ACTION REQUIRED

- Submit a report to the Agency by 13/01/12 that details how and when the corrective actions specified will be completed and the non-compliances specified within the audit report will be rectified.

Failure to comply with the requirements specified in this notification of non-compliance will lead to further enforcement action by the Agency. Please quote the above reference in future correspondence in relation to this matter. If you have any queries please contact the Lead Auditor specified in the report.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Dr. Michael Henry', is written over a horizontal line.

Dr. Michael Henry
Office of Environmental Enforcement

Encls.



Office of
Environmental
Enforcement

West/North West Region
Environmental Protection Agency
Regional Inspectorate, John Moore Road
Castlebar, County Mayo, Ireland

Cigireacht Réigiúnach, Bóthar Sheán de Mórdha
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Licence Audit Report

Mr. Kevin Mulrennan
Environment Section
Ballinasloe Town Council
Galway County Council
County Buildings
Prospect Hill
Galway

Date of Issue of
Audit Report: 21/12/11

Lead Auditor:	Michael Henry	Licence Register No:	W0027-02
		Audit Reference No:	(W0027-02)11AR04MH
Audit Criteria:	Licence Reg. No. W0027-02	Scheduled:	Unannounced
Audit No:	3	Date of Audit:	10/11/2011

This Licence Audit Report details the Agency's findings following an audit at Ballinasloe Town Council on 10/11/2011.

NOTIFICATION OF NON-COMPLIANCE

Ballinasloe Town Council have been found to be in non-compliance with the conditions of the Waste Licence as set out in this Audit Report.

The Agency is extremely concerned at the level of non compliance at this facility. Failure to comply with the requirements specified in this notification of non-compliance will leave the Agency no option but to consider legal action in regard to this matter.

In view of the above you are required to submit a schedule to the Agency by 13/01/12 detailing how the non-compliances and observations specified therein are to be rectified. Please quote the above Audit Reference Number in any future correspondence in relation to this Report. If you have any further queries please contact Dr. Michael Henry at 094-9048400.

1. OPENING MEETING

This was an unannounced audit and on arrival at the facility at 14.00, Michael Henry met with Kevin Mulrennan (Facility Manager). Michael Henry gave a brief introduction to the objectives and scope of the audit and the procedure to be followed for the remainder of the audit.



2. ON-SITE ASSESMENT

2.1 Site Inspection and Assessment

An inspection of the site was conducted, special attention was paid to leachate and landfill gas management, civic waste facility, SCADA system, surface water monitoring locations.

2.2 Interview

The following representatives were interviewed during the audit:

Name	Position	Issue
Kevin Mulrennan	Facility Manager	Various
Tom Fleming	Civic Waste Facility Operative	Civic Waste Facility

2.3 Documentation

The following documentation was requested for review:

Record	Condition No.	Comment
Waste records	10.6	See Audit Findings

3. GENERAL COMMENT

The issues highlighted in this report should be addressed by the licensee without delay and adequate and appropriate corrective actions taken to address the issues. In particular, it is essential that the licensee puts in place measures in relation to the management of landfill gas and leachate at the facility.

4. CLOSING MEETING

Michael Henry gave a brief summary of main issues noted as they arose during the audit. The licensee was found to be in non-compliance with the Licence in the area listed below. Non compliances and observations made during the audit (listed below), were discussed.

The licensee was briefed on the Agency's reporting procedures and was advised that an audit report would be issued.

Finally, the licensee was thanked for the courteous and co-operative manner of the staff, and the assistance and co-operation extended during the audit.

5. AUDIT FINDINGS

5.1 Audit Non-Compliances

The audit process is a random sample on a particular day of a facility's compliance with some of its licence conditions. Where a non-compliance against a particular condition has not been reported, this should not be construed to mean that there is full compliance with that condition of the licence.

The licensee was found to be in non-compliance with the requirements of the licence in respect of the following on the day of the audit (Schedule and Condition numbers refer to the Licence):

1. **Leachate Management:** The following issues were noted in relation to leachate management:
 - It was noted that not all leachate pumps are capable of being automatically activated and that some pumps are manually switched on/off in order to facilitate the transfer of leachate. For example, pumps 1, 2, 3 and 6 are reliant on manually switching on/off.
 - The leachate pumping chamber which was installed in 2008 was not linked up to the SCADA system.

-
- There was no high level alarm present on the leachate lagoon or on the leachate pumping chambers.
 - The leachate lagoon hadn't been inspected and certified fit for purpose as required by Condition 5.13.2.

This is in non-compliance with **CONDITION's 5.11.2 and 5.13.2.**

Condition 5.11.2 states:

The level of leachate in the pumping chambers, lined cells and leachate lagoon shall be monitored continuously by a system that shall automatically activate leachate pumps to maintain leachate at the required level. A high level alarm shall also be installed in the punping chambers and the leachate lagoon.

Condition 5.13.2 states:

All lagoon structures on the facility shall be inspected and certified fit for purpose every three years by an independent chartered engineer or equivalent.

Corrective Action Required

Comply with Conditions 5.11.2 and 5.13.2 in relation to leachate management. This should include the provision of remote access to the SCADA/telemetry system at the facility/

2. Civic Waste Facility

A large number of waste paint cans were stored at the Civic Waste facility in a manner which wasn't considered satisfactory (Appendix 1).

Also, housekeeping at the Civic Waste facility was not considered satisfactory and spillages of oil were noted adjacent to the waste oil tanks.

This is in non-compliance with **CONDITION's 5.10.2 and 9.4.1.**

Condition 5.10.2 states:

All waste deposited in the Civic Waste Facility shall be either:-

- a) *Into a skip;*
- b) *Into the hopper of the compactor for disposal;*
- c) *Into a receptacle for recovery; and*
- d) *In the case where inspection is required, into a designated inspection area.*

Condition 9.4.1 states:

All significant spillages occurring at the facility shall be treated as an emergency and immediately cleaned up and dealt with so as to alleviate their effects.

Corrective Action Required

The licensee should ensure that housekeeping is improved at the civic waste facility to ensure that waste is removed on a regular basis and also that, where spillages occur, these are cleaned up immediately.

3. Waste Records

A written record which contains the information required by Condition 10.6 for wastes departing from the Civic Waste facility was not being maintained by the licensee on-site.

This is in non-compliance with **CONDITION 10.6.**

Condition 10.6 states:

A written record shall be kept for each load of waste departing from the Civic Waste Facility. The

following shall be recorded:-

- a) The name of the carrier;*
- b) The vehicle registration number;*
- c) The destination of the waste (facility name and waste licence/permit number as appropriate);*
- d) A description of the waste (if recovered or rejected waste, the specific nature of the waste);*
- e) The quantity of waste, recorded in tonnes;*
- f) The name of the person checking the load; and*
- g) The time and date of departure.*

Corrective Action Required

Comply with Condition 10.6 in relation to waste records for waste departing the Civic Waste facility.

5.2 Audit Observations

While these observations do not constitute non-compliances with any condition of the licence. They should be addressed or where relevant noted by the licensee in order to ensure compliance, improve environmental performance of the facility and provide clarification on certain issues. Where requested the actions taken and clarifications requested should be reported back to the Agency.

1. Landfill gas management

The following issues should be noted by the licensee and corrective action measures put in place in relation to landfill gas:

- The frequency of balancing of the gas field should be reviewed to establish whether it should be carried out more frequently than the current monthly balancing
- Balancing of gas field should include pressure monitoring at wells
- Sampling ports should be replaced on gas wells where required
- The 4 new wells which were installed 3-4 weeks prior to the visit should be fitted with well heads and sampling ports and connected to the gas flare.
- Condensate was noted in some of the gas lines and measures should be put in place to minimise condensate build up.

2. Leachate management

The following issues should be noted by the licensee and corrective action measures put in place in relation to leachate:

- The licensee should investigate the elevated leachate levels noted in some pump sumps/chambers (e.g. Pump 3 and Pump 6) as recorded on the SCADA system
- The licensee should also investigate the accuracy of the levels recorded in the pump sumps, chambers etc. as is shown on the SCADA system. e.g. no leachate was recorded in pump sump 1 (lined cell).

3. Surface Water Management

The licensee should investigate the following in relation to surface water management and put in place appropriate corrective action measures:

- Presence of litter in the stream running alongside the civic waste facility and the water in this

stream was noted to be discoloured.

6. FOLLOW-UP ACTIONS

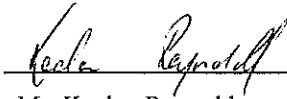
The licensee shall take the actions required to close out the non-compliances and observations raised in this Licence Audit Report. These actions will be verified during subsequent site inspections/audits.

Please quote the Audit Reference Number in any future correspondence in relation to this Report.

Report prepared by:

Dr. Michael Henry

Reviewed by:



Mr. Kealan Reynolds

Date:

Date:

cc. Mr. Mark O'Donnell, Town Clerk, Ballinasloe Town Council.

Appendix 1



Photo 1: Evidence of litter and also discoloration of water in drain running alongside the civic waste facility.



Photo 2: Spillages of oil noted at the waste oil storage area of the civic waste facility.



Photo 3: Significant number of paint cans stored at the civic waste facility.

Appendix L

Environmental Management Plan



Ballinasloe Town Council
Comhairle Bhaile Béal Atha na Slua

POLLBOY LANDFILL FACILITY

Environmental Management Plan 2011

March 2012

RPS

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1 INTRODUCTION

This Environmental Management Plan (EMP) refers to Pollboy Landfill located in the townland of Pollboy, 2km south of Ballinasloe, Co. Galway and is prepared to comply with Condition 2.3 of Waste Licence W0027-02 granted to Ballinasloe Town Council for the operation of the landfill by the Environmental Protection Agency on 6th October 2003. The reporting period is from the 1st January 2011 to the 31st December 2011.

This landfill facility closed for acceptance of waste on 31st December 2005.

2 OPERATOR DETAILS

Site Operator: Ballinasloe Town Council,
Civic Offices,
Ballinasloe,
Co. Galway
Tel: 090-9642274

Site Supervisor: Mr. Kevin Mulrennan,
Environment Department,
Galway County Council,
County Buildings,
Prospect Hill,
Galway.
Tel: 091-476467
Mob: 087-6851937

3 TYPES OF WASTE ACCEPTED

Tables 3.1 below outlines the categories and quantities which may be accepted for disposal and for recovery under Third and Fourth Schedules of the Waste Management Act 1996 as per Part 1 Licensed Activities of Waste Licence W0027-02.

Table 3.1: Waste Categories and Quantities to be accepted for recovery

Waste Type	Maximum Quantity
Waste to be accepted for composting	Maximum Quantity of biodegradable waste which can be processed = 1,000m ³
Waste to be accepted at Civic Waste Facility (Metal, electrical and electronic waste, glass, aluminium and tin cans, waste oils, fabrics, batteries, household hazardous, fluorescent tubes can all be accepted)	Tonnage to be agreed with the Agency.

Table 3.2 provides details on the quantity and composition of waste that was accepted for recovery in 2011. The facility accepts waste on Tuesdays, Thursdays and Saturdays between 8.30am and 4.30pm.

Table 3.2: Waste Accepted at Civic Waste Facility in 2011

EWC Code	Quantity (tonnes)	Description of waste	Hazardous waste. (Yes/No)	Waste Treatment Operation
20 03 07	1.52	bulky waste	N	D1
15 01 02	0.05	plastic packaging	N	R3
13 02 08	2.2	other engine, gear and lubricating oils	Y	R6
16 01 07	0.09	oil filters	Y	R12
20 01 10	0.44	clothes	N	R13
20 01 40	27.0	metals	N	R13
20 01 99	30.65	other fractions not otherwise specified	N	R4
20 01 23	11.162	discarded equipment containing chlorofluorocarbons	Y	R4
20 01 36	27.853	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	N	R4
20 01 36	12.956	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	N	R4

EWC Code	Quantity (tonnes)	Description of waste	Hazardous waste. (Yes/No)	Waste Treatment Operation
20 01 21	0.232	fluorescent tubes and other mercury-containing waste	Y	R4
16 05 04	0.219	gases in pressure containers (including halons) containing dangerous substances	Y	R13
20 01 19	0.091	pesticides	Y	R13
20 01 27	22.446	paint, inks, adhesives and resins containing dangerous substances	Y	R10
15 01 04	0.793	metallic packaging	N	R13
15 01 04	0.298	metallic packaging	N	R13
15 01 07	3.651	glass packaging	N	R13
16 06 01	1.61	lead batteries	Y	R6
16 06 04	0.858	alkaline batteries (except 16 06 03)	N	R6
16 06 02	0.084	Ni-Cd batteries	Y	R6
19 07 03	19.825	landfill leachate other than those mentioned in 19 07 02	N	D8

4 ENGINEERING DETAILS

4.1 DEVELOPMENT WORKS DURING THE REPORTING PERIOD

There were no significant development works completed at the facility during the reporting period.

4.2 CONTAINMENT DETAILS AND LEACHATE COLLECTION AND TREATMENT

Pollboy Landfill comprises of an old unlined cell and a lined cell (Cell 1) with associated leachate collection facilities.

The old landfill was designed and operated on a dilute and disperse basis and hence there is no basal containment of leachate generated. Cell 1 was constructed using a composite liner system for the base and the sides of the cell which is comprised of the following elements:

- 0.5m leachate collection layer of non calcareous drainage stone with 200mm diameter slotted HDPE leachate collection pipes;
- Geotextile protection layer;

- 2mm HDPE liner;
- 1m thick compacted clay liner with a permeability of less than $1 \times 10^{-9} \text{m/s}$.

The landfill ceased accepting waste in December 2005. The original unlined landfill area was capped in March 2006 while the lined cell (known as Cell 1) was capped in October 2006.

Leachate from the original unlined landfill cell is currently being pumped on a continuous basis by means of 8 no. submersible borehole type pumps installed in the leachate extraction wells. Leachate is pumped into the leachate storage lagoon via a ring main. The cut-in and cut-out of these pumps are controlled by the level sensors installed in the boreholes. A leachate interceptor drain was also installed around the perimeter of the original unlined landfill to prevent leachate from escaping laterally from the waste. This leachate is pumped via three separate pumping chambers to the leachate lagoon.

Leachate from the lined cell (Cell 1) is pumped via a rising main and pump chamber to the leachate storage lagoon. 5 no. pneumatic pump wells which were installed in Cell 1 in 2008 also pump leachate to the lagoon. Leachate is then pumped to Ballinasloe WWTP through a 90mm diameter HDPE rising main over a distance of approximately 2 km.

4.3 ABATEMENT

An active gas extraction system consisting of 19 no. gas extraction wells and collector pipes collects gas from the old landfill. Gas collected by this system is flared by the $1250 \text{m}^3/\text{hr}$ AFS flare unit located in the flare compound close to the former composting facility. The gas main header pipe for this system which was installed in 2004 was replaced in 2008.

An active gas extraction system consisting of 23 no. gas extraction wells and collector pipes collects gas from Cell 1. Gas collected by this system is flared by the $1,250 \text{m}^3/\text{hr}$ AFS flare unit also which is also located in the flare compound. The $850 \text{m}^3/\text{hr}$ Hasse flare is retained as a back-up flare.

4.4 MONITORING POINTS

The location of monitoring points for surface water, groundwater, leachate and landfill gas have been shown in **Appendices 1-4** of the *Annual Environmental Report for 2011*.

4.5 SITE SECURITY

The front boundary of the site, which runs alongside the main access road, is formed by steel palisade security fencing. The entrance gates of the site are only accessible during the opening hours. A private security contractor is engaged outside normal working hours. All out of hours visits to the site are recorded and logged. Palisade security fencing was erected on the bog road along the east side of the landfill in 2004.

4.6 SITE ROADS

The service roads from the site entrance to the reception area and surrounds are compacted hardcore overlain with tarmacadam. The internal haul roads are compacted hardcore including the road and turnabout to the working face.

4.7 OFFICES, FUEL STORES ETC.

There is an administration/reception building on site which consists of a toilet block, canteen, offices and a control room. There is no fuel stored on site.

4.8 WHEELWASH, WEIGHBRIDGE

A wheelwash and a weighbridge are located at the landfill.

4.9 SURFACE WATER CONTROL MEASURES

A surface water drain around the old landfill collects surface water draining from the remediated surface and directs it to the surrounding watercourses. All sealed roads and concrete surfaces within the landfill are drained via a combined kerb and drainage system (beany block) to an oil/petrol interceptor, prior to discharge to an adjacent stream. Water in the wheelwash is recirculated and reused within the wheelwash.

5 OPERATIONAL MATTERS

5.1 CURRENT OPERATIONS

The landfill facility closed on 31st December 2005. A Civic Waste Facility is still in operation at the site where members of the public can deposit recyclable materials which are removed on a regular basis to licensed recovery facilities.

5.2 SITE OPENING TIMES

The landfill is now closed and the Civic Waste Facility under the control of Galway County Council is opened to the public on Tuesdays, Thursdays and Saturdays between 8.30am and 4.30pm.

5.3 ACCESS CONTROL AND WASTE ACCEPTANCE PROCEDURES

The site is secure and the entrance gates of the site are only accessible during the opening hours. There is also a procedure for visitors to the landfill.

5.4 MONITORING AND MAINTENANCE REQUIREMENTS

Monitoring of the site is carried out by the Licensee under the requirements of the Waste Licence. This requires the issuing of a quarterly report on the results of gas, surface water, leachate and groundwater monitoring.

5.5 MANAGEMENT STRUCTURE

The management structure at Pollboy Landfill for 2009 is as follows:

- **Mr. Tony McInerney**, Senior Executive Engineer, Environment Section, Galway County Council, has overall responsibility for management of the Pollboy Landfill Facility.
- **Mr. Kevin Mulrennan**, Site Supervisor, supervises operations on the landfill.

5.6 OPERATIONAL AND SAFETY RULES

Table 5.1 outlines the current list of procedures in operation at Pollboy Landfill. These procedures are contained in Appendix 1. Following closure of the landfill on 31st December 2005 the list of procedures has been updated and some which related to the operation of the landfill are now not applicable and have been deleted from the list, as follows:

- Procedure for Recording Incoming Waste,
- Procedure for Waste Inspections & Non-Conforming Material,
- Procedure for Waste Acceptance & Characterisation Procedures,
- Procedure for Waste Placement.

Table 5.1: Register of Procedures at Pollboy Landfill

NAME OF PROCEDURES	No.	Rev. No.	Date of Revision
Emergency Response Procedure (ERP)	01	003	26/11/04
Operational Procedures			
Training and Awareness Procedure	02	004	18/05/04
Corrective Action Procedure	03	004	18/05/04
Communication Programme	04	004	20/01/04
Procedure for Dealing with Incidents	05	005	25/04/05
Procedure for Submission of Documentation to the EPA.	06	004	18/05/04
Procedure for Recording all Complaints	09	004	18/05/04
Procedure for Recording each Load of Waste Departing from Civic Waste Facility.	010	004	18/05/04
Procedure for the Operation of the Civic Waste Facility.	013	004	19/05/04
Procedure for the Control of Environmental Nuisances.	014	005	13/02/06

NAME OF PROCEDURES	No.	Rev. No.	Date of Revision
Procedure for Environmental Monitoring.	015	004	19/05/04
Procedure for Visitors at Pollboy Landfill.	016	004	19/05/04
Procedure for Composting Organic Material on Site	017	004	19/05/04
Procedure for Recording Leachate Removed	018	001	20/05/04
Procedure for Maintenance Records	019	001	20/05/04

5.7 VERMIN AND PEST CONTROL

Currently there is no evidence of vermin present on the site. Pestguard Environmental Services, Rathcoole, Co. Dublin are contracted to control the vermin on the site. External bait boxes are located around the facility and internal bait boxes are located in the office buildings. The bait boxes are checked on a six weekly basis and more frequently when required.

Insect and pests nuisance is not an issue at the landfill since it has been full capped.

5.8 ODOUR

Odour management at the facility has significantly improved since 2005, as a result of the following works being carried out:

- Installation of temporary clay capping immediately following cessation of filling.
- Installation of permanent capping system incorporating, inter alia, an LLDPE membrane and landfill gas drainage geocomposite layer.
- Installation of additional landfill gas collection wells in Cell 1.
- Use of two flares for gas management and control.
- Reinstatement of the gas management system on the old landfill

6 CLOSURE AND AFTERCARE

The Restoration and Aftercare Plan for Pollboy Landfill was submitted to the EPA in February 2003.

7 SCHEDULE OF OBJECTIVES AND TARGETS FOR 2012

Objective 1: Landfill Gas Management

Reason for undertaking project: To further improve landfill gas and odour control at the facility.

Targets:

- 1 Fusion welded caps will be provided to all wellheads which are currently capped using duct tape.
- 2 Where possible, level of landfill gas main to be regraded to encourage drainage of condensate towards the existing knockout pots.
- 3 Reduce the level of a number of wellheads in Cell 1 so that the gas carrier pipes can be laid either at a gradient towards the gas main or towards the gas well, thereby removing sags in the pipework and preventing the build up of condensate
- 4 Install a new section of gas main close to Gas Well No. 2A to bypass the old defunct knockout pot which appears to be a source of positive pressure.
- 5 Regrade the gas main between Gas Wells No. 37 and No. 24 on Cell 1 allowing condensation to flow to pump sump 1 at the bottom of the hill which will then be pumped into the lagoon. Should additional knockout pots be deemed necessary, their location and arrangement will be notified to the Agency prior to installation.
- 6 It is proposed that AFS Ltd. will carry out balancing of the gas field on a weekly basis. They will also be responsible for repairs to the system on an on-going basis

Summary: Wells providing low/no gas to the system will be disconnected and new wells will be installed. The north eastern area of the old landfill cell has been identified as one such location.

Responsibility: The Landfill Facility Manager is responsible for the implementation of this project.

Timescale: Works to be completed in the first quarter of 2012.

Objective 2: Leachate Management Upgrade

Reason for undertaking project: To improve the efficiency of leachate management

Summary: A Leachate Management System Review report is currently (end of March 2012) being prepared by RPS on behalf of Galway County Council and Ballinasloe Town Council which is scheduled to be forwarded to the Agency in April 2012. This report will provide recommendations for upgrading the existing leachate telemetry system, increased pumping of leachate and the provision of additional leachate storage.

Responsibility: Ballinasloe Town Council/Galway County Council will be responsible for the implementation of the recommendations of this project.

Timescale: A timescale for execution of any works will be agreed with the Agency following approval of the Leachate Management System Review report.

Appendix 1

Procedures

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Emergency Response Procedure (ERP) Procedure No: 01	
Version Number: 003	Date of Revision: 26/11/04
Authorised Signature:	
Date:	

This ERP will be linked to the Major Emergency Plan for Galway County Council.

In circumstances when Pollboy Landfill is unable to accept waste due to the following:

Power failure, mechanical breakdown, industrial dispute, adverse weather conditions or other unforeseen circumstances all waste contractors shall be notified.

Activation

The ERP shall be activated and controlled by the Landfill Manager/Assistant in the event of any of the following incidents occurring: -

1. Fire within cells or outside cells but within the facility area.
2. Exceedance of landfill gas emission limits at site offices or elsewhere within the facility.
3. Any spillage of dangerous or toxic materials (leachate or other) occurring at the facility.
4. When it is evident that the landfill is having a significant effect on the quantity and/or quality of water in local wells.
5. Side slope failure.
6. Personal accident on site.

Outside assistance will be sought if occurrence is beyond the capabilities of site staff.

Control of Operations

The Landfill Manager or his representatives shall have full control of operations under the ERP:

- ❖ To co-ordinate the activities of site personnel during any emergency.
- ❖ To request the assistance of Fire Services, Gardai, Ambulance or other service that may be requested.
- ❖ To requisition any equipment needed at short notice.
- ❖ To alert the Health and Safety Section of the Galway County Council and EPA and Fisheries of any environmental incidents.
- ❖ To keep a record of the incident.
- ❖ To prepare a written report to the Galway County Manager and the EPA.

Ending the ERP

The controller may demobilise the Emergency Response Procedure if:

- ❖ The emergency does not occur
- ❖ The emergency being dealt with has passed.

The controller shall notify all bodies and agencies of the change being put into effect when the ERP has been demobilised.

ERP: Fire

1. All site staff shall receive adequate training on fire safety and protocol. A trained person shall remain on site at all times during operating hours.
2. The office buildings have fire alarms installed and fire fighting equipment is located at the facility. A fire hydrant is located on site near the reception area. A fire safety drill shall be developed and all staff will be given instruction in its operation. Fire drills shall be carried out on a regular basis and the Fire Authority shall be consulted.
3. On discovery of a fire the fire drill shall be initiated and all persons will assemble at the fire assembly point. The landfill shall be immediately closed and all vehicles will be allowed to exit the site.
4. The senior staff member on site shall decide if the Fire Brigade should be called. If not, trained operatives on site will deal with the fire. If it is decided that the Fire Brigade are needed 999 or 112 is dialled and the location and the description of the fire should be given. It will take approximately 10 minutes for the Fire Brigade to arrive on site.
5. Additional water supplies can be pumped from nearby streams where a dam can be erected.
6. Site staff or fire brigade personnel shall decide as to whether a fire has been extinguished.
7. The EPA shall be notified immediately of all fire incidents on site; and the incident will be recorded.
8. If fire occurs after normal opening hours the local Fire Station shall have access to the site and all necessary contact telephone numbers.

Scenario 1 Incoming Vehicle's Waste Load on Fire

All vehicles entering the site are examined as part of the waste acceptance procedures for indications of fire (smoke or burning smells). Any suspicious vehicle shall be directed to the inspection area where the fire can be extinguished. If necessary the load shall be emptied onto the concreted area and the fire extinguished with water. The quarantine area is contained and any firewater runoff will drain to the leachate lagoon.

Scenario 2 Fire in Waste Body

If material deposited at the working face is seen to be on fire, it shall be removed by excavator to a selected area where it will be mixed with sub soil. If a deep seated fire is discovered or suspected, the extent of the fire can be verified by measuring temperatures in the area by means of a temperature probe inserted into pipes driven into the tipped material. Readings shall start in the unaffected areas and progressively move towards the area of the suspected fire. The affected area should be marked off by indicator boards. A trench shall be dug ahead of the fire and filled with sub soil.

Scenario 3 Fire in the Civic Amenity Facility

If a minor fire occurs in the civic amenity facility the fire shall be extinguished with fire extinguishers or using water from the fire hydrant located there. If water is being used in fire fighting the shut off valve in the petrol interceptor shall be closed to contain any firewater runoff. If in house fire fighting is not successful or household hazardous waste is involved the fire brigade shall be called.

Scenario 4 Fire at Composting Facility

If a fire occurs in the composting process area the fire shall be extinguished with sub soil.

Scenario 5 Administration Building on Fire

On discovery of a fire the fire drill will be initiated and all persons shall evacuate the building and assemble at the fire assembly point. The fire brigade shall be called. A roll call will be taken to ensure that everyone is accounted for. Trained in house fire fighters shall be employed to fight the fire until the fire brigade arrives on site.

Scenario 6 Vehicle/Machinery on Fire

Fire extinguishers shall be contained on all machinery in case of engine fires.

Scenario 7 Waste in Quarantine Area on Fire

The fire shall be extinguished with water. The quarantine area is contained and any firewater runoff will drain to the leachate lagoon.

ERP: Migration of Landfill Gas.

1. A gas monitor is located in the main control office of the administration building at the landfill. Sensors will detect danger levels of methane and carbon dioxide and also oxygen depletion within the building.
2. If the levels rise above 1% v/v for methane or 1.5v/v for carbon dioxide an alarm shall be raised to evacuate the building. If such a situation arises the EPA and the Environment Section of Galway County Council shall be notified immediately.
3. If the levels of methane and carbon dioxide in the perimeter gas wells rise above the emission limits the EPA shall be contacted.

ERP: Accidental Spillage of Leachate or other Potential Contaminating Substances

1. Every precaution shall be taken to prevent any spillage of leachate or any other potentially contaminating substance.
2. In the event of any spillage at the civic amenity site or at the landfill containment booms and/or absorbent material shall be used to contain and absorb the spillage. The used absorbent shall be sent for treatment/disposal to a licensed facility.
3. If a leachate spillage occurs a temporary bund shall be constructed to contain the spillage and the liquid shall be pumped to the nearest leachate chamber or the lagoon from which it will be pumped or tankered off site.
4. If necessary the discharge outlet from the oil interceptor shall be shut off to prevent any contamination of surface water. Firewater and the contaminated water will be pumped to the leachate lagoon.
5. Both EPA and Shannon Regional Fisheries Board shall be notified immediately of any incident causing contamination of surface waters.

ERP: Contamination of Local Wells

1. When it is evident that the landfill is having a significant effect on the quantity and/or quality of water in local wells action will be taken.
2. The affected residents shall be informed of the contamination and an alternative supply of water shall be provided.

ERP: Side Slope Failure

1. In the event that there is a risk of side slope failure immediate measures shall be put in place to eliminate the risk, temporary or otherwise.

ERP: Personal Accident on Site

1. Staff members will be trained in first aid and first aid kits are located on site. In the case of minor injuries a first aider on site shall treat the person. In the case of major injuries the ambulance services shall be employed. The fire brigade should also be called in situations where a person is trapped etc.

Contact Details:

EPA,
North West Regional Office of Environmental Enforcement,
John Moore Road,
Castlebar,
Co. Mayo.

Tel: 094 9021588
Fax: 094 9021934

Galway County Council,
County Hall,
Prospect Hill,
Galway

Tel: 091 509000
Fax: 091 509010

Shannon Regional Fisheries Board,
Ashbourne Business Park,
Dock Road,
Limerick
Tel: 061 300238
Fax: 061 300308

The Central Fisheries Board,
Unit 4,
Swords Business Campus
Balheary Road,
Swords
County Dublin

Tel: 01 8842 600
Fax: 01 8360 060

Risk Assessment of Environmental Pollution Associated with Contaminated Firewater at Pollboy Landfill.

Existing Control and Protection Measures

Fire fighting equipment is located at the facility. A fire hydrant connected to the mains supply and extension hoses are located on site near the reception area. Fire extinguishers are located throughout the site.

The office buildings have smoke/heat detectors and fire alarms installed. Emergency numbers are on a notice board located on storage sheds near the administration building. The local fire station has a list of contact mobile phone numbers for Pollboy Landfill in case of a fire outside working hours. It is not necessary for the local fire station to have keys as they will be able to cut the lock and gain access to the site.

An Emergency Response Procedure (ERP) has been formulated in consultation with the Fire Authority (Assistant Chief Fire Officer visited the site on 9th June 2004). Fire safety and awareness, fire fighting and first aid training are provided at the facility. The local fire brigade will practice fire drills with the members of staff.

The local fire fighting unit has the following equipment available:

- 2 no. Class B Tenders with hoses, each can hold a 400 gallon water tank.
- Breathing apparatus and coveralls for gas and splash suits.

The approximate response time is 10 minutes and there are good access roads around the site.

Risk Assessment

No fuel is stored on site. Fire extinguishers should be kept on all machinery in case of engine fires.

Fire in civic waste facility is not significant as the quantities of household hazardous waste are small and contained in leak-proof storage containers on a concreted area. In the event of any spillage containment booms and/or absorbent material will be used to contain and absorb the spillage. The used absorbent will be sent for treatment/disposal to a licensed facility. Some fire water retention capacity exists in civic amenity site if the discharge outlet from the oil interceptor is blocked and firewater can backup onto concreted kerbed area. Fire water retention capacity of the kerbed areas at the facility was calculated at 1,426m³. During cleanup firewater can then be pumped to the leachate lagoon.

For fighting fires at the working face, waste body and composting facility inert material i.e. sub-soil will be used and not water therefore there will be no risk of firewater contamination.

All vehicles entering the site are examined as part of the waste acceptance procedures for indications of fire (smoke or burning smells). Any suspicious vehicle will be directed to the quarantine/inspection area where the fire can be extinguished. If necessary the load can be emptied onto the bunded concreted area and the fire extinguished with water. The inspection/quarantine area is contained and any firewater runoff will drain to the leachate lagoon. The firewater retention capacity of the inspection/quarantine area was calculated at 224m³. If a waste materials stored in quarantine goes on fire the same procedure as above will apply.

If the storage sheds, administration building and the civic amenity site office go on fire there is no risk of firewater contamination.

To conclude the potential impact on environment and on residents in the area are minimal. It is determined from this risk assessment that a significant risk of contaminated firewater pollution does not exist at Pollboy Landfill.

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Training and Awareness Procedure	Procedure No.: 02
Version Number: 004	Date of Revision: 18/05/04
Authorised Signature:	
Date:	

Purpose: To ensure proper development and implementation of a training and awareness programme.

Person Responsible: Landfill Manager.

Procedure:

1. All members of the staff upon appointment to Pollboy Landfill Site will undergo a suitable induction programme.
2. All members of staff shall be given a copy of the Waste Licence 27-2.
3. All relevant aspects of the licence will be explained to the staff.
4. Importance of compliance with the conditions of the licence will be emphasised.
5. The role of each member of staff will be explained and the potential environmental effects of departure from their responsibility will be emphasised.
6. All staff will be made aware of the benefit of improved performance in a working environment.
7. At any time a staff member may make a request for environmental training. These requests will be reviewed by the Landfill Manager. It will be the responsibility of the Landfill Manager to decide if training will be given. A training schedule will be drafted to incorporate services offered by external bodies, relevant legislation and other guidelines received from the regulatory authorities.
8. A training record will be set up for each member of staff and all details of training will be filed. A record template sheet for training and awareness is attached.
9. The following is a list of training courses which will be implemented on site as soon as it is practicable:
 - Familiarisation with licence conditions and corrective action procedure,
 - Waste acceptance procedure and waste inspection procedure,
 - Emergency response procedure,
 - Familiarisation with all other relevant procedures,
 - FAS waste management course,

- First Aid course,
- Manual Handling course,
- Safe Pass course.

TRAINING AND AWARENESS RECORD

Date:

Name of employee:

Position:

Course attended:

Date of course:

Duration of course:

Record of attendance enclosed:

Course feedback:

Certificate obtained:

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Corrective Action	Procedure No: 03
Version Number: 004	Date of Revision: 18/05/04
Authorised Signature:	
Date:	

Purpose: To ensure corrective action following an occurrence of non-compliances.

Person responsible: Landfill Manager.

Procedure:

Should any of the procedures fail as detailed in the EMS or non-compliances from the Agency occur regarding the waste licence the following procedure shall be applied:

1. When a non-compliance occurs it is given a CAR (Corrective Action Request) number and registered on the CAR register and the CAR sheet is filled out. (CAR register and CAR sheet templates attached).
2. The person who the CAR is directed to is noted, the person raising the CAR is noted, the date of issue is noted, the description of the non-compliance is given, the reason for occurrence is recorded, the action to corrective with effective date, the action to prevent recurrence with effective date is also described.
3. When the corrective action has been effective the person raising the CAR signs and dates the CAR Sheet closing the process. The date of closure is recorded on the register also for tracking purposes.

CORRECTIVE ACTION REQUEST (CAR) SHEET

CAR N0. 01 etc

To:

From:

Date:

Description of Non-Compliance

Reason for Non-Compliance

Action to Correct

Effective Date

Action to prevent recurrence

Effective Date

Signatures

Date closed off

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Communications Programme	Procedure No.: 04
Version Number: 004	Date of Revision: 20/01/04
Authorised Signature:	
Date:	

2.4 Communications Programme

2.4.1 Within three months of the date of grant of this licence, the licensee shall submit to the Agency for agreement a revised Communications Programme to inform and involve the local community and ensure that members of the public can obtain information at the facility, at all reasonable times, concerning the environmental performance of the facility.

- **Legislative Requirements & Access to Information.**

In formulating a revised Communications Programme for the Pollboy Landfill facility, Ballinasloe Town Council are fully aware of its statutory requirements under the following Acts:

- **EPA Act, 1992**
- **Waste Management Act 1996.**
- **Litter Pollution Act 1997.**

The Council will also ensure that greater access to environmental information on the landfill facility will be readily available in accordance with Council Directive 90/313/EEC on Freedom of Access to Information on the Environment, which came into effect in Ireland in May 1993.

- **Communications Programme.**

In the formulation and implementation of an effective Communications Programme it is important to note that a wide variety of communication and education tools are available. The tools chosen for effective communication should ensure that all publicity material is consistent, have maximum impact and forms a part of building public understanding and trust.

There are many tools available for effective communication and the main ones that will be used in the revised communications programme and implemented at the landfill are :

- **Electronic Mail/Internet.**

A link has now been set up between the landfill site and Ballinasloe Town Council where all staff have e-mail and access to all information concerning the environmental performance of the facility.

Information in relation to the landfill and the Civic Waste Facility will now be more readily available to the public or any interested party to view at the facility or at the offices in Ballinasloe Town Council.

Environmental information will be available without prior notification during normal facility working hours.

Security and reception staff will be made aware of the arrangements for public access to environmental information.

All details of the community liaison committee will be provided and kept on file and will include details of meetings (dates of meetings, actions arising etc.) between the licensee and representatives of local residents.

Files will contain a list of the following:

- Correspondence and reports submitted to the Agency.
- Correspondence received from the Agency.
- Contents and reports pertaining to the licence.

Members of the public requesting information will not be asked to make their request in writing.

Members of the public will be allowed to review all information in private.

Personal details will not be requested unless required for site safety purposes.

➤ **Word of Mouth Communication.**

Word of mouth communication approaches by the landfill management will now be used to provide a balanced view of the need available to address local community concerns. In addressing local community concerns the management will admit to any problem arising from the facility and explain how it is being resolved.

Other tools to ensure effective communication will be implemented in the revised communications programme and they are as follows:

- **Local newspaper advertising.**
- **Local radio advertising.**
- **Brochures/leaflets.**
- **Displays.**
- **Newsletters.**

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Dealing with Incidents	Procedure No. 05
Version Number: 005	Date of Revision: 25/04/05
Authorised Signature:	
Date:	

Purpose: To ensure that all incidents are dealt with and recorded in the proper manner.

Person Responsible: Landfill Manager

Procedure:

The following shall constitute an incident for the purposes of this licence:

- An emergency,
- Any emission which does not comply with the requirements of the licence,
- Any trigger level specified in the licence which is attained or exceeded; and
- Any indication that environmental pollution has, or may have taken place.

In the event of any incident at Pollboy Landfill, the Ballinasloe Town Council will make a written record of the incident and carry out the following:

1. Identify the time, date and place of the incident.
2. Carry out an immediate investigation to identify the nature, source and cause of the incident and any emission arising from therefrom.
3. Isolate the source of the emission.
4. Evaluate the environmental pollution, if any, caused by the incident.
5. Identify and execute measures to minimise the emissions/malfunction and the effects thereof.
6. Notify the EPA as soon as practicable, and in any case not later than 10.00am the following working day after the occurrence of any incident.
7. Submit to the EPA a written record of the incident with 5 working days after the occurrence of any incident.
8. In the event of any incident which relates to discharges to surface water, notify the Shannon Regional Fisheries Board immediately, but not later than 10.00am on the following working day after such an incident.
9. The local residents liaison committee members will be notified of any incident which relates to the non-operation of the gas flare.

10. Should any further actions be taken as a result of an incident occurring a written report should be forwarded to the Agency as soon as practicable and not later than 10 days after the initiation of those actions.

INCIDENT RECORD

Name of Persons involved if applicable:

Address of Persons involved if applicable:

Time:

Date:

Place:

Cause of incident:

Description of incident:

Injury if any:

Action Taken:

Name and address of witness:

Name of supervisor on site

Signature of supervisor

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Submission of Documentation to EPA	Procedure No: 06
Version Number: 004	Date of Revision: 18/05/04
Authorised Signature:	
Date:	

Purpose: To ensure that all documentation is submitted to the agency on time and in the format required.

Person Responsible: Landfill Manager

Procedure:

1. Any written communication with the EPA in relation to waste licence compliance shall be sent to the Regional Office of Environmental Enforcement (West/Northwest Region).
2. An original and 2 no. copies of each document should be sent to the Agency.
3. The documentation should be submitted according to the following format:

All correspondence should have the licence no. and licence condition if relevant and should be typed, A4, double sided, corner stapled, punched (2 hole) and if too large to staple then should be inserted in a ring binder (2 hole). Maps should be submitted in A3 format if possible and no rolls of maps. Where the original is in colour so too should be copies. Material should not be submitted with spiral binding, heat binding, metal binding, plastic covers/folders/pockets and box files.

4. The information shall be identified by a unique code and it shall indicate any modifications or amendments and it shall be correctly dated to reflect any such modifications or amendments.
5. In the case of results of any environmental monitoring it shall be accompanied by a written interpretation setting out their significance. Documents shall be submitted in accordance with the relevant frequency specified in the licence.
6. The following documents shall be kept at the facility office:
 - The current waste licence relating to the facility,
 - The current EMS for the facility,
 - The previous year’s AER for the facility; and
 - All written procedures.
7. The following written records shall be maintained:
 - The types and quantities of waste recovered and disposed of at the facility each year,

- All training undertaken by facility staff,
- Details of the maintenance records for the landfill gas flare,
- Results from all integrity tests of bunds and other structures and any maintenance or remedial work arising from them,
- Details of all nuisance inspections; and
- The names and qualifications of all persons who carry out all sampling and monitoring as required by this licence and who carry out the interpretation of the results of such sampling and monitoring.

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Recording of Complaints	
Procedure No.: 09	
Version Number: 004	Date of Revision: 18/05/04
Authorised Signature:	
Date:	

Purpose: To ensure that accurate records of all complaints are recorded.

Person Responsible: Landfill Manager

Procedure:

All complaints shall be recorded in the complaints book and the following details shall be completed.

- Date and time of complaint,
- The name of complainant,
- Details of the nature of the complaint,
- Actions taken on foot of the complaints and the results of such actions and the response made to the complainant.

In the case of non-conformance with this procedure, corrective action will be taken as outlined in corrective action procedure.

Recording of complaints shall be completed at the time a complaint is made.

COMPLAINTS REGISTER

Date and time of complaint:
Name and address of complainant: _____ _____ _____
Nature of the complaint: _____ _____ _____ _____ _____
Actions taken on foot of complaint and the results of these actions : _____ _____ _____ _____ _____ _____ _____ _____ _____
Response made to each complainant: _____ _____ _____ _____ _____ _____
Complaint logged by: _____

Procedure for Recording Outgoing Waste from the Civic Waste Facility

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Recording Outgoing Waste from the Civic Waste Facility	Procedure No.: 010
Version Number: 004	Date of Revision: 19/05/04
Authorised Signature:	
Date:	

Purpose: To ensure that accurate information is available on the amount of waste being recycled and disposed of.

Person Responsible: Landfill Manager

Procedure:

1. A digital record is kept for each load of waste departing from the civic waste facility. The record contains the following:-
 - The name of carrier and waste collection permit details.
 - The vehicle registration number.
 - The destination of the waste (facility name and waste licence/permit number as appropriate.)
 - A description of the waste.
 - The quality of waste recorded in tonnes.
 - The name of the person checking the load.
 - The time and date of departure.
2. Additional written records are kept at the civic waste facility office, which provide a register of materials received for recycling and a register of household waste which is removed to the landfill for disposal. Templates are attached which are used to record this information.

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for the Operation of the Civic Waste Facility	Procedure No.: 013
Version Number: 004	Date of Revision: 19/05/04
Authorised Signature:	
Date:	

Purpose: To ensure that the Civic Waste facility is operated in a safe manner.

Person Responsible: Landfill Manager

Procedure:

1. Only private vehicles are allowed to use the civic waste facility.
2. The facility shall not be used as transfer station for disposal of waste by commercial waste disposal contractors.
3. No hazardous waste (excluding household hazardous waste, waste oil and batteries collected for recovery) shall be deposited at the civic waste facility.
4. All tipping of waste shall be into a skip for disposal or in a receptacle for recovery or in the case where inspection is required into a designated inspection area.
5. Waste shall only be accepted at the civic waste facility between the hours of 08.30 and 17.00 hours Monday to Friday inclusive and 9.00 to 16.00 hours on Saturdays.

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for the Control of Environmental Nuisances.	Procedure No.: 014
Version Number: 005	Date of Revision: 13/02/06
Authorised Signature:	
Date:	

Purpose: To ensure that environmental nuisances are not present at the site.

Person responsible: Assistant Landfill Manager.

Procedure:

1. The facility and its immediate surrounds shall be inspected on a weekly basis for nuisances caused by litter, vermin, birds, flies, mud, dust and odours.
2. A record shall be kept of these inspections.

Litter

3. All loose litter accumulated within the facility and its environs shall be removed subject to agreement of the landowners and appropriately disposed immediately and in any event by 10.00am of the next working day after such waste is discovered.

Dust

4. In dry weather, site roads and other areas used by vehicles shall be sprayed with water as and when required to minimise airborne dust nuisances.
5. Prior to exiting the facility, all waste vehicles shall use the wheelwash.

Vermin, Birds and Flies

6. Birds will be prevented from gathering on and feeding at the facility by the use of bird control techniques.
7. A programme for the control and eradication of vermin and fly infestations is implemented at the facility. A written record shall be kept at the facility and shall include the following:
 - The date and time during which spraying of insecticide is carried out;
 - Contractor details;
 - Contractor logs and site inspection reports;
 - Details of the rodenticide (s) and insecticide (s) used;
 - Operator training details;

- Details of any infestations;
- Mode, frequency, location and quantity of application; and
- Measures to contain sprays within the facility boundary.

Odour

8. An odour survey is carried out twice daily and during the evenings and at the weekend. Local residents are involved in these odour surveys. Any incidents of odour will be reported to the EPA in accordance with the Procedure in Dealing with Incidents and the Waste Licence conditions 1.7, 9.1 and 11.2.
9. An odour control programme is implemented at the facility. As part of this programme a monthly review of the odour measures in place takes place which included the following:
 - Consideration of odour complaints received,
 - Details of monitoring carried out,
 - Recommendations to deal with odour problems and implementation of these recommendations.

Pollboy Landfill Nuisance Inspection Report

* S= Satisfactory U= Unsatisfactory N=Not present P=Present

Time & Date	Nuisance	Status *	Action taken (if any)	Results.
	Litter			
	Birds			
	Vermin			
	Mud			
	Dust			
	Flies			
	Odour (See Odour Monitoring Report Form)			

Comments

Signed _____

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Environmental Monitoring	
Procedure No.: 015	
Version Number: 004	Date of Revision: 19/05/04
Authorised Signature:	
Date:	

Purpose: To ensure that environmental monitoring is carried out in compliance with Waste Licence 27/2.

Person responsible: Assistant Landfill Manager

Procedure:

The Environmental Monitoring Programme will consist of the following:-

Surface Water

Surface water monitoring points are SW1, SW3, SW4, SW5, SW6, SW7 and SW8. The locations of which are shown in Drawing DG0001-05.

Surface water monitoring and frequency is set out in Schedule D.5 of the waste licence.

The flow of the stream u/s of SW6 is recorded weekly using a starflow flow recorder.

Groundwater

Ground water monitoring points are as follows:-

B8A, RC2, RC3, B2AP, B8AP, MW1, MW2, MW3 and MW6 shown in DG0001-01.

Groundwater monitoring is carried out at the frequency set out in Schedule D.5 of the waste licence.

Dust

Dust monitoring is to be carried out three times a year (twice during May to September) at four locations D1, D2, D3 and D4 shown in DG0001-02. The emission limit for dust is 350 mg/m²/day.

Noise

Noise monitoring is to be carried out on an annual basis. Noise monitoring are as follows: B1, B2, B3, NSL, and NSL2 which are shown in DG0001-03. The parameters required are set out in Schedule D.4 of the waste licence. The daytime limit for noise is 55dB (A) L_{Aeq} and the night time limit for noise is 45 dB (A) L_{Aeq} .

Gas Monitoring

12 no. gas migration monitoring boreholes have been installed around the perimeter of the site. The locations of which are shown in DG0001-04. The parameters outlined in Schedule D.2 of the waste licence are measured on a monthly basis. The landfill gas concentration limit is 20% LEL (1% v/v) for Methane and 1.5% v/v for Carbon Dioxide.

Monitoring of the landfill gas flare is outlined in Schedule D.2 of the waste licence and emission limits in Schedule C.4.

Leachate

Leachate monitoring is carried out at five locations: two leachate extraction boreholes L11 and L19, two leachate chambers CH1 and CH2 and the outlet from the leachate lagoon LD1. The parameters required and the frequency of monitoring is set out in Schedule D.5 (boreholes and chambers) and D.7 (outlet from lagoon) of the waste licence. Emission limits are outlined for leachate being discharge off-site in Schedule C.5.

Meteorological Monitoring

Meteorological monitoring should be carried out in accordance with Schedule D.6 of the waste licence.

Nuisance Monitoring

The facility is inspected daily for odours and weekly for other nuisances.

Compost Monitoring

The quality of the compost should be analysed biannually and the composting process is monitored on a continuous and weekly basis as outlined in Schedule D.8 of the waste licence.

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Pollboy Landfill Site Visitors	Procedure No.: 016
Version Number: 004	Date of Revision: 19/05/04
Authorised Signature:	
Date:	

Purpose: To ensure control and safety of all visitors to the landfill site.

Person responsible: Receptionist/Weighbridge Operator/Gateman.

Procedure:

1. All visitors will be directed to report to the site office.
2. All visitors will be requested to complete a detailed visitor's log book stating name, date, reason for visit, time of entry and time of exit.
3. All visitors will be provided with safety items, and it is a pre-condition that they wear these safety items before they are allowed enter the site.
4. All visitors must be accompanied by a member of staff while on site.
5. All visitors will be made aware of any possible dangers on the site.
6. When leaving the site all visitors must report to the reception area and return any safety items provided and fill in their time of exit from the landfill in the visitor's log book. Any comments can be included in the log book.

Visitor Report Form, Pollboy landfill Site, Ballinasloe

Time and Date of visit:
Name of Visitor(s) : _____ _____ _____
Name of organisation/company which visitor represents: _____ _____ _____
Purpose of visit : _____ _____ _____ _____ _____ _____ _____ _____
Name of person(s) who accompanied the visitor: _____ _____ _____
Comments : _____ _____ _____ _____ _____
Logged by: _____

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for the Composting of Organic Material	Procedure No.: 017
Version Number: 004	Date of Revision: 19/05/04
Authorised Signature:	
Date:	

Purpose: To ensure that a good quality compost is produced.

Person Responsible: Assistant Landfill Manager.

1. Material Receipt

All incoming material from off-site sources will be quantified as to its volume, weight and generator for record-keeping purposes. Any notable problem such as contaminants should be identified and removed. The operator has the responsibility to reject any load that does not meet specifications. The facility will not be open to the general-public.

2. Feedstock Preparation

2.1- Mixing

A mobile twin auger mixer is used for blending raw feedstocks. Using the front-end loader, the operator is responsible for loading dry carbonaceous, high moisture nitrogenous, water, compost inoculant, and other raw materials together in the mixing unit. Effective composting will only occur if a number of physio-chemical parameters can be achieved in the feedstock. Fundamentally, this includes.

2.2 Moisture

The moisture content of the incoming material must be between 55 to 65%. Wetter materials will tend to become anaerobic while dryer material will inhibit microbial activity.

2.3 Nutrient ratios

Composting is a biological process and the microbes involved must be provided with the correct proportions of essential nutrients. Typically, carbon and nitrogen are of fundamental importance with a ratio of 25 to 35 parts of carbon to one part of nitrogen providing optimum conditions for composting.

2.4 Porosity

This physical factor is essential in order to allow air and oxygen to circulate, as composting is an aerobic process.

Typically, most organic waste will not efficiently compost individually and must therefore be mixed with other materials to bring the above parameters into line. For example, food waste and sewage sludge on their own are often too wet, compact and have too much nitrogen. However, by mixing with other waste materials, a recipe can be derived to address these issues. For example, shredded cardboard and paper will soak excess moisture and add carbon, while wood chips will add porosity. The calculation of a composting recipe based on readily available materials is a crucial first step in the composting process. Likely input materials may include source separated municipal organic waste, shredded wood waste, paper, cardboard, sawdust and wood chip. A typical composting recipe is given be in Table 1.

Table 1: Sample compost recipe

Feedstock	Moisture %	C:N ratio	Porosity	Proportion
Food waste	70	15:1	Poor	2.5
Shredded cardboard	8	500:1	Good	0.7
Water	100	--	Bad	0.2
Woodchip chipped brush	/ --	--	V. good	0.7
Mixture	60	30:1	Good	4.1

On a batch-by-batch basis, materials are mixed and discharged directly into the digester via conveyor. If a digester is not available to place under the conveyor, the mix is discharged onto the concrete surface of the mixing area. When thirty cubic meters have been mixed, the mix is loaded by front-end loader into the digester. Records will be kept regarding the weight, volume, and source of the processed material. Mixed material is to be immediately placed into a digester.

!!WARNING!!

Caution should be exercised around the mixer, as the augers are dangerous and capable of maiming or killing operators. Safety lockout procedures should be practiced when working on the mixer to ensure that the mixer does not accidentally start during maintenance. The mixer should be kept running during filling and discharge, as the mixer may be difficult to re-start with a full load. Consult the mixer operations manual for unloading procedures should a batch cause the mixer to stall.

The operator is responsible for visually inspecting the mix and adding inoculant and bulking material. The mixing formula ratios can be adjusted in the field, as necessary. Sawdust and or dry wood shavings should be available on site for conditioning moisture as may be necessary. Wood chips should also be available for adjusting porosity, especially during re-mixing. The mixing formula is for guidance purposes only and is

not a rigid rule of operation. The interaction of positive and negative air in the process control system, as well as the variable speed drive will impact the net air pressure through the system. This may reduce the amount of bulking material required in the mixture to provide free air space.

3. Digester Management

Each digester is to be managed in a safe and efficient manner that protects the environment. The proper operation of the container systems involve proper management of the mixture, air, temperature, and moisture. The goals of proper digester management are to achieve destruction of disease-forming organisms (pathogens), prevent the release of leachate, minimize off-odors, and to produce a compost product of beneficial use for growing plants.

3.1 Digester Loading

After the initial mixing phase, the blend is loaded into the digester until full. When loading the digester, it is important to load the digester evenly to ensure even and equal airflow throughout the mass. Load the digester as full as possible, leveling the mass as much as possible. When filling is completed, remove the safety pin carefully and lower the lid. Attach all lid latches before moving the digester.

!!WARNING!!

Make sure that all lid latches are undone before raising the lid. Be extremely careful raising the lid in windy conditions and insert the safety pin when the lid is in the upright position.

Once the digester is full and the lid is closed, the flexible airlines are then connected to the appropriate coupler. The discharge airline is connected to the upper coupler and the air feed line is connected to the lower coupler. The temperature probe is inserted completely into the center of the digester. The leachate line is then attached.

3.2 Digester Unloading

3.2.1 Container Management

Unloading the digester is performed when the material inside of the digester requires re-mixing (see digester remixing) or has met all of its regulatory and product requirements.

Before ever unloading the digester onto the roll-off truck, make sure that the air hoses, leachate lines, and the temperature probe are removed from the digester.

Once in place, proceed to open the rear door. When opening the rear door, make sure that the lid latch on the rear of the digester is undone. After the door is open, make sure

that the chain attached to the door is hooked to the wall of the digester before tipping the digester. Once the rear door is properly secured, the operator may proceed to tip the digester.

!!WARNING!!

Make sure that no one is standing behind the digester during the tipping process. Once the digester is unloaded, inspect the inside of the container for unloaded compost that may have stuck to the corners, sides, or edges. Re-tip the digester or otherwise remove this material using a shovel or other tools as may be necessary. Inspect the perforations in the floor for clogging and clear debris as may be necessary. Lastly, close the door and latch tightly before placing the digester in the loading area.

The rear door should never be opened when the digester is full, unless it is for dumping of material. Debris may fall into the gasket or seals, compromising the integrity of the seal. Material may also expand after the door is opened, making it difficult to re-close the door.

3.2.2 Process to Further Reduce Pathogens (PFRP)

The time/temperature composting protocols utilized in the Celtic Composting System is broadly based upon the USEPA 503 Regulations for the sanitation of sewage sludge. These regulations are broadly in line with the current drafts of the EU Biowaste and Biosolids Directives that require technologies to maintain feed stocks at set temperatures for defined lengths of time. These technologies are referred to as “Processes to Further Reduce Pathogens” (PFRP). The time/temperature standards are required to ensure that the material is relatively free of disease producing organisms and viable weed seeds as well as unattractive to vectors (i.e. insect, rodents, and birds) that can potentially transmit diseases from pathogens in the material being composted.

In order to meet the PFRP requirement, the material is maintained at 55°C or higher for 72 continuous hours. In addition, in order to reduce vector attraction, the material to be composted is maintained at temperatures greater than 40°C for 14 days or longer during which the average temperature must be higher than 45°C. Material should not be moved to the compost curing and further processing area until it has met the PFRP and the vector attraction reduction standard in the digester. These protocols may need to be altered in the future, in the event that the requirements of the Biowaste and Biosolids Directive differ from current drafts. Such changes are easily configurable using the CCS operating software.

Careful attention to the composting environment is necessary during the “intensive care” period in the digester to meet PFRP and vector attraction reduction standards. Numerous variables will affect composting reactions, and many of these conditions, such as outdoor temperature and precipitation, shall be logged on the “Daily Log of Compost Operations” sheet. It is essential to collect and interpret data daily in order to identify any process or system problems early and to isolate the cause and take corrective action. The operator must perform routine tasks, and have the ability to adjust quickly to changing conditions rather than engage in operations under a predetermined set of actions and procedures.

Success is determined not by how many hours are spent in operation, but by achieving quantifiable product performance and quality standards.

3.3 Digester Codes and Documentation

For the purpose of regulatory requirements and facility management, the material being composted must be carefully tracked through the system.

As the feed stocks and bulking materials are loaded from the mixer into a digester, the material is subsequently transported to the appropriate empty space in the digester aeration area. To avoid confusion, it is recommended that a digester be placed in the same location every time it is filled.

The data logger and process controller recognize the blowers and temperature probe as they are located in the composting area. For consistency in operation, the same digester should be placed in the same location, such as Digester C-1 placed in temperature location "Digester-1" as identified by the process controller.

There are two "time and temperature" standards to be met to produce a Class I compost. The first is the Process to Further Reduce Pathogens (PFRP) which is 72 continuous hours over 55°C. The second is the Vector Attraction specification, which is achieved when the materials in any digester have been processed for a net of 14 days above 40°C (averaging 45°C).

When the materials in any digester have been processed for a net 14 days above 40°C (averaging 45°C) and have met the PFRP for any 72 consecutive hours (at 55°C) during this time period, the "Digester Code" is noted under "PFRP and Vector Attraction Met" of the "Daily Log of Compost Operations". The digester may then be unloaded and the materials are loaded into the curing piles. The volume and weight are noted on the "Daily Log of Compost Operations". The computer data logger will keep track of the temperature trend of the digester location, but this manual log and notation is an essential certification of the compost for regulatory compliance.

The curing piles may occasionally have overlapping aging dates due to the time lag of incoming dates. The longer the aging period, the more decomposed the compost will become and more product will be recovered in the finer and hence more valuable mesh sizes. Finally, the volume and weight of materials transferred off-site are noted.

3.4 Digester Aeration and Agitation

There are two techniques for digester aeration: digester re-mixing and the computerized CCS aeration system. Since the digesters are fully enclosed, minimal aeration occurs through natural convection within the mass. The digesters are agitated or re-mixed infrequently, so it is critical that the air system is fully operational. Should the computer

lock-up for any reason, there is a back-up control mechanism on the blowers, which is capable of maintaining proper oxygen levels even without the compute interface.

4. Curing

The in-vessel composting process converts raw feed stocks into a pasteurized compost product that has most of its the readily biodegradable material decomposed and stabilized. Consequently, it has a low attraction to vectors and other vermin. However, while this material can be described as being stable it is not yet mature enough for use as a soil amendment. An additional phase of maturation is therefore needed to allow the material to fully humify while reducing its fermentability further. This phase, called "curing," is a mesophyllic, aerobic process that eliminates organic plant phytotoxins, consumes fungal substrate and provides additional biological stabilization, especially the decomposition of cellulose, hemicellulose and lignin (woody materials, including paper). It also provides maturity and begins a prolonged period of humification and mineralization. Curing can be conducted in a number of ways: in static piles, turned windrows or in aerated static piles. CCS recommends using aerated static piles because it speeds the curing process and reduces the potential for generating odours.

4.1 The aerated curing system used by CCS :

In this configuration, perforated pipes are laid on top of a concrete slab where air is drawn downward through the curing pile and exhausted through a separate biofilter. This negative aeration process maintains the aerobic conditions needed for effective curing while further reducing the potential for odour. Due to the wet climate in Ireland, these piles should be covered with a breathable tarpaulin so that excess moisture will not penetrate the piles. Excessive wetting of the curing pile at this stage can potentially halt the maturation phase by causing anaerobic conditions and making the compost difficult to handle or screen. The materials will then need to cure for a minimum of 30 days. If time and space allows, 45-60 days would provide a more mature product.

The curing system (see Figure 3 below for a top view schematic and the appendices for full drawings and specifications for the CH2M Hill C:N Composting System) consists of a large concrete bunker into which the composting materials from the containers are discharged. The curing bunker is divided into four cells or zones, which are aerated by a series of HDPE air lances (4 lances per zone). A series of butterfly valves above the curing system blower controls airflow to each of these zones. The aeration system operates in negative aeration mode by drawing air through the curing pile and passing it through a biofilter to remove any off-odours produced. The curing piles are covered by a breathable tarpaulin to keep materials from getting too wet. Run-off from precipitation is directed towards a drain at the front of the curing area, which in turn drains to a sediment trap. The screening and compost storage area, next to the curing pad, are also served by this drainage system. Supernatant or liquid from this sediment trap is discharged to a percolation area. The manifold piping arrangement is configured to separate the exhaust airflow from any condensate produced. The condensate is directed to a concrete sump

and is automatically pumped to the sediment trap, while the dehumidified air stream is directed to the blower and discharged through the biofilter.

5. Screening, Blending and Packaging

The screening and storage area is located adjacent to the curing system. When materials are cured, they can be moved to storage area for screening. The County Council plans to share the Corporation's mobile trommel screen, supplied by Powerscreen. A trommel screen is basically a rotating cylinder on an incline. Composted materials are placed into the screen's hopper with the use of a bucket loader or tractor. The hopper then slowly feeds the rotating screen at the high end. As the materials are rotated within the screen and move to the lower end, small particles fall through the screen holes and fall below the screen onto the ground or onto a conveyor which piles the screened compost away from the screen. Oversized undecomposed materials or inert contaminants fall out of the lower end of the screen into a pile. Depending of the level of contamination, this larger fraction can be disposed of if it is highly contaminated. If contamination is low, the oversized materials, mostly undecomposed wood chip can be either reused in new batch of compost as an inoculant and structural material to add porosity or sold as a landscaping mulch. The level of the cylinder and the speed of rotation can be adjusted to facilitate movement of composted materials through the screen.

Once the compost is screened, it can be stored until it is used by the County or sold to customers. It can also be blended with other materials to make topsoil, potting mixes, custom growing mixes or organic fertilizer. These can be bagged or sold in bulk form.

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Recording Leachate Removed	Procedure No.: 018
Version Number: 001	Date of Revision: 20/05/04
Authorised Signature:	
Date:	

Purpose: To ensure that accurate information is available on the amount of leachate being removed from the facility.

Person Responsible: Landfill Manager

Procedure:

A written record shall be kept for each consignment of leachate removed from the facility. The record shall contain the following:-

- The name of the carrier,
- The date and time of removal of leachate from the facility.
- The volume of leachate, in cubic metres, removed from the facility on each occasion.
- The name and address of the WWTP to which the leachate was transported; and
- Any incidents of spillages of leachate during its removal or transportation.

Leachate Consignments Register

Date and time of removal of leachate from Pollboy landfill:
Name of the carrier of the leachate: _____ _____ _____
Volume of leachate, in cubic metres, removed from Poolboy landfill: _____ _____
Name and address of the Waste Water Treatment Plant to which the leachate was transported: _____ _____ _____ _____
Any incidents or spillages of leachate during its removal or transportation: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
Consignment logged by:

Pollboy Landfill Waste Licence 27-2	
Procedure Name: Procedure for Maintenance Records	Procedure No.: 019
Version Number: 001	Date of Revision: 20/05/04
Authorised Signature:	
Date:	

Purpose: To ensure for appropriate operation of the facility.

Person Responsible: Landfill Manager

Procedure:

1. All treatment/abatement and emission control equipment shall be calibrated and maintained, in accordance with the instructions issued by the manufacturer/supplier or installer. Written records of the calibrations and maintenance shall be made and kept by the licensee.
2. The wheel-wash shall be inspected on a daily basis and drained as required. Silt, stones and other accumulated material shall be removed as required from the wheel-wash and disposed of at the working face.
3. The oil separator should be inspected weekly and desludged as appropriate to a licensed facility for this type of waste.
4. Written records shall be kept for inspections and maintenance of the wheel-wash and oil separator.

RECORD OF OIL SEPARATOR INSPECTION AND MAINTENANCE

Date & Time of weekly Inspection	Date & Time Desludging	Checked by	Name of Licensed Facility for Treatment

RECORD OF CALIBRATION

Item calibrated:

Date of calibration:

Calibrated by:

Certification of calibration enclosed:

Comments:

Frequency of calibration required:

Next calibration due on:

Person responsible for upkeep of register: