Comhairle Chontae chill Mhantáin
WICKLOW COUNTY COUNCIL

BALLYMURTAGH LANDFILL
Waste Licence W0011-01

ANNUAL ENVIRONMENTAL REPORT 2009

June 2010

RPS

Ballymurtagh Landfill
W0011-01

Annual Environmental Report
2009

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1 INTRODUCTION

This Annual Environmental Report (AER) summarises the environmental performance of Ballymurtagh Landfill between January and December 2009 and outlines proposals for the 2010 reporting period to help minimise environmental impacts. RPS have prepared this AER on behalf of Wicklow County Council in accordance with the conditions of waste licence W0011-01, the Environmental Protection Agency (EPA) "Draft Guidance on Environmental Management Systems and Reporting to the Agency" and the EPA "Landfill Manuals – Landfill Monitoring 2nd Edition".

Wicklow County Council operate Ballymurtagh Landfill in accordance with Waste Licence Register No. W0011-01.

It is the policy of Wicklow County Council to comply fully with the conditions of this waste licence, to minimise impact on the environment and ensure that members of staff are aware of the environmental impacts associated with their work on the landfill.

1.1 WASTE MANAGEMENT POLICY

The County Wicklow Waste Management Plan outlines the following policy;

"*..to move quickly to a 'maximum recycling' scenario, which will meet the wishes of the public and also meet the mandatory targets for recycling set out by government… The Council aims to arrest and counteract the current trend of waste growth through concerted measures aimed at waste minimisation and prevention".*

1.2 SITE DESCRIPTION

Ballymurtagh Landfill is located in the townlands of Ballymurtagh, Ballygahan Upper, Ballygahan Lower, and Tinnahinch in the Vale of Avoca approximately 1.5 km north-west of the village of Avoca in County Wicklow. It is situated in the catchment of the Avoca River, which rises in the Wicklow Mountains and enters the Irish Sea at Arklow. The landfill is located within a disused Open Lode pit of the former Avoca Mines. Prior to landfilling the pit was used for the settlement of mine tailings, a layer of which underlies the body of waste. The bedrock underlying the landfill consists of volcanic rock, which is part of the Avoca Formation. The lithologies based on drilling carried out by the Geological Survey of Ireland consists of light greenish grey, fine grained, well foliated metavolcanic rock.

The principal activity between 1989 to 2002, was to 'deposit in, on or under land', Waste acceptance ceased for landfilling on the 31st December 2002 and recycling is now the principal activity. It is estimated that approximately 480,000m^3 of waste were deposited at the site since it commenced operation in 1989. The Civic Waste Facility was opened in February 2003. The layout of the facility is shown on Figure 2.2.

Restoration works in accordance with the Waste Licence commenced in October 2004 and were completed in November 2005. The site has been landscaped and vegetation was successfully established during 2006.

1.3 WASTE ACCEPTANCE

A procedure for the acceptance of waste at the Civic Waste Facility has been developed and is outlined in the Environmental Management Plan (EMP).

2 ENVIRONMENTAL MONITORING

The following sections summarise the monitoring undertaken at Ballymurtagh during the 2009 reporting period. More detailed interpretations can be found within the quarterly monitoring reports, which were submitted to the Agency throughout 2009.

2.1 SURFACE WATER

TE Laboratories (TelLabs), Co Carlow collected and analysed samples from 5 monitoring locations (see Figure 2.1) specified in the waste licence. Samples were collected in March, June, September and November. Parameters requiring annual analysis were monitored in November. Results were compared with the European Community (Quality of Surface Water intended for Abstraction of Drinking Water) Regulations, 1989 (S.I. No. 294 of 1989) and the EPA's Environmental Quality Objectives and Environmental Quality Standards 2003.

Section 2.1.1 summarises the overall surface water quality at the landfill. However, it should be noted that the Ballygahan Adit and Ballymurtagh Road Adit carry acid mine drainage (AMD). Surface water quality monitoring point SW3 is located in close proximity to the adits. Parameters which would mainly originate from acid mine drainage include sulphate, copper, lead, iron, manganese and zinc along with low pH and elevated electrical conductivities are continuously found at these monitoring points.

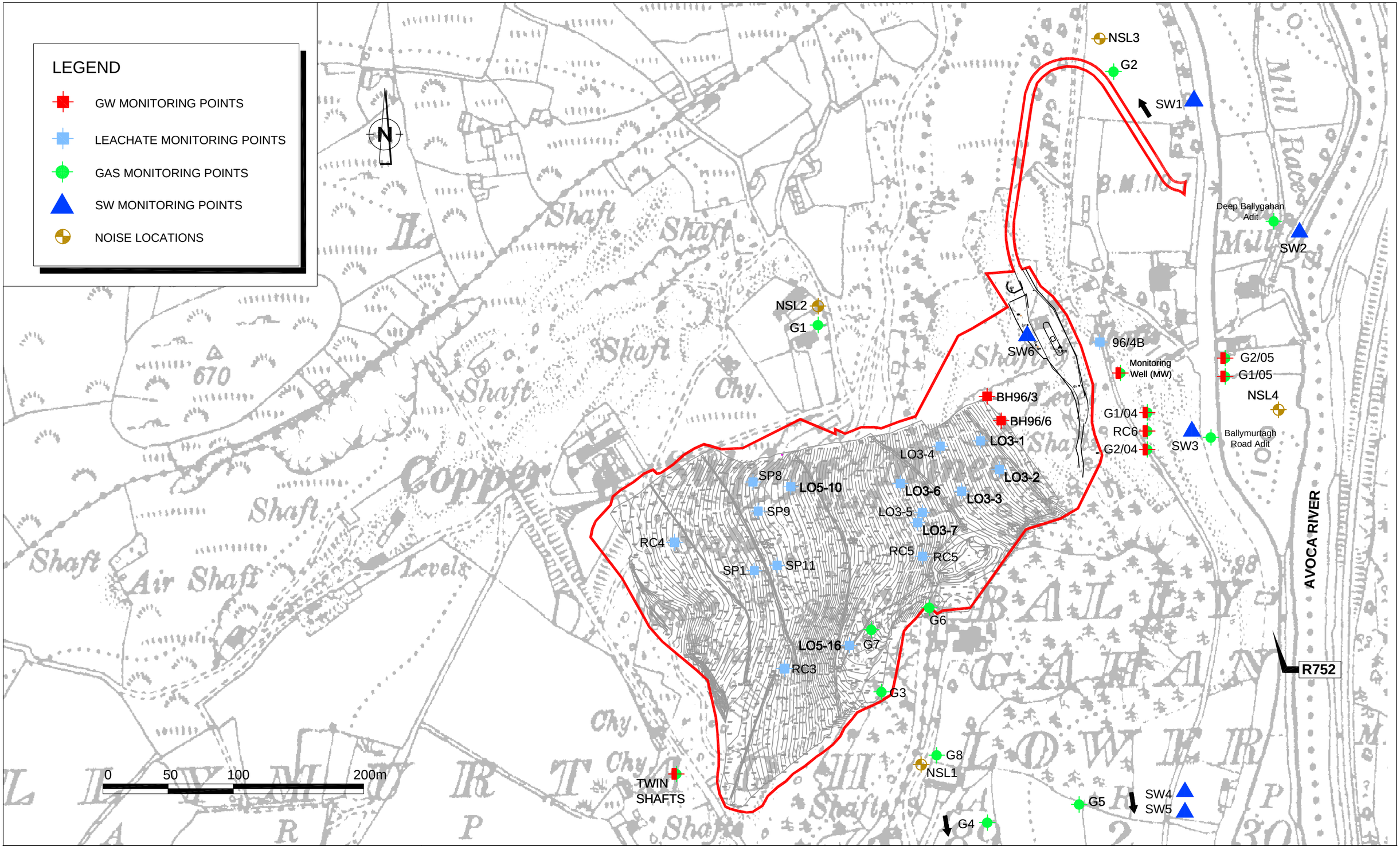
Full copies of all results can be found in Appendix A.

2.1.1 Interpretation

Surface water quality upstream of the facility (at SW1 and SW2) was generally of good quality during the 2009 monitoring period with no quarterly limits exceeded. Iron was recorded during the annual round of monitoring and was elevated at both monitoring points. SW1 recorded 0.24mg/lFe and SW2 recorded 0.26mg/lFe.

Surface water quality at SW3 (Ballymurtagh Road Adit) shows evidence of Acid Mine Drainage in the form of low pH (range 3.9 – 4.3) (see Figure 2.3), elevated conductivity (ranging from 1,810µS/cm to 2,200µS/cm), and elevated sulphate (1,195mg/l – 1,581mg/l). Sulphate concentrations were elevated throughout the year and remain similar to those recorded in previous years as shown in Figure 2.5. Elevated concentrations of iron, cadmium, copper, manganese, lead and zinc were also detected in the annual sample. Dissolved oxygen concentrations ranged from 2.6mg/l in November 2009 to 8.2mg/l in September 2009. Low dissolved oxygen concentrations were recorded in the 4th quarter (2.6 mg/l) and this is likely due to seasonal variances. BOD levels ranged from (<3mg/l – 12mg/l). Ammoniacal Nitrogen levels were elevated at SW3, ranging from 6.9mg/l NH_4 to 8.9mg/l NH_4). Since the site was capped ammoniacal nitrogen levels have gradually decreased as can be seen in Figure 2.4.

Surface water quality at SW4 and SW5, (approx 300-400m downstream of SW3) is generally of good quality and similar to that of 2009. Manganese was elevated at 0.1mg/l at SW4 and 0.07mg/l at SW5 during the annual round of monitoring in November 2009. Copper Was elevated at SW5 in the 4th Quarter of 2009 (0.15mg/l). Iron and zinc were also slightly elevated. All other parameters were within recommended limits.



NOTES

1. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
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Client: Wicklow County Council, County Buildings, Wicklow, Co. Wicklow

Drawn By	Checked By	Approved By	Date
HF	PL	PL	Sept. '09

RPS
West Pier Business Campus, Dun Laoghaire, Co. Dublin, Ireland
T +353 1 4882900
F +353 1 2835676
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Project: **Ballymurtagh Landfill Environmental Management Plan**

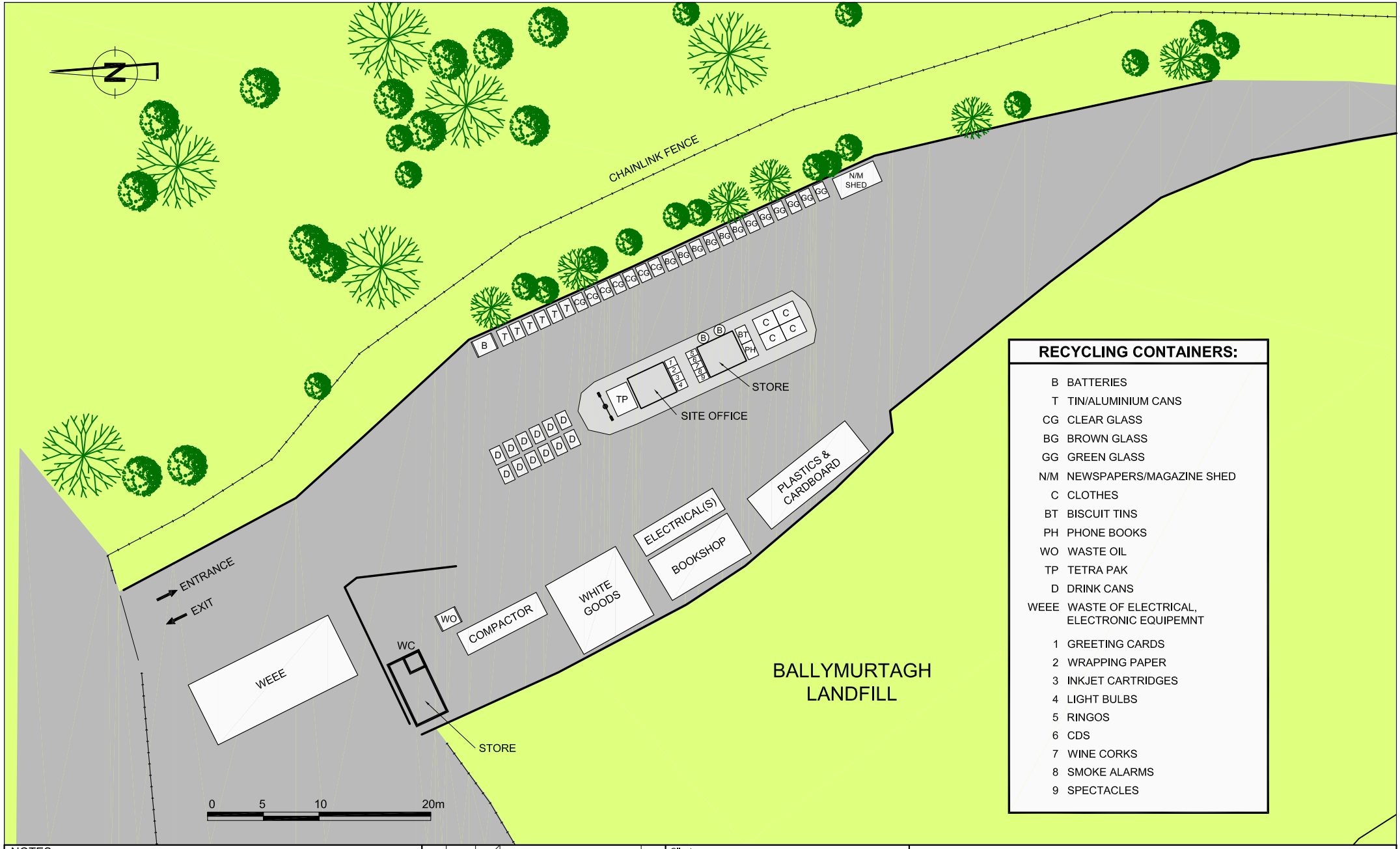
Drawing Status	Sheet Size	Scale
Preliminary	A4	NTS

Drawing Number: MDE0046/Fig. 4.3

Rev: A01

Title: MONITORING POINTS

Mde0046FG4.3.dwg



RECYCLING CONTAINERS:

B	BATTERIES
T	TIN/ALUMINIUM CANS
CG	CLEAR GLASS
BG	BROWN GLASS
GG	GREEN GLASS
N/M	NEWSPAPERS/MAGAZINE SHED
C	CLOTHES
BT	BISCUIT TINS
PH	PHONE BOOKS
WO	WASTE OIL
TP	TETRA PAK
D	DRINK CANS
WEEE	WASTE OF ELECTRICAL, ELECTRONIC EQUIPEMNT
1	GREETING CARDS
2	WRAPPING PAPER
3	INKJET CARTRIDGES
4	LIGHT BULBS
5	RINGOS
6	CDS
7	WINE CORKS
8	SMOKE ALARMS
9	SPECTACLES

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RPS
West Pier Business Campus, Dun Laoghaire, Co. Dublin, Ireland
T +353 1 4882900
F +353 1 2835676
W www.rpsgroup.com/Ireland
E Ireland@rpsgroup.com

Project: **Ballymurtagh Landfill Environmental Management Plan**

Drawing Status	Sheet Size	Scale
Preliminary	A4	NTS

Drawing Number | Rev

Title

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Figure 2.3: pH concentrations at all surface water monitoring locations from Feb 2005 to Nov 2009

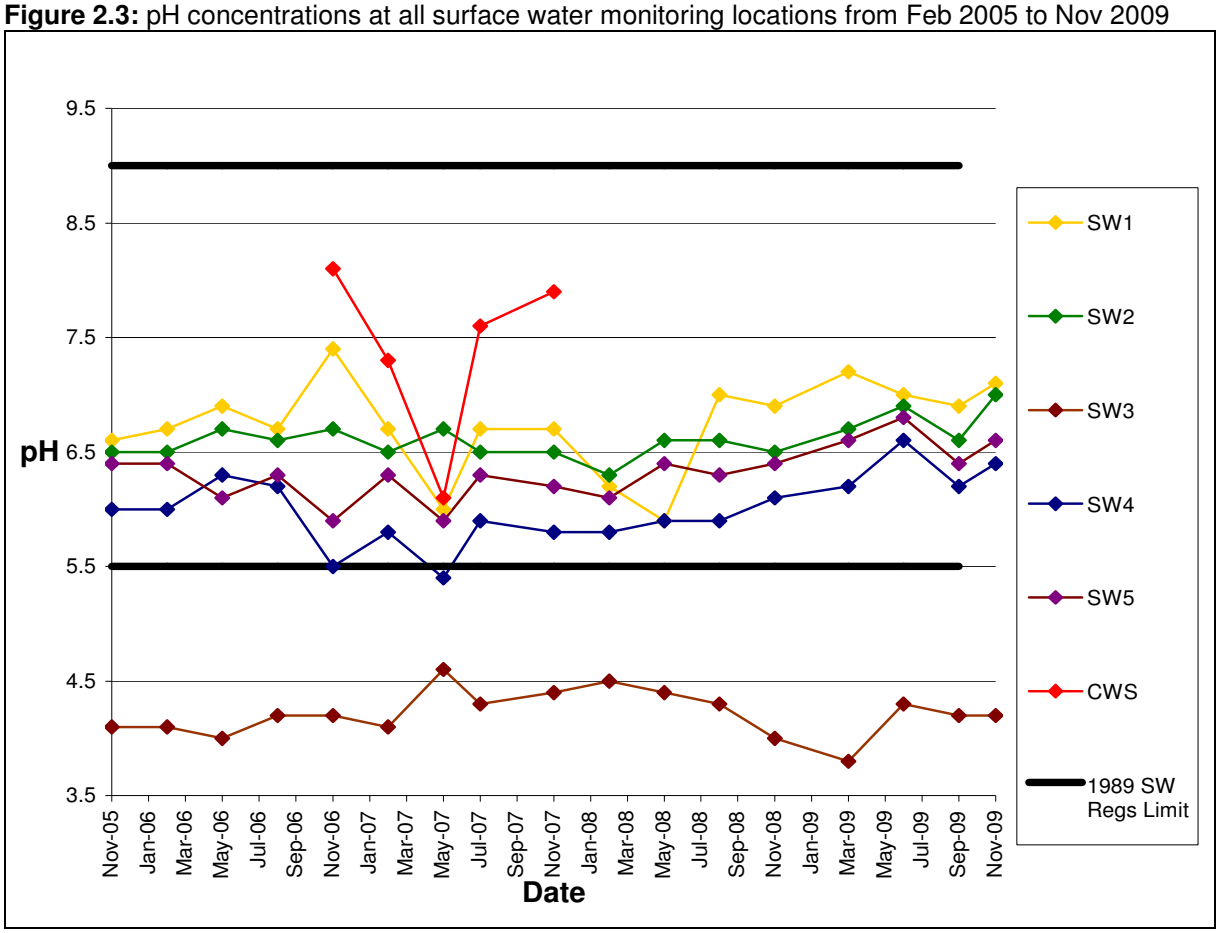


Figure 2.4: Ammoniacal Nitrogen concentrations at SW3 from Aug 04 - Nov 09

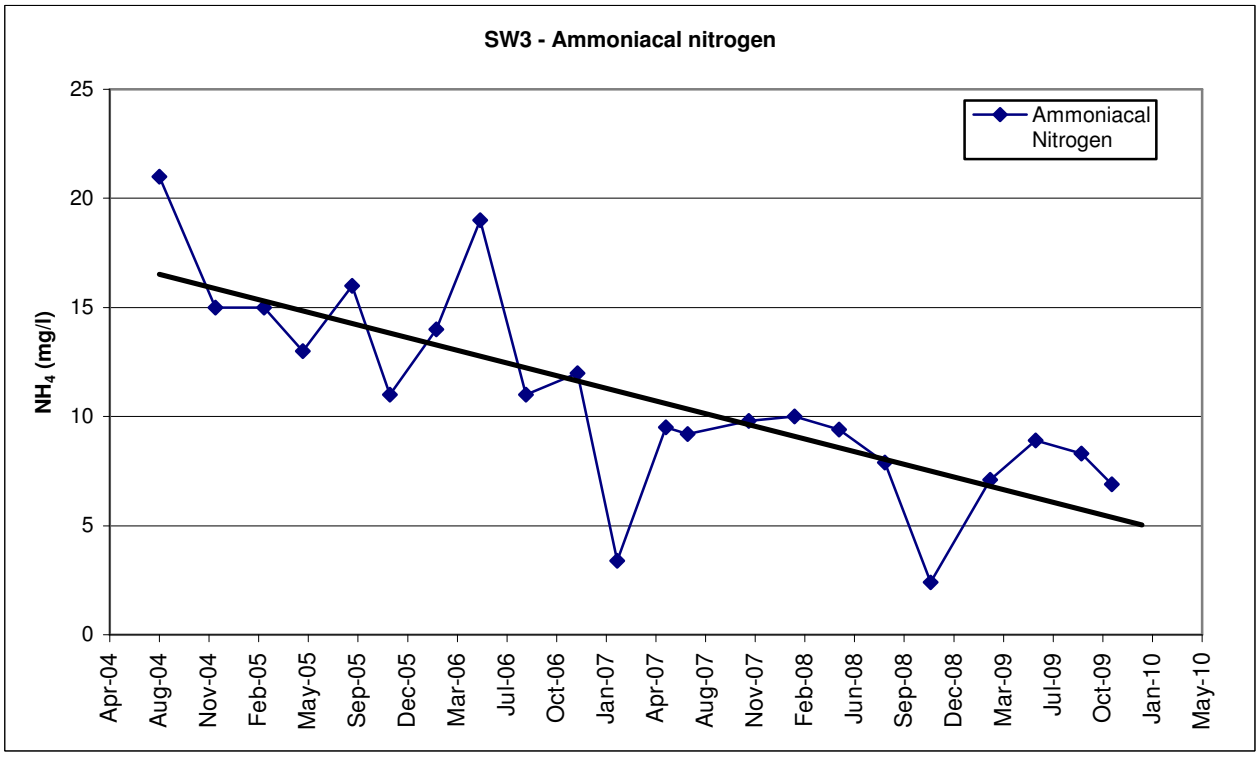
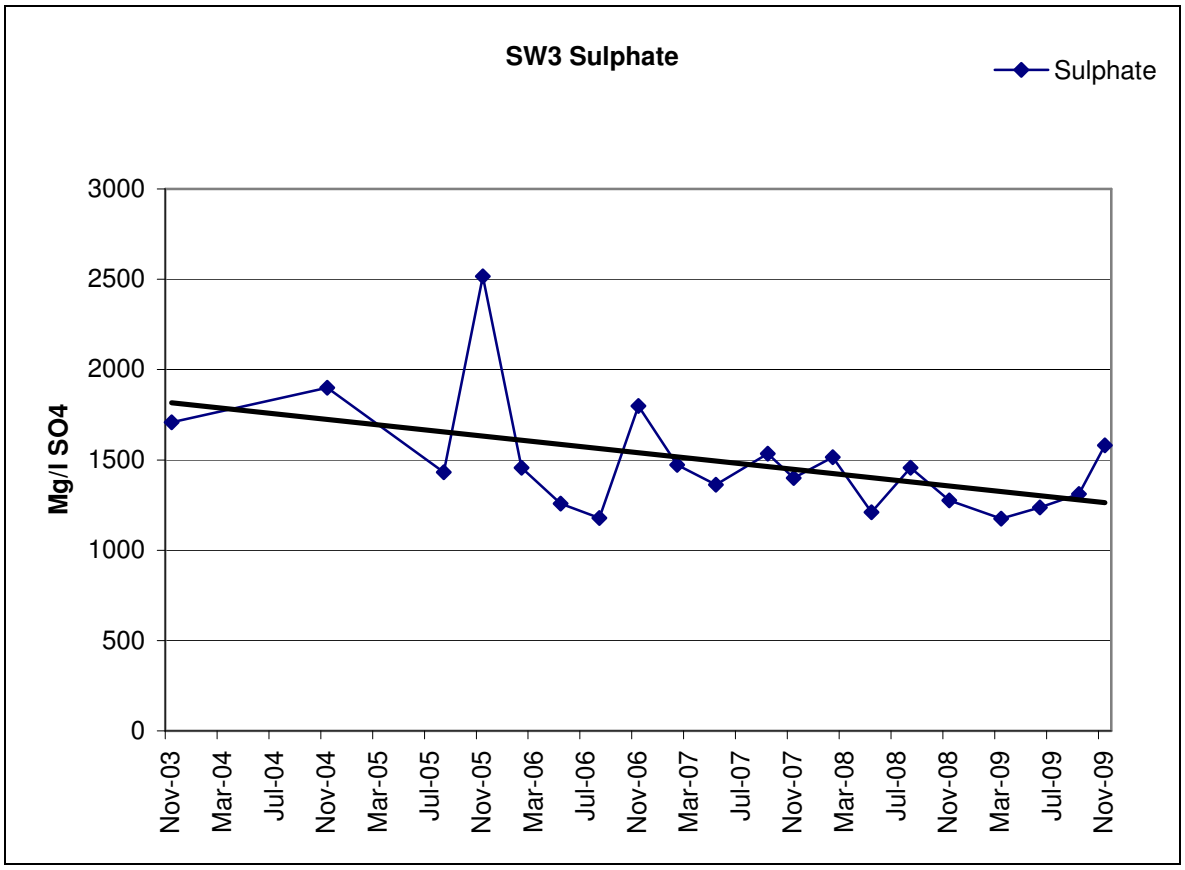


Figure 2.5: Sulphate concentrations at SW3 from Nov 03 - Nov 09



2.1.2 ELV Compliance

There is a surface water discharge limit of 35mg/l suspended solids. No exceedances of this limit were recorded during 2009.

2.2 GROUNDWATER

TelLabs took groundwater samples in March, June, September and November 2009, the results of which are contained within Appendix A. Samples were obtained from the Twin Shafts, G1/04, G2/04, G1/05, G2/05 and BH96/3, and RC6. Four private groundwater wells (Thomas Merrigan, Donal O' Leary, Eddie Coleman and Jeffery Green) were also monitored in 2009. Parameters that require analysis on an annual basis were sampled in November.

The results are compared with the EPA Groundwater Interim Guideline Values (2003) (IGV).

As discussed in the 'Monitoring Infrastructure Assessment Report' and the 'Groundwater Flow and Contaminant Transport Modelling Study', Ballymurtagh Landfill is located within a disused open mine pit, which is underlain by 6 - 16.5m of mine tailings and an underground mine. This underground mine was allowed to flood after closing and overflows mainly at the Ballymurtagh Road Adit (SW3) and on occasion at the Deep Ballygahan Adit (SW2). Therefore, any leachate generated within the body of waste seeps into the underground tailings and subsequently into the underground mine. Therefore, any landfill leachate contamination would be observed at the Ballymurtagh Road Adit (SW3).

RC6 was dry for the first 3 quarters of 2009, with a sample obtained in November 2009. A sample was previously obtained in November 2006.

The following interpretations summarise the overall groundwater quality. More detailed interpretations can be found within the quarterly monitoring reports, which were submitted to the Agency throughout the reporting period.

2.2.1 Interpretation

The groundwater up-gradient of the landfill (Twin Shafts) is generally of good quality, however during analysis of annual parameters in the fourth quarter high concentrations of zinc (0.38mg/l), manganese (0.16mg/l) and copper (31µg/l) were recorded Potassium limits (5mg/l) were exceeded in all quarters of 2009 with levels ranging from 7mg/l to 13mg/l. Bacteriological quality is generally poor and high concentrations of total coliforms ranged from >100CFU/100mls throughout 2009. Ammoniacal Nitrogen levels were within the required limits in 2009.

BH96/3 is located down gradient but adjacent to the main body of waste and is therefore more representative of leachate than groundwater. Samples taken at BH96/3 are of poor quality with conductivity, chloride, ammonia, potassium and sulphate exceeding the relevant IGV limits on all sampling occasions. Iron was elevated in 3 of the quarters of 2009 ranging from 0.22mg/l in Quarter 1 to 0.5mg/l in Q4 of 2009. Total coliforms exceeded IGV concentrations for all quarters of 2009. Calcium, phosphates, manganese and magnesium were also elevated in the 4th quarter for the annual round of monitoring.

Groundwater quality at other down-gradient (G1/04, G1/05, G2/04 and G2/05) monitoring points is also considered poor with low pH concentrations, incidences of high conductivity and sulphate concentrations.

Exceedances for ammonium were recorded at G1/04 ranging from 0.23mg/l in Quarter 3 to 1.7mg/l in Quarter 1 of 2009. The limits for calcium, chloride, chromium, copper, magnesium, manganese, zinc, iron, lead and fluoride were also exceeded at G1/04 during monitoring of annual parameters. Incidents of high total coliforms were recorded throughout the year indicating poor bacteriological quality.

Water quality at the private wells is generally good. However the pH concentrations were outside the recommended range in O' Leary's well and Coleman's well throughout the year. The pH concentrations in Mary Merrigan's well were outside the range in all quarters apart from Quarter 1 (6.5). Jeffrey Green's well was within the pH concentration limits for 1st and 2nd Quarter of 2009 (6.5 and 6.9 respecticely). Copper and Zinc were elevated in the 4th quarter in Coleman's and Green's Well.

Elevated total coliforms were detected in all wells; Merrigan's well in the 1st Quarter, all wells in the 2nd quarter, Merrigan's and O' Leary's well in the 3rd Quarter and all except Coleman's well in the 4th quarter. No Faecal coliforms were detected in the private wells in the 1st and 3rd Quarters of 2009. During the 2nd Quarter of 2009 faecal coliforms were detected in Merrigan's well (1CFU/100mls), Coleman's well (7CFU/100mls) and Green's well (4CFU/100mls). During the 4th Quarter of 2009 faecal coliforms were detected in Merrigan's well (55CFU/100mls) and Green's well (1CFU/100mls). Interpretations and results are provided to each well owner after each quarter.

As discussed above in Section 2.2, it is considered that SW3 (Ballymurtagh Road Adit) is representative of down-gradient conditions, details of which are outlined in Section 2.1.1.

2.3 LEACHATE

Leachate samples were taken from leachate monitoring points L05/10 and L05/16. L05/16 was dry in the 1st and 3rd quarters of 2009. L05/16 was dry in every quarter with the exception of quarter 1. All

other boreholes were dry throughout the year. Wicklow County Council intend to commission three new boreholes in 2010. Details of this can be seen in Section 5.2.

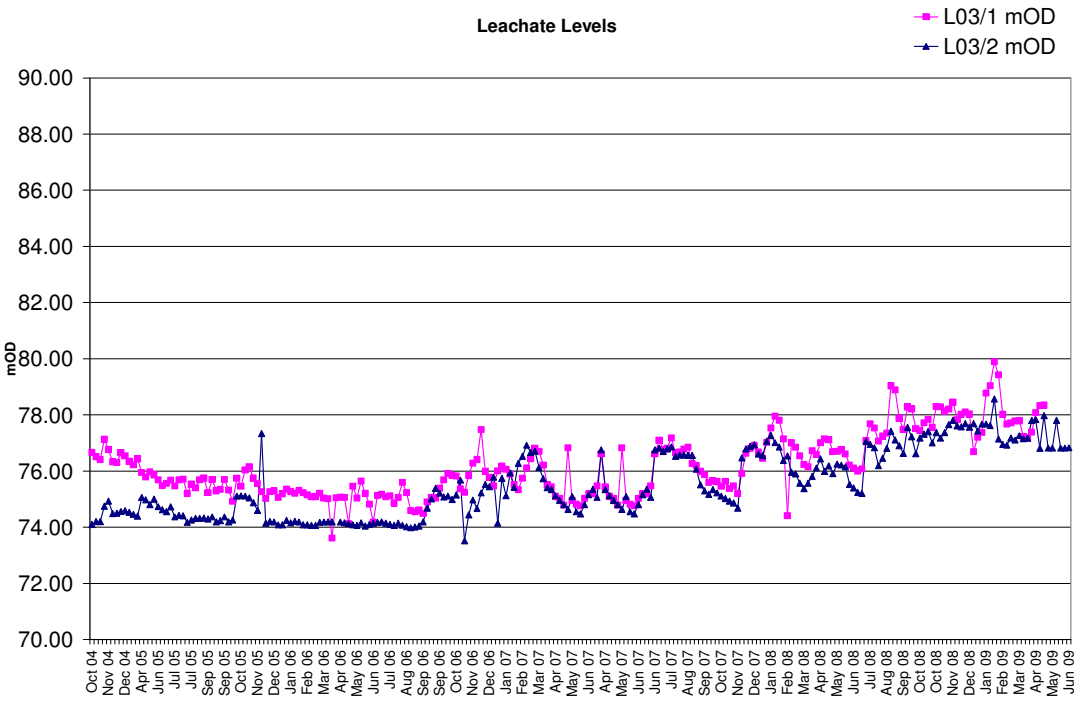
The samples obtained in November were analysed for a broader range of parameters to comply with the annual monitoring requirements of the licence. The results were compared with typical leachate compositions of 30 samples from UK/Irish landfills (EPA, 1997).

The concentrations of most of the indicator parameters, including all the metals for most of the samples taken, are within the typical/average values for landfill leachate.

2.3.1 Leachate Levels

Wicklow County Council record leachate levels at a number of monitoring locations in accordance with Condition 9.4 of the W0011-01. Historically L03/1, L03/2 and L03/4 were illustrated below. These boreholes were recorded as blocked and levels were not recorded in the 3rd & 4th quarters of 2009. Leachate levels fluctuate as shown in Figure 2.6.

Figure 2.6: Leachate Levels at L03/1 and L03/2 – August 2004 to December 2009



2.4 NOISE

Noise monitoring was undertaken by Euro Environmental at 2 monitoring locations (NSL1 and NSL4) (see Figure 2.1) on 11th November 2009. The 55dB(A) day limit was exceeded at both monitoring points. NSL 1 exceeded the recommended daytime limits of 55dB(A) at 59dB(A) and NSL 4 exceeded the recommended daytime limits at 57Db(A). This was attributed to traffic on the main road. No noise could be heard from operations at the landfill at NSL1 at the time of monitoring. No noise emanating from the flare was audible at NSL1, the nearest noise sensitive location to the flare. This report is attached in Appendix F.

2.5 GAS

Wicklow County Council undertook landfill gas monitoring during 2009 at those monitoring locations shown on Figure 2.1, summary results of which are contained in Appendix A. The table below outlines the exceedances in CO_2 during 2009.

Table 2.1: CO2 Exceedances in 2009

	Unit	$C0_2$ ELV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
G2	%v/v	1.5%	2.70	1.90	-	NE	NE	NE	NE	NE	NE	NE	NE	2.8
G3			NE	NE	NE	NE	NE	NE	2.3	NE	NE	7.3	2.3	NE
G4			6.60	NE	NE	NE	NE	NE	5.4	NE	8	4.5	4.3	5.1
G6			4.10	4.60	4.50	3.7	3.3	4.1	2.6	4.6	3.8	2.5	2.6	2.8
G7			4.60	3.20	3.50	2.7	5.2	3.5	3.2	4.5	3.5	NE	NE	NE
GW1/05			NE	NE	NE	NE	NE	NE	1.6	NE	NE	NE	NE	NE
GW2/05			1.70	1.70	1.80	1.7	1.8	2.1	NE	NE	3.9	3.2	NE	NE
NE: CO2 ELV not exceeded.														

CO_2 levels exceeded the limit of 1.5 %v/v at G6 (2.5% - 4.6%) throughout the reporting period. Exceedances of CO_2 were recorded at other wells on occasion throughout the reporting period as shown in Table 2.1. CH_4 levels did not exceed the Emission Limit Value at any of the points monitored during the reporting period.

2.5.1 Investigation into Elevated CO_2 levels

RPS carried out a Phase 1 desk study review of the available and relevant geological, hydrogeological and geochemical information for the area including the landfill itself and the mine workings. This report was forwarded to the agency on 5th December 2007.

2.6 LANDFILL GAS FLARE

Irish Power Systems Ltd undertook monitoring of the landfill gas flare and gas abstraction sampling points throughout 2009. Methane levels averaged at 21.8%, carbon dioxide at 28.6% and oxygen at 1%. Although the methane content is low and decreasing, this is indicative of the stage of the microbial degradation. The remaining % is most likely made up of hydrogen, nitrogen, carbon monoxide and water vapour derived from the atmosphere. The methane and oxygen levels recorded at the flare have decreased proportionately. CO_2 levels have increased slightly in comparison to 2008.

Euro Environmental undertook the flare outlet monitoring in September to comply with the bi-annual requirements, results of which are included in Appendix G.

2.6.1 Gas Flare Unit Efficiency

Gas monitoring reports are included in Appendix G.

These reports state that efficient combustion is taking place within the combustion chamber of the flare and in general, is operating under the original manufacturers specification

Recently the availability of gas required to operate the flare has reduced. Options to remedy this issue are currently under review by Wicklow County Council.

2.7 METEOROLOGICAL DATA

No meteorological data was obtained on-site during the reporting period, however data is provided by the weather station at Casement Aerodrome.

2.8 SITE SURVEY

A site survey was undertaken in June 2009 and is attached in appendix B**.**

2.9 ECOLOGY

An assessment of the ecology of the restored landfill and adjoining habitats was carried out in May 2009. This report has been forwarded to the agency and is attached in Appendix E.

3 WASTE TYPES

The landfill ceased disposal of waste in December 2002. In total 480,000 tonnes of waste was disposed of at the facility.

Table 3.2 provides summary information on wastes received at the Civic Waste Facility and which was subsequently sent off-site for recovery during 2009.

Table 3.1: Total Quantities of Waste Accepted at the Civic Waste Facility during 2009

Waste Type	EWC Code	Approximate monthly Quantities (kg)	Materials transported Off-site (kg)
Aluminium cans	19 12 03	326.42	3,917
Steel Cans	20 01 40	1,270.92	15,251
Cardboard/ Newsprint/ Tetra Pak	20 01 01	19,955.00	239,460
Fluorescent tubes / Bulbs	20 01 21	40.33	484
WEEE	20 01 36	4412.67	52,952
Plastics	20 01 39	4265.5	51,186
Batteries	20 01 33/34	904	10,848
Mixed Municipal Waste	20 03 01	630.83	7,570
Waste Oils	20 01 25/26	287.5	3,450
Ink jet cartridges,	08 03 13	0.83	10
Glass	20 01 02	8,251.92	99,023
Polystyrene	20 01 39	145.83	1,750
Textiles, Clothes	20 01 10/11	1986.67	23,840
Scrap Metal	20 01 40	2413.33	28,960
Mobile Phones	20 01 35	1.17	14
Aerosols	20 01 99	88	1,056
Total		44,980.92	539,771

4 MASS BALANCE OF SPECIFIED SUBSTANCES (MBSS)

According to the Agency's 'Waste Licensing, Draft Guidance on Environmental Management Systems and Reporting to the Agency', the purpose of a MBSS is to produce a detailed analysis of the facility in order to itemise and quantify all material flows i.e. Inputs = Output + Accumulation + Consumption - Generation. Since activities at the landfill ceased in December 2002 the main inputs during 2009 relate to incoming waste to the Civic Amenity Site. The main outputs are leachate (section 4.4), air emissions (section 4.3), noise (section 2.4) and waste departing the Civic Waste Facility (section 3). In terms of generation, leachate and air emissions (mainly landfill gas) are generated because of the decomposition of waste, which result in their output. However, as the site was restored during 2005 and 2006, it is expected that these emissions will continue to reduce over time. The main activity at the Civic Waste Facility is the transfer of the waste disposed of at the site to suitable recovery/recycling facilities.

4.1 EPRTR REQUIREMENTS

As part of the requirements of the European Pollutant Release and Transfer Register, Ballymurtagh Landfill uploaded the results of emissions on the 13th May 2010. Further details can be seen in Appendix C.

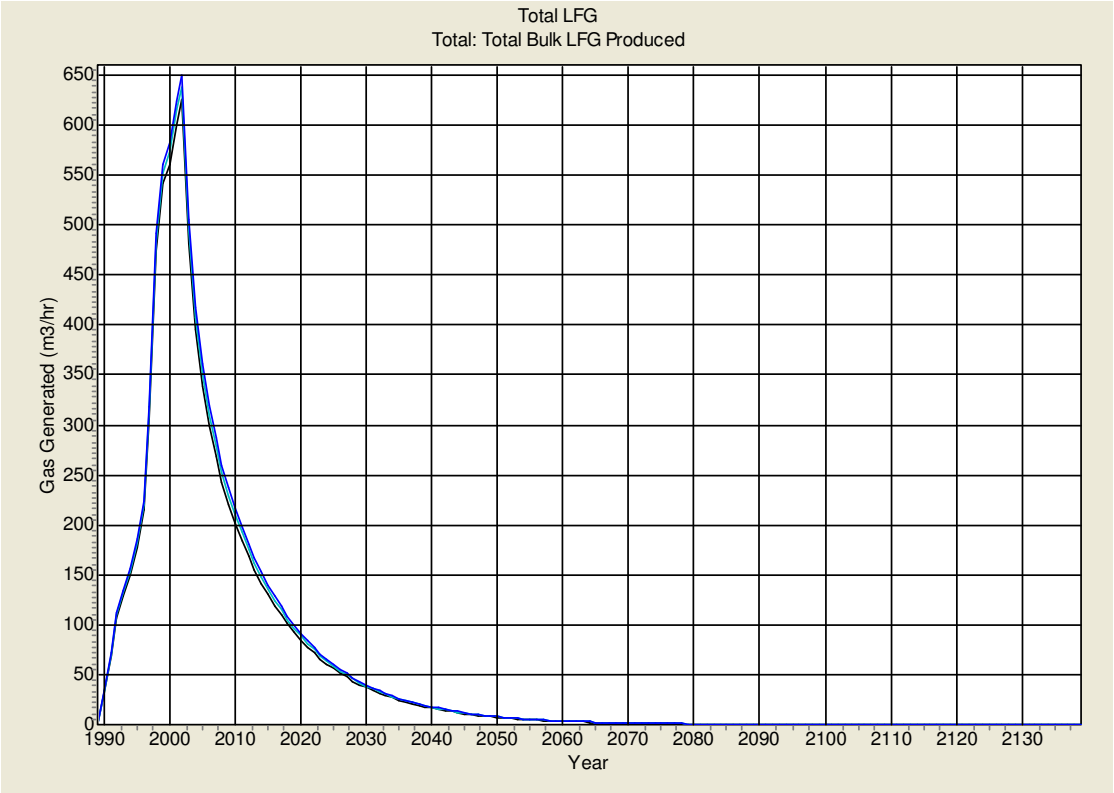
4.2 RESOURCE AND ENERGY CONSUMPTION SUMMARY

The operation of the landfill required 57,661 units of electricity, 3,800L of diesel (to operate the generator at the civic amenity site) and 7,500L of water during 2009.

4.3 ESTIMATED & CUMULATIVE QUANTITES OF LANDFILL GAS

GasSim 2.0, a landfill gas modeling software package (developed by the UK Environmental Agency), was used to simulate the expected production of landfill gas at Ballymurtagh Landfill based on the input information (see Table 3.1). Figure 4.1 shows the average hourly rate of landfill gas generation for each year for Ballymurtagh landfill.

Figure 4.1: Average hourly rate of landfill gas generated at the facility for each year 1990 to 2130.

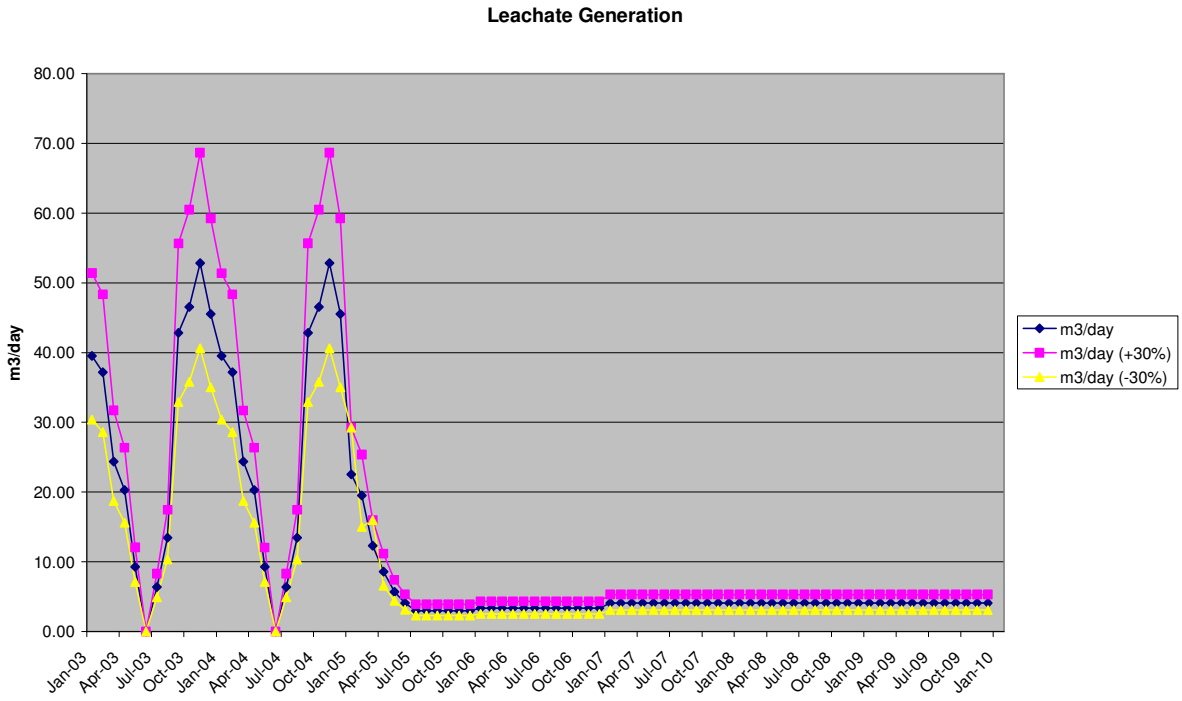


The flare at Ballymurtagh has a capacity of 500m^3/hr.

4.4 MONTHLY WATER BALANCE CALCULATION AND INTERPRETATION

Monthly rainfall data obtained from the Met Eireann weather station at Casement recorded a total of approximately 816.2mm of rainfall in 2009. Evapotranspiration data was obtained from Met Éireann's weather station at the Casement Aerodrome. The total estimated amount of rainfall lost to evapotranspiration is estimated at 503.7mm. Monthly volumes of leachate were calculated for the entire landfill area based on monthly rainfall, area and the stage at which the area is at i.e. completely filled and permanently capped. The water balance calculations are outlined in Appendix D. Figure 4.2 shows the estimated leachate generation for the reporting period and projections for 2009.

Figure 4.2: Estimated leachate generation at Ballymurtagh Landfill 2003-2009



It is estimated that up to 1,492.4 m^3 of leachate were generated during the reporting period, 124.4m^3/month. This amount is similar to the estimated figure of 91m^3/month as calculated before capping.

**Note Casement data was used to calculate leachate generation in 2009*

4.5 EMISSIONS TO GROUNDWATER

The landfill was designed on a 'dilute and disperse' principle with no leachate containment measures put in place. The leachate, which is attenuated by the underlying soil and groundwater, drains naturally to the Avoca River.

5 SITE DEVELOPMENT WORKS

5.1 DEVELOPMENT WORKS UNDERTAKEN DURING 2009

No development works were carried out on site in 2009.

5.2 PROPOSED DEVELOPMENT WORKS

It is proposed to implement 2 new leachate wells on site. In addition to this an amemometer is proposed for the site. This is outlined in the EIS review which was submitted to the agency in November 2009.

6 ENVIRONMENTAL MANAGEMENT

The Facility Manager, assisted by the Senior Engineer, is responsible for achieving the schedule of objectives and targets, which are set out in the EMP. The responsibilities and time scales for achieving the objectives and targets for 2010 - 2014 are outlined in Table 6.1. As waste acceptance ceased in 2002, the objectives and targets mainly relate to the protection of the receiving environment and the aftercare of the facility.

Table 6.2 discusses the % completion of the Schedule of Objective & Targets set for 2009 - 2013.

6.1 ENVIRONMENTAL INCIDENTS

Corrective Action Report Forms relating to incidents occurring in 2009 are included in quarterly reports forwarded to the agency throughout the year.

6.2 PROCEDURES

The updated Environmental Management Plan and associated procedures was forwarded to the Agency in October 2009.

6.3 REPORTS ON FINANCIAL PROVISIONS

Wicklow County Council allocates funding on an annual basis from its revenue sources. The fund will be maintained in an amount always sufficient to underwrite the current Restoration and Aftercare Plan in accordance with Condition 11 of the Waste Licence.

Table 6.1: Schedule of Environmental Objectives and Targets for 2010 - 2014

SCHEDULE OF OBJECTIVES AND TARGETS 2010 - 2014			
Objective	**Target**	**Responsible Party**	**Completion Date**
Improve the environmental performance of the facility	Undertake regular reviews of Facility to assess compliance of site with Waste Licence	Facility Manager	Ongoing
Reduce potential odour at the facility	Minimise the number of landfill gas flare shutdowns and ensure that the flare is operating as near to 100% of the time as possible.	Facility Manager	Ongoing
Encourage public to recycle their waste	To inform the public of the waste accepted at the civic waste facility by issuing information at the civic waste facility office to members of the public, radio and newspaper advertisements	CWF Supervisor Facility Manager	Ongoing
Provide for the protection of the receiving environment.	Wicklow County Council will support any remedial action taken to improve the quality of the Avoca River. A report into the investigation of treatment of groundwater discharges from the adits was completed in February 2007. (University of Newcastle)	Senior Engineer	Ongoing
Accept additional waste materials at the Civic Waste Facility	Source further recycling/re-use opportunities	CWF Supervisor Facility Manager	Ongoing

Table 6.2. % Completion of Schedule of Objectives & Targets for 2009-2013

SCHEDULE OF OBJECTIVES AND TARGETS 2009-2013				
Objective	**Target**	**Responsible Party**	**%Completion**	**Comment**
Improve the environmental performance of the facility	Undertake regular reviews of Facility to assess compliance of site with Waste Licence	Facility Manager	Ongoing	Compliance of the facility is discussed on a regular basis.
	Submit Application for Review of Waste Licence (and accompanying EIS)	Director of Services	100%	A review of Waste Licence and an accompanying EIS was submitted in November 2009.
Reduce potential odour at the facility	Minimise the number of landfill gas flare shutdowns and ensure that the flare is operating as near to 100% of the time as possible.	Facility Manager	Ongoing	
Encourage public to recycle their waste	To inform the public of the waste accepted at the civic waste facility by issuing information at the civic waste facility office to members of the public, radio and newspaper advertisements	CWF Supervisor Facility Manager	Ongoing	
Provide for the protection of the receiving environment.	Wicklow County Council will support any remedial action taken to improve the quality of the Avoca River. A report into the investigation of treatment of groundwater discharges from the adits was completed in February 2007. (University of Newcastle)	Senior Engineer	Ongoing	
Accept additional waste materials at the Civic Waste Facility	Source further recycling/re-use opportunities	CWF Supervisor Facility Manager	Ongoing	

7 STAFFING AT BALLYMURTAGH LANDFILL

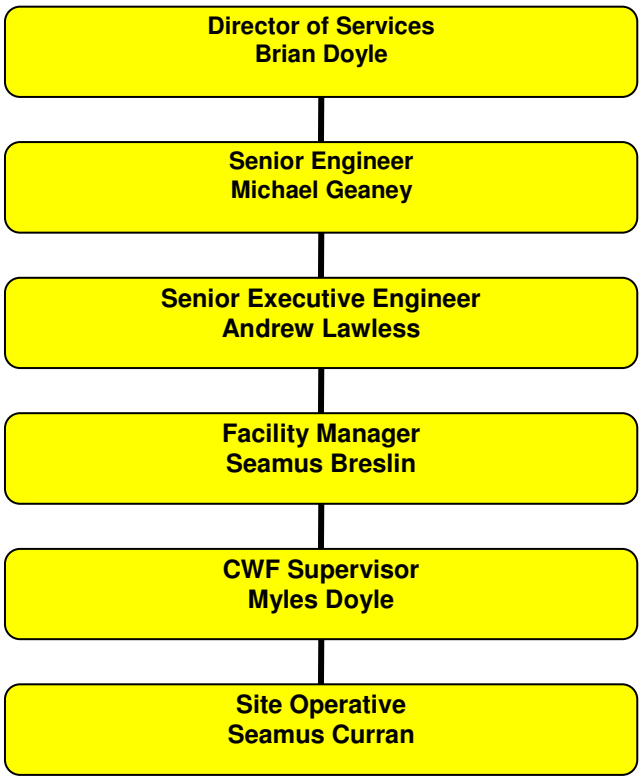
The site is under the overall operational control of the Director of Services and the Senior Engineer who provide office support as required. The Facility Manager is responsible for the day-to-day supervision and management of the site. The Facility Manager maintains regular contact with County Buildings, with regular site visits from the Senior Executive Engineer. RPS Consulting Engineers advises Wicklow County Council on operations at the facility and waste licence compliance issues. Table 7.1 provides details of the management in 2009.

Table 7.1: Managerial Staff

Position	Contact details
Mr Brian Doyle, Director of Services (Environmental & Sanitary Services)	Wicklow County Council, County Buildings, Wicklow. Telephone No: 0404 20100 Fax No: 0404-67792
Mr Michael Geaney, Senior Engineer (Environmental & Sanitary Services)	Wicklow County Council, County Buildings, Wicklow.
Mr Andrew Lawless, Senior Executive Engineer (Environmental & Sanitary Services)	Wicklow County Council, County Buildings, Wicklow.
Mr Seamus Breslin, Facility Manager	Wicklow County Council, County Buildings, Wicklow.

Figure 7.1 outlines the management structure for the site. A supervisor is also employed to run the civic waste facility. Any changes to this structure will be submitted to the Agency for agreement in accordance with Condition 2.6 of Waste Licence Reg. No. W0011-1.

Figure 7.1: Management Structure & Organisational Chart



7.1 ECONOMIC CONTRIBUTION

The operation of the landfill employed 4 local employees when it was in operation. Since closing in December 2002, one employee has taken the position of site supervisor at the Civic Waste Facility and another employee as Civic Waste Facility operator.

8 NUISANCE CONTROL

Wicklow County Council undertake weekly inspections of the landfill and civic waste facility to identify any environmental nuisances caused by litter, dust, odour and vermin. An inspection form is outlined in the EMP and forms part of the Corrective Action Procedure.

8.1 LITTER

The Facility Manager ensures that the facility is kept free from litter. In the event of fly tipping, the Facility Manager notifies and organises for the proper disposal of the waste.

8.2 ODOUR

In the event of odour detection, the Facility Manager has regard to the Corrective Action Procedure.

Irish Power Systems (IPS) visit the site on a weekly basis to maintain the gas extraction system so as to minimise flare failure which may lead to landfill gas migration and subsequent odour complaints.

8.3 VERMIN CONTROL

The Procedure for the Control of Vermin (set out in the EMP) outlines measures to ensure that vermin do not give rise to nuisance at the landfill and civic waste facility.

The Facility Manager oversees the implementation of the procedure for the control and eradication of pests. However, since waste acceptance has ceased at the landfill facility, the potential for vermin, pests, birds, etc has been much reduced.

APPENDIX A

Monitoring Results

Ballymurtagh Landfill Co Wicklow
Surface Water Quality
2009

Parameter	Units	Surface Water Regulations 1989 Max. Admissable Conc.	Environmental Quality Standards EPA Interim Report 2003	SW1 Whitesbridge s/w sample 9-Mar-09	SW1 Whitesbridge s/w sample 8-Jun-09	SW1 Whitesbridge s/w sample 24-Sep-09	SW1 Whitesbridge s/w sample 21-Nov-09
Total Alkalinity	mg/L	**-**	**-**	-	-		20
Ammonium	mg/L	**0.2**	**0.02**	<0.08	<0.08	<0.08	<0.08
BOD	mg/L	**7**	**-**	<3	<2	4	<2
Cadmium	mg/L	**0.005**	**0.005**	-	-		0.0002
Calcium	mg/L	**-**	**-**	-	-		5
Chloride	mg/L	**250**	**250**	8	7	9	8
COD	mg/L	**40**	**-**	14	9	9	12
Conductivity	uS/cm at 20°C	**1,000**	**1,000**	61	61	86	59
Copper	mg/L	**0.05**	**0.03**	-	-		0.017
Dissolved Oxygen (on site)	mg/L	**-**	**-**	8.3	10	10.1	10.8
Iron	mg/L	**0.2**	**0.2**	-	-	-	0.24
Lead	mg/L	**0.05**	**0.01**	-	-	-	0.0060
Magnesium	mg/L	**-**	**-**	-	-	-	2
Manganese	mg/L	**0.05**	**0.3**	-	-	-	0.04
Mercury	mg/L	**0.001**	**0.001**	-	-	-	<0.05
Orthophosphate	mg/L	**-**	**-**		-	-	<1
pH	mg/L	**5.5 < pH < 9**	**-**	7.1	7.4	6.8	6.2
Potassium	mg/L	**-**	**-**	-	-	-	<1
Sodium	mg/L	**-**	**-**	-	-	-	6
Sulphate	mg/L	**200**	**200**	6	5	12	6
Suspended Solids	mg/L	**50**	**-**	<1	2	1	9
Temperature (on site)	mg/L	**25**	**-**	4	12	11	9
Chromium	mg/L	**0.05**	**0.03**	-	-	-	<0.001
Total Oxidised Nitrogen	mg/L	**-**	**-**	-	-	-	1
Total Phosphorus as P	mg/L	**-**	**-**	-	-	-	<0.05
Zinc	mg/L	**3**	**0.1**	-	-	-	0.05

Ballymurtagh Landfill Co Wicklow
Surface Water Quality
2009

Parameter	Units	Surface Water Regulations 1989 Max. Admissable Conc.	Environmental Quality Standards EPA Interim Report 2003	SW2 Whitesbridge s/w sample 9-Mar-09	SW2 Upstream adit s/w sample 8-Jun-09	SW2 Whitesbridge s/w sample 24-Sep-09	SW2 Whitesbridge s/w sample 21-Nov-09
Total Alkalinity	mg/L	-	-	-	-	-	15
Ammonium	mg/L	0.2	0.02	<0.08	<0.08	<0.08	<0.08
BOD	mg/L	7	-	<2	<2	4	<2
Cadmium	mg/L	0.005	0.005	-	-	-	0.0002
Calcium	mg/L	-	-	-	-	-	5
Chloride	mg/L	250	250	8	7	9	8
Chromium	mg/L	0.05	0.03	-	-	-	<0.001
COD	mg/L	40	-	8	13	9	12
Conductivity	uS/cm at 20°C	1,000	1,000	76	65	116	58
Copper	mg/L	0.05	0.03	-	-	-	0.028
Dissolved Oxygen (on site)	mg/L	-	-	8.3	11	10.2	10.9
Iron	mg/L	0.2	0.2	-		-	0.26
Lead	mg/L	0.05	0.01	-		-	0.0060
Magnesium	mg/L	-	-	-		-	2
Manganese	mg/L	0.05	0.3	-		-	0.05
Mercury	mg/L	0.001	0.001	-	-	-	<0.05
Orthophosphate	mg/L	-	-	-	-	-	<1
pH	mg/L	5.5 < pH < 9	-	7.0	7.4	6.8	6.1
Potassium	mg/L	-	-	-	-	-	<1
Sodium	mg/L	-	-	-	-	-	5
Sulphate	mg/L	200	200	11	9	13	8
Suspended Solids	mg/L	50	-	2	3	2	7
Temperature (on site)	mg/L	25	-	4	12	-	9
Total Oxidised Nitrogen	mg/L	-	-	-	-	-	1
Total Phosphorus as P	mg/L	-	-	-	-	-	<0.05
Zinc	mg/L	3	0.1	-	-	11	0.06

Ballymurtagh Landfill Co Wicklow

Surface Water Quality

2009

Parameter	Units	Surface Water Regulations 1989 Max. Admissable Conc.	Environmental Quality Standards EPA Interim Report 2003	SW3 9-Mar-09	SW3 8-Jun-09	SW3 24-Sep-09	SW3 21-Nov-09
Total Alkalinity	mg/L	-	-	-	<0.5	-	<0.5
Ammonium	mg/L	**0.2**	**0.02**	8.2	8.9	**8.3**	6.9
BOD	mg/L	**7**	-	13	11	**12**	<3
Cadmium	mg/L	**0.005**	**0.005**	-	0.018	-	0.0200
Calcium	mg/L	-	-	-	253	-	228
Chloride	mg/L	**250**	**250**	37	36	33	35
COD	mg/L	**40**	-	15	14	22	20
Conductivity	uS/cm at 20°C	**1,000**	**1,000**	1810	1944	**1895**	2200
Copper	mg/L	**0.05**	**0.03**	-	0.37	-	0.52
Dissolved Oxygen (on site)	mg/L	-	-	5.4	5	8.2	2.6
Iron	mg/L	**0.2**	**0.2**	-	106	-	197
Lead	mg/L	**0.05**	**0.01**	-	0.351	-	0.3440
Magnesium	mg/L	-	-	-	98	-	156
Manganese	mg/L	**0.05**	**0.3**	-	8.8	-	13.7
Mercury	mg/L	**0.001**	**0.001**	-	0.00013	-	<0.05
Orthophosphate	mg/L	-	-	-	0.10	-	<10
pH	mg/L	**5.5 < pH < 9**	-	4.3	4.4	**4.3**	3.9
Potassium	mg/L	-	-	-	10	-	9
Sodium	mg/L	-	-	-	20	-	22
Sulphate	mg/L	**200**	**200**	1195	1236	**1311**	1581
Suspended Solids	mg/L	**50**	-	3	3	2	<1
Temperature (on site)	mg/L	**25**	-	11	12	13	12
Chromium	mg/L	**0.05**	**0.03**	-	<1	-	<0.001
Total Oxidised Nitrogen	mg/L	-	-	-	0.4	-	0.6
Total Phosphorus as P	mg/L	-	-	-	0.06	-	0.05
Zinc	mg/L	**3**	**0.1**	-	12	-	18

Ballymurtagh Landfill Co Wicklow
Surface Water Quality
2009

Parameter	Units	Surface Water Regulations 1989 Max. Admissable Conc.	Environmental Quality Standards EPA Interim Report 2003	SW4 Coal Yard s/w sample 9-Mar-09	SW4 Coal Yard s/w sample 8-Jun-09	SW4 Coal Yard s/w sample 24-Sep-09	SW4 Coal Yard s/w sample 21-Nov-09
Total Alkalinity	mg/L	-	-	-	-	-	10
Ammonium	mg/L	0.2	0.02	0.09	<0.08	0.24	<0.08
BOD	mg/L	7	-	<2	<2	<2	<2
Cadmium	mg/L	0.005	0.005	-	-		0.0004
Calcium	mg/L	-	-	-	-		6
Chloride	mg/L	250	250	9	7	10	8
Chromium	mg/L	0.05	0.03	-	-		<0.001
COD	mg/L	40	-	11	13	8	10
Conductivity	uS/cm at 20°C	1,000	1,000	89	66	133	82
Copper	mg/L	0.05	0.03	-	-		0.01
Dissolved Oxygen (on site)	mg/L	-	-	8.0	11	10	10.7
Iron	mg/L	0.2	0.2	-	-		0.87
Lead	mg/L	0.05	0.01	-	-		0.0080
Magnesium	mg/L	-	-	-	-		3
Manganese	mg/L	0.05	0.3	-	-		0.10
Mercury	mg/L	0.001	0.001	-	-		<0.05
pH	mg/L	5.5 < pH < 9	-	6.4	6.7	6.4	5.8
Potassium	mg/L	-	-	-	-		<1
Sodium	mg/L	-	-	-	-		6
Sulphate	mg/L	200	200	19	11	30	14
Suspended Solids	mg/L	50	-	6	5	2	9
Temperature (on site)	mg/L	25	-	5	12	11	9
Total Oxidised Nitrogen	mg/L	-	-	-	-		1
Total Phosphorus as P	mg/L	-	-	-	-		0.05
Zinc	mg/L	3	0.1	-	-		0.15

Ballymurtagh Landfill Co Wicklow
Surface Water Quality
2009

Parameter	Units	Surface Water Regulations 1989 Max. Admissable Conc.	Environmental Quality Standards EPA Interim Report 2003	SW5 Coal Yard s/w sample 9-Mar-09	SW5 Coal Yard s/w sample 8-Jun-09	SW5 Coal Yard s/w sample 24-Sep-09	SW5 Coal Yard s/w sample 21-Nov-09
Total Alkalinity	mg/L	-	-	-	-	-	15
Ammonium	mg/L	0.2	0.02	0.12	<0.08	<0.08	<0.08
BOD	mg/L	7	-	<2	<2	<2	<2
Cadmium	mg/L	0.005	0.005	-	-	-	0.0003
Calcium	mg/L	-	-	-	-	-	5
Chloride	mg/L	250	250	9	7	9	8
Chromium	mg/L	0.05	0.03	-	-	-	<0.001
COD	mg/L	40	-	10	14	9	6
Conductivity	uS/cm at 20°C	1,000	1,000	71	72	101	64
Copper	mg/L	0.05	0.03	-	-	-	0.15
Dissolved Oxygen (on site)	mg/L	-	-	8.3	11	10.3	10.6
Iron	mg/L	0.2	0.2	-	-	-	0.44
Lead	mg/L	0.05	0.01	-	-	-	0.0080
Magnesium	mg/L	-	-	-	-	-	2
Manganese	mg/L	0.05	0.3	-	-	-	0.07
Mercury	mg/L	0.001	0.001	-	-	-	<0.05
pH	mg/L	5.5 < pH < 9	-	6.6	8.0	6.7	6.0
Potassium	mg/L	-	-	-	-	-	<1
Sodium	mg/L	-	-	-	-	-	5
Sulphate	mg/L	200	200	12	7	19	10
Suspended Solids	mg/L	50	-	4	3	3	7
Temperature (on site)	mg/L	25	-	5	12	11	9
Total Oxidised Nitrogen	mg/L	-	-	-	-	-	1
Total Phosphorus as P	mg/L	-	-	-	-	-	<0.05
Zinc	mg/L	3	0.1	-	-	-	0.11

Parameter	Units	EPA Groundwater Guidelines 2003 IGV	BH96/3 09-Mar-09	BH96/3 08-Jun-09	BH96/3 24-Sep-09	BH96/3 23-Nov-09
Alkalinity			-	-		1270
Ammoniacal Nitrogen	mg/L	0.15	201	203	**202**	216
Boron	mg/L	1	-	-		0.77
Cadmium	mg/L	0.005	-	-		<0.0001
Calcium	mg/L	200	-	-		305
Chloride	mg/L	30	60	66	**63**	70
Total Chromium	mg/L	0.030	-	-		0.001
Conductivity(uS/cm @ 20	uS/cm at 20°C	1000	3830	3710	**3780**	3970
Copper	mg/L	0.03	-	-		0.014
Cyanide	mg/L	0.01	-	-		<0.01
Dissolved Oxygen	mg/L	No abnormal change	3.0	4.0	3.2	5.2
Fluoride	mg/L	1.00	-	-		0.67
Iron	mg/L	0.20	0.22	0.24	0.06	0.50
Lead	mg/L	0.01	-	-		<2
Magnesium	mg/L	50.00	-	-		212
Manganese	mg/L	0.05	-	-		7.0
Mercury	mg/L	0.001	-	-		<0.00005
Orthophosphate	mg/L	0.03	-	-		0.06
pH	pH Units	6.5-9.5	7.5	7.6	7.3	7.0
Potassium	mg/L	5	68	56	**63**	72
Residue on Evaporation @180'C			-	-		2465
Sodium	mg/L	150	52	47	43	52
Sulphate	–	200	1541	1713	**1445**	1214
Temperature, 'C	mg/L	25	14	14	13	14
TOC	mg/L	No abnormal change	20	18	18	21
Total Oxidised Nitrogen	mg/L	No abnormal change	<0.25	0.4	<0.24	<0.32
Total Phenols by Colourir	µg/L	0.5000	0.05	0.13	<0.05	<0.05
Total Phosphorus	mg/L	0.50	-	-	-	0.14
Zinc	mg/L	0.10	-	-	-	<0.01
Faecal Coliforms (cfu/100	cfu/100mls	0	0	0	0	0
Total Coliforms (cfu/100r	cfu/100mls	0	**>100**	**>100**	**>100**	**37**

Parameter	Units	EPA Groundwater Guidelines 2003 IGV	Twin Shafts 09-Mar-09	Twin Shafts 08-Jun-09	Twin Shafts 24-Sep-09	Twin Shafts 23-Nov-09
Alkalinity			-	-	-	40
Ammoniacal Nitrogen	mg/L	0.15	<0.08	<0.08	<0.08	<0.08
Boron	mg/L	1	-	-	-	0.14
Cadmium	mg/L	0.005	-	-	-	0.002
Calcium	mg/L	200	-	-	-	43
Chloride	mg/L	30	24	24	22	22
Total Chromium	mg/L	0.030	-	-	-	<.001
Conductivity(uS/cm @ 20'C)	uS/cm at 20°C	1000	350	378	349	314
Copper	mg/L	0.03	-	-	-	0.031
Cyanide	mg/L	0.01	-	-	-	<0.01
Dissolved Oxygen	mg/L	No abnormal change	3.0	9	10.6	10.6
Fluoride	mg/L	1.00	-	-	-	0.20
Iron	mg/L	0.20	0.09	0.11	<0.05	<0.05
Lead	mg/L	0.01	-	-	-	<2
Magnesium	mg/L	50.00	-	-	-	10
Manganese	mg/L	0.05	-	-	-	0.16
Mercury	mg/L	0.001	-	-	-	<0.00005
Orthophosphate	mg/L	0.03	-	-	-	<1
pH	pH Units	6.5-9.5	7.2	7.2	6.6	6.6
Potassium	mg/L	5	13	7	8	13
Residue on Evaporation @180'C			-	-	-	230
Sodium	mg/L	150	11	11	9	11
Sulphate	–	200	88	105	107	88
Temperature, 'C	mg/L	25	14	12	10	10
TOC	mg/L	No abnormal change	2.1	1.8	1.10	3.2
Total Oxidised Nitrogen	mg/L	No abnormal change	5.4	2.4	3.6	4.9
Total Phenols by Colourimetry	µg/L	0.5000	0.06	<0.05	<0.05	<0.05
Total Phosphorus	mg/L	0.50	-	-	-	<0.05
Zinc	mg/L	0.10	-	-	-	0.38
Faecal Coliforms (cfu/100mls)	cfu/100mls	0	0	0	8	2
Total Coliforms (cfu/100mls)	cfu/100mls	0	>100	>100	>100	>100

Parameter	Units	EPA Groundwater Guidelines 2003 IGV	SG1/05 09-Mar-09	SG1/05 08-Jun-09	SG1/05 24-Sep-09	SG1/05 23-Nov-09
Alkalinity			-	-	-	<0.5
Ammoniacal Nitrogen	mg/L	0.15	<0.08	<0.08	<0.08	<0.08
Boron	mg/L	1	-	-	-	0.19
Cadmium	mg/L	0.005	-	-	-	0.053
Calcium	mg/L	200	-	-	-	205
Chloride	mg/L	30	16	16	15	17
Total Chromium	mg/L	0.030	-	-	-	0.002
Conductivity(uS/cm @ 20'C)	uS/cm at 20°C	1000	1926	1513	**1847**	1959
Copper	mg/L	0.03	-	-	-	13
Cyanide	mg/L	0.01	-	-	-	<0.01
Dissolved Oxygen	mg/L	No abnormal change	2.3	6	5.4	6.1
Fluoride	mg/L	1.00	-	-	-	0.36
Iron	mg/L	0.20	0.67	0.33	0.45	16
Lead	mg/L	0.01	-	-	-	0.212
Magnesium	mg/L	50.00	-	-	-	139
Manganese	mg/L	0.05	-	-	-	8.1
Mercury	mg/L	0.001	-	-	-	<0.00005
Orthophosphate	mg/L	0.03	-	-	-	<5
pH	pH Units	6.5-9.5	4.1	3.8	**3.8**	3.4
Potassium	mg/L	5	2	1	2	2
Residue on Evaporation @180'C			-	-	-	2209
Sodium	mg/L	150	-	-	-	12
Sulphate	–	200	13	12	12	1525
Temperature, 'C	mg/L	25	1509	1094	12	10
TOC	mg/L	No abnormal change	5	11	1.60	1.7
Total Oxidised Nitrogen	mg/L	No abnormal change	1.9	1.5	1.4	1.2
Total Phenols by Colourimetry	µg/L	0.5000	<0.05	<0.05	<0.05	<0.05
Total Phosphorus	mg/L	0.50	-	-	-	0.07
Zinc	mg/L	0.10	-	-	-	20
Faecal Coliforms (cfu/100mls)	cfu/100mls	0	0	0	0	0
Total Coliforms (cfu/100mls)	cfu/100mls	0	**2**	**2**	**1**	0

Parameter	Units	EPA Groundwater Guidelines 2003 IGV	SG2/05 09-Mar-09	SG2/05 08-Jun-09	SG2/05 24-Sep-09	SG2/05 23-Nov-09
Alkalinity			-	-	-	<0.5
Ammoniacal Nitrogen	mg/L	0.15	<0.08	<0.08	<0.08	<0.08
Boron	mg/L	1	-	-	-	0.21
Cadmium	mg/L	0.005	-	-	-	0.040
Calcium	mg/L	200	-	-	-	185
Chloride	mg/L	30	15	17	15	16
Total Chromium	mg/L	0.030	-	-		0.002
Conductivity(uS/cm @ 20'C)	uS/cm at 20°C	1000	1432	1185	1219	1721
Copper	mg/L	0.03	-	-	-	9.4
Cyanide	mg/L	0.01	-	-	-	<0.01
Dissolved Oxygen	mg/L	No abnormal change	4.1	7	6.8	5.1
Fluoride	mg/L	1.00	-	-	-	2.6
Iron	mg/L	0.20	0.56	0.52	0.34	0.34
Lead	mg/L	0.01	-	-	-	<10
Magnesium	mg/L	50.00	-	-	-	108
Manganese	mg/L	0.05	-	-	-	6.3
Mercury	mg/L	0.001	-	-	-	<0.00005
Orthophosphate	mg/L	0.03	-	-	-	<2
pH	pH Units	6.5-9.5	3.9	3.8	3.8	3.4
Potassium	mg/L	5	2	1	2	2
Residue on Evaporation @180'C			-	-	-	1842
Sodium	mg/L	150	11	12	12	12
Sulphate	–	200	999	775	794	1245
Temperature, 'C	mg/L	25	5	11	12	10
TOC	mg/L	No abnormal change	1.5	1.4	1.30	1.8
Total Oxidised Nitrogen	mg/L	No abnormal change	1.1	1.3	1.2	1.4
Total Phenols by Colourimetry	µg/L	0.5000	<0.05	<0.05	<0.05	<0.05
Total Phosphorus	mg/L	0.50	-	-	-	0.13
Zinc	mg/L	0.10	-	-	-	13
Faecal Coliforms (cfu/100mls)	cfu/100mls	0	0	0	1	0
Total Coliforms (cfu/100mls)	cfu/100mls	0	10	10	11	6

Parameter	Units	EPA Groundwater Guidelines 2003 IGV	SG1/04 09-Mar-09	SG1/04 08-Jun-09	SG1/04 24-Sep-09	SG1/04 23-Nov-09
Alkalinity			-	-	-	<0.5
Ammoniacal Nitrogen	mg/L	0.15	1.7	0.41	**0.23**	0.26
Boron	mg/L	1	-	-	-	0.45
Cadmium	mg/L	0.005	-	-	-	1
Calcium	mg/L	200	-	-	-	311
Chloride	mg/L	30	20	32	**33**	20
Total Chromium	mg/L	0.030	-	-	-	0.050
Conductivity(uS/cm @ 20'C)	uS/cm at 20°C	1000	9110	9260	**9210**	9670
Copper	mg/L	0.03	-	-	-	98
Cyanide	mg/L	0.01	3.1	-	-	<0.01
Dissolved Oxygen	mg/L	No abnormal change	-	5.0	7.6	9.1
Fluoride	mg/L	1.00	94	-	-	26
Iron	mg/L	0.20	-	106	78	61
Lead	mg/L	0.01	-	-	-	0.072
Magnesium	mg/L	50.00	-	-	-	1237
Manganese	mg/L	0.05	-	-	-	59
Mercury	mg/L	0.001	-	-	-	<0.00005
Orthophosphate	mg/L	0.03	-	-	-	0.27
pH	pH Units	6.5-9.5	3.0	3.0	**3.0**	2.9
Potassium	mg/L	5	<5	<5	<5	<5
Residue on Evaporation @180'C			-	-	-	17644
Sodium	mg/L	150	6	13	8	9
Sulphate	–	200	12546	11861	**11896**	14295
Temperature, 'C	mg/L	25	6	12	13	11
TOC	mg/L	No abnormal change	8.7	11	7.60	7.6
Total Oxidised Nitrogen	mg/L	No abnormal change	<1.84	<0.89	1.3	<0.18
Total Phenols by Colourimetry	µg/L	0.5000	<0.05	0.12	<0.05	<0.05
Total Phosphorus	mg/L	0.50	-	-	-	0.46
Zinc	mg/L	0.10	-	-	-	266
Faecal Coliforms (cfu/100mls)	cfu/100mls	0	0	1	0	**1**
Total Coliforms (cfu/100mls)	cfu/100mls	0	**24**	**>101**	**11**	**18**

Parameter	Units	EPA Groundwater IGV	G2/04 09-Mar-09	G2/04 08-Jun-09	G2/04 24-Sep-09	G2/04 23-Nov-09
			-	-	-	
Alkalinity			-	-	-	<0.5
Ammoniacal Nitrogen	mg/L	0.15	-	-	-	2.1
Boron	mg/L	1	-	-	-	0.18
Cadmium	mg/L	0.005	-	-	-	0.064
Calcium	mg/L	200	-	-	-	112
Chloride	mg/L	30	-	-	-	11
Conductivity(uS/cm @ 20'C)	uS/cm at 20°C	1000	-	-	-	2980
Copper	mg/L	0.03	-	-	-	47
Cyanide	mg/L	0.01	-	-	-	<0.01
Dissolved Oxygen	mg/L	No abnormal change	-	-	-	9.3
Fluoride	mg/L	1.00	-	-	-	5.6
Iron	mg/L	0.20	-	-	-	4.5
Lead	mg/L	0.01	-	-	-	0.032
Magnesium	mg/L	50.00	-	-	-	280
Manganese	mg/L	0.05	-	-	-	15
Mercury	mg/L	0.001	-	-	-	<0.00005
Orthophosphate	mg/L	0.03	-	-	-	0.36
pH	pH Units	6.5-9.5	-	-	-	3.4
Potassium	mg/L	5	-	-	-	<5
Residue on Evaporation @180'C			-	-	-	4055
Sodium	mg/L	150	-	-	-	9
Sulphate	–	200	-	-	-	2689
Temperature, 'C	mg/L	25	-	-	-	12
TOC	mg/L	No abnormal change	-	-	-	2.2
Total Chromium	mg/L	0.030	-	-	-	0.007
Total Oxidised Nitrogen	mg/L	No abnormal change	-	-	-	2.6
Total Phenols by Colourimetry	µg/L	0.5000	-	-	-	<0.05
Total Phosphorus	mg/L	0.50	-	-	-	6.6
Zinc	mg/L	0.10	-	-	-	21
Faecal Coliforms (cfu/100mls)	cfu/100mls	0	-	-	-	**>100**
Total Coliforms (cfu/100mls)	cfu/100mls	0	-	-	-	**>100**

Parameter	Units	EPA Groundwater Guidelines 2003 IGV	RC6 09-Mar-09	RC6 08-Jun-09	RC6 24-Sep-09	RC6 23-Nov-09
Alkalinity			-	-	-	<0.5
Ammoniacal Nitrogen	mg/L	0.15	-	-	-	<0.08
Boron	mg/L	1	-	-	-	0.38
Cadmium	mg/L	0.005	-	-	-	0.156
Calcium	mg/L	200	-	-	-	316
Chloride	mg/L	30	-	-	-	12
Total Chromium	mg/L	0.030	-	-	-	0.013
Conductivity(uS/cm @ 20'C)	uS/cm at 20°C	1000	-	-	-	5920
Copper	mg/L	0.03	-	-	-	50
Cyanide	mg/L	0.01	-	-	-	<0.01
Dissolved Oxygen	mg/L	No abnormal change	-	-	-	9.7
Fluoride	mg/L	1.00	-	-	-	14
Iron	mg/L	0.20	-	-	-	107
Lead	mg/L	0.01	-	-	-	0.054
Magnesium	mg/L	50.00	-	-	-	482
Manganese	mg/L	0.05	-	-	-	23
Mercury	mg/L	0.001	-	-	-	<0.00005
Orthophosphate	mg/L	0.03	-	-	-	0.21
pH	pH Units	6.5-9.5	-	-	-	2.6
Potassium	mg/L	5	-	-	-	<5
Residue on Evaporation @180'C			-	-	-	8658
Sodium	mg/L	150	-	-	-	8
Sulphate	–	200	-	-	-	5803
Temperature, 'C	mg/L	25	-	-	-	11
TOC	mg/L	No abnormal change	-	-	-	3.5
Total Oxidised Nitrogen	mg/L	No abnormal change	-	-	-	<0.59
Total Phenols by Colourimetry	µg/L	0.5000	-	-	-	<0.05
Total Phosphorus	mg/L	0.50	-	-	-	0.15
Zinc	mg/L	0.10	-	-	-	49
Faecal Coliforms (cfu/100mls)	cfu/100mls	0	-	-	-	**1**
Total Coliforms (cfu/100mls)	cfu/100mls	0	-	-	-	**1**

Parameter	Units	EU Drinking Water Regulations 2000 S.I 439 of 2000	EPA Groundwater Guidelines 2003 Interim Guideline Value	Mary Merrigan g/w sample 09/03/2009	Mary Merrigan g/w sample 08/06/2009	Mary Merrigan g/w sample 24-Sep-09	Mary Merrigan g/w sample 23-Nov-09
Alkalinity	mg/l	-	*No Abnormal Change*	-	-	-	40
Ammonium	mg/l	**0.3**	**0.15**	<0.08	<0.08	<0.08	<0.08
Boron	mg/l	**1.0**	**1.0**	-	-	-	0.28
Cadmium	µg/l	**5**	**5**	-	-	-	<0.0001
Calcium	mg/l	**200**	**200**	-	-	-	23
Chloride	mg/l	**250.0**	**30.0**	10	10	9	8
Chromium	µg/l	**50**	**30**	-	-	-	<1
Conductivity	µS/cm @ 20'C	**1500**	**1,000**	173	161	164	177
Copper	µg/l	**2000**	**30**	-	-	-	0.005
Cyanide	mg/l	**0.05**	**0.01**	-	-	-	<0.01
Dissolved Oxygen	mg/l	-	-	5.6	8	7.3	9.0
Fluoride	mg/l	**1.0**	**1.0**	-	-	-	<0.1
Iron	mg/l	**0.2**	**0.2**	<0.05	0.05	<0.05	<0.05
Lead	µg/l	**10**	**10**	-	-	-	<2
Magnesium	mg/l	**-**	**-**	-	-	-	4
Manganese	mg/l	**50**	**50**	-	-	-	<0.03
Mercury	µg/l	**0.05**	**0.05**	-	-	-	<0.05
Nitrate	mg/l	**20**	**20**	-	-	-	-
Nitrite	mg/l	**50**	**25**	-	-	-	-
Orthophosphate	mg/l	**0.03**	**0.03**	-	-	-	<0.03
pH	pH Units	**>=6.5 and <=9.5**	**>=6.5 and <=9.5**	6.5	6.4	**5.9**	5.6
Phenols	mg/l	**-**	**0.5**	0.05	0.08	-	<0.05
Potassium	mg/l	**12.0**	**5.0**	<1	<1	<1	1
Residue on Evaporation	mg/l	**-**	**-**	-	-	-	96
Sodium	mg/l	**150**	**150**	6	7	6	6
Sulphate	mg/l	**250**	**200**	27	27	27	31
TOC	mg/l	**-**	*No Abnormal Change*	1.5	1.6	1.4	2.0
TON	mg/l	**-**	*No Abnormal Change*	3.2	2.6	2.1	3.0
Total Phosphorous	mg/l P	**-**	**-**	-	-	-	<0.05
Zinc	mg/l	**5**	**0.1**	-	-	-	0.06
Faecal Coliforms	CFU per 100 ml	**0**	**0**	0	1	0	**55**
Total Coliforms	CFU per 100 ml	**0**	**0**	4	3	**12**	**>100**

Parameter	Units	EU Drinking Water Regulations 2000 S.I 439 of 2000	EPA Groundwater Guidelines 2003 Interim Guideline Value	Eddie Coleman g/w sample 09/03/2009	Eddie Coleman g/w sample 08/06/2009	Eddie Coleman g/w sample 24-Sep-09	Eddie Coleman g/w sample 24-Sep-09
Alkalinity	mg/l	-	*No Abnormal Change*	-	-	-	15
Ammonium	mg/l	0.3	0.15	<0.08	<0.08	<0.08	<0.08
Boron	mg/l	1.0	1.0	-	-	-	0.25
Cadmium	µg/l	5	5	-	-	-	<0.0001
Calcium	mg/l	200	200	-	-	-	9
Chloride	mg/l	250.0	30.0	13	11	11	12
Chromium	µg/l	50	30	-	-	-	<1
Conductivity	µS/cm @ 20'C	1500	1,000	131	127	130	125
Copper	µg/l	2000	30	-	-	-	0.0720
Cyanide	mg/l	0.05	0.01	-	-	-	<0.01
Dissolved Oxygen	mg/l	-	-	4.1	8	9.3	9.1
Fluoride	mg/l	1.0	1.0	-	-		0.10
Iron	mg/l	0.2	0.2	0.15	0.11	<0.05	<0.05
Lead	µg/l	10	10	-	-	-	5
Magnesium	mg/l	-	-	-	-	-	4
Manganese	mg/l	50	50	-	-	-	0.05
Mercury	µg/l	0.05	0.05	-	-	-	<0.05
Nitrate	mg/l	20	20	-	-	-	-
Nitrite	mg/l	50	25	-	-	-	-
Orthophosphate	mg/l	0.03	0.03	-	-	-	<0.03
pH	pH Units	>=6.5 and <=9.5	>=6.5 and <=9.5	5.7	5.7	5.3	5.2
Phenols	mg/l	-	0.5	<0.05	<0.05		0.05
Potassium	mg/l	12.0	5.0	1	1	2	2
Residue on Evaporation	mg/l	-	-	-	-	-	61
Sodium	mg/l	150	150	9	9	8	8
Sulphate	mg/l	250	200	29	23	24	23
TOC	mg/l	-	*No Abnormal Change*	0.73	1.4	0.64	0.71
TON	mg/l	-	*No Abnormal Change*	1.8	3.0	2.9	3.1
Total Phosphorous	mg/l P	-	-	-	-	-	-
Zinc	mg/l	5	0.1	-	-	-	0.12
Faecal Coliforms	CFU per 100 ml	0	0	0	7	0	0
Total Coliforms	CFU per 100 ml	0	0	0	>100	0	0

Parameter	Units	EU Drinking Water Regulations 2000 S.I 439 of 2000	EPA Groundwater Guidelines 2003 Interim Guideline Value	Donal O' Leary g/w sample 09/03/2009	Donal O' Leary g/w sample 08/06/2009	Donal O' Leary g/w sample 24-Sep-09	Donal O' Leary g/w sample 24-Sep-09
Alkalinity	mg/l	-	*No Abnormal Change*	-	-		40
Ammonium	mg/l	**0.3**	**0.15**	<0.08	<0.08	<0.08	<0.08
Boron	mg/l	**1.0**	**1.0**	-	-		0.230
Cadmium	µg/l	**5**	**5**	-	-		<0.0001
Calcium	mg/l	**200**	**200**	-	-		9
Chloride	mg/l	**250.0**	**30.0**	12	11	13	12
Chromium	µg/l	**50**	**30**	-	-		<1
Conductivity	µS/cm @ 20'C	**1500**	**1,000**	143	139	134	142
Copper	µg/l	**2000**	**30**	-	-		<.002
Cyanide	mg/l	**0.05**	**0.01**	-	-		<0.01
Dissolved Oxygen	mg/l	-	-	5.5	8	9.5	9.1
Fluoride	mg/l	**1.0**	**1.0**	-	-		<0.10
Iron	mg/l	**0.2**	**0.2**	<0.05	0.13	<0.05	0.07
Lead	µg/l	**10**	**10**	-	-		<2
Magnesium	mg/l	**-**	**-**	-	-		7
Manganese	mg/l	**50**	**50**	-	-		0.04
Mercury	µg/l	**0.05**	**0.05**	-	-		<0.05
Nitrate	mg/l	**20**	**20**	-	-	-	-
Nitrite	mg/l	**50**	**25**	-	-	-	-
Orthophosphate	mg/l	**0.03**	**0.03**	-	-		<0.03
pH	pH Units	**>=6.5 and <=9.5**	**>=6.5 and <=9.5**	6.1	5.9	6	6.1
Phenols	mg/l	**-**	**0.5**	0.06	<0.05		0.06
Potassium	mg/l	**12.0**	**5.0**	2	1	2	2
Residue on Evaporation	mg/l	**-**	**-**	-	-		76
Sodium	mg/l	**150**	**150**	8	8	11	10
Sulphate	mg/l	**250**	**200**	23	28	12	17
TOC	mg/l	**-**	*No Abnormal Change*	0.76	1.9	0.26	0.26
TON	mg/l	**-**	*No Abnormal Change*	3.2	2.5	3.9	2.3
Total Phosphorous	mg/l P	**-**	**-**	-	-	-	-
Zinc	mg/l	**5**	**0.1**	-	-	-	0.10
Faecal Coliforms	CFU per 100 ml	**0**	**0**	0	0	0	0
Total Coliforms	CFU per 100 ml	**0**	**0**	0	6	**1**	**1**

Parameter	Units	EU Drinking Water Regulations 2000 S.I 439 of 2000	EPA Groundwater Guidelines 2003 Interim Guideline Value	Jeffery Green g/w sample 09/03/09	Jeffery Green g/w sample 08/06/09	Jeffery Green g/w sample 24-Sep-09	Jeffery Green g/w sample 23-Nov-09
Alkalinity	mg/l	-	*No Abnormal Change*	-	-	-	10
Ammonium	mg/l	0.3	0.15	<0.08	<0.08	<0.08	<0.08
Boron	mg/l	1.0	1.0	-	-	-	<.100
Cadmium	µg/l	5	5	-	-	-	0.00015
Calcium	mg/l	200	200	-	-	-	10
Chloride	mg/l	250.0	30.0	14	12	12	11
Chromium	µg/l	50	30	-	-	-	<1
Conductivity	µS/cm @ 20'C	1500	1,000	140	150	127	130
Copper	µg/l	2000	30	-	-	-	0.095
Cyanide	mg/l	0.05	0.01	-	-	-	<0.01
Dissolved Oxygen	mg/l	-	-	5.8	9	4.6	9.3
Fluoride	mg/l	1.0	1.0	-	-	-	0.13
Iron	mg/l	0.2	0.2	<0.05	0.07	0.19	0.06
Lead	µg/l	10	10	-	-	-	<2
Magnesium	mg/l	-	-	-	-	-	4
Manganese	mg/l	50	50	-	-	-	0.17
Mercury	µg/l	0.05	0.05	-	-	-	<0.05
Nitrate	mg/l	20	20	-	-	-	<0.03
Nitrite	mg/l	50	25	-	-	-	
Orthophosphate	mg/l	0.03	0.03	-	-	-	
pH	pH Units	>=6.5 and <=9.5	>=6.5 and <=9.5	6.5	6.9	5.4	5.3
Phenols	mg/l	-	0.5	<0.05	<0.05	-	0.06
Potassium	mg/l	12.0	5.0	<1	1	<1	2
Residue on Evaporation	mg/l	-	-	-	-	-	57
Sodium	mg/l	150	150	<1	10	9	8
Sulphate	mg/l	250	200	12	11	29	27
TOC	mg/l	-	*No Abnormal Change*	0.28	0.86	0.57	1.1
TON	mg/l	-	*No Abnormal Change*	4.4	3.7	0.94	2.3
Total Phosphorous	mg/l P	-	-	-	-	-	
Zinc	mg/l	5	0.1	-	-	-	0.29
Faecal Coliforms	CFU per 100 ml	0	0	0	4	0	1
Total Coliforms	CFU per 100 ml	0	0	0	9	0	15

Ballymurtagh Landfill, Co. Wicklow Leachate Composition on site 2009						
Parameter	**Units**	**Typical Leachate Range (EPA Manual)**	**L05/10**	**L05/10**	**L05/10**	**L05/10**
			09-Mar-09	**08-Jun-09**	**24-Sep-09**	**23-Nov-09**
Alkalinity	mg/l $CaCO_3$	**176 - 8840**	-	-	-	-
Ammonia	mg/l NH_4	**<0.2 - 1700**	522	-	-	-
B.O.D	mg/l	**4.5 - >4800**	47	-	-	-
Boron	mg/l	**<0.02 - 116**	-	-	-	-
C.O.D.	mg/l	**<10 - 33700**	947	-	-	-
Cadmium	µg/l	**<10 - 330**	-	-	-	-
Calcium	mg/l	**43 - 1440**	-	-	-	-
Chloride	mg/l	**27 - 3410**	718	-	-	-
Chromium	µg/l	**<40 - 560**	-	-	-	-
Conductivity	uS/cm @20°C	**503 - 19,200**	9230	-	-	-
Copper	µg/l	**<20 - 160**	-	-	-	-
Cyanide (total)	mg/l	**<0.05 - 0.16**	-	-	-	-
Dissolved Oxygen	mg/l	**-**				
Fluoride	mg/l	**n/a**	-	-	-	-
Iron	mg/l	**0.4 - 664**	-	-	-	-
Lead	µg/l	**<40 - 280**	-	-	-	-
Magnesium	mg/l	**18 - 470**	-	-	-	-
Manganese	mg/l	**0.1 - 23.2**	-	-	-	-
Mercury	ug/l	**<0.1 - 1.0**	-	-	-	-
Nickel	mg/l	**<0.03 - 0.33**				
Odour	-	**-**	musty	-	-	-
Orthophosphate	mg/l	**-**	-	-	-	-
pH	pH unit	**6.4 - 8.0**	7.8	-	-	-
Phenols	mg/l	**-**	0.09	-	-	-
Phosphorus (Total)	mg/l P	**-**	-	-	-	-
Potassium	mg/l	**2.7 - 1480**	-	-	-	-
Sodium	mg/l	**12 - 3000**	-	-	-	-
Sulphate	mg/l	**<5 - 739**	-	-	-	-
T.O.C.	mg/l	**2.8 - <5690**	-	-	-	-
Temperature (on site)	°C	**-**	37	-	-	-
Total Oxidised Nitrogen	mg/l N	**-**	<0.71	-	-	-
Zinc	mg/l	**<0.01 - 6.7**	-	-	-	-
Faecal Coliforms	CFU per 100 ml	**-**	0	-	-	-
Total Coliforms	CFU per 100 ml	**-**	**>100**	**-**	**-**	**-**
Leachate Level	(m)	**-**	-	-	-	-
Depth	(m)	**-**	-	-	-	-
Visual Description	-	**-**	Brown, lots of suspended solids	-	-	-

Ballymurtagh Landfill, Co. Wicklow
Leachate Composition on site
2009

Parameter	Units	Typical Leachate Range (EPA Manual)	L05/16 09-Mar-09	L05/16 08-Jun-09	L05/16 24-Sep-09	L05/16 23-Nov-09
Alkalinity	mg/l $CaCO_3$	**176 - 8840**	-	-	-	430
Ammonia	mg/l NH_4	**<0.2 - 1700**	-	10	-	10
B.O.D	mg/l	**4.5 - >4800**	-	15	-	9
Boron	mg/l	**<0.02 - 116**	-	-	-	0.220
C.O.D.	mg/l	**<10 - 33700**	-	104	-	89
Cadmium	µg/l	**<10 - 330**	-	-	-	<0.1
Calcium	mg/l	**43 - 1440**	-	-	-	213
Chloride	mg/l	**27 - 3410**	-	16	-	16
Chromium	µg/l	**<40 - 560**	-	-	-	2
Conductivity	uS/cm @20°C	**503 - 19,200**	-	1,250	-	1184
Copper	µg/l	**<20 - 160**	-	-	-	9
Cyanide (total)	mg/l	**<0.05 - 0.16**	-	-	-	<0.01
Dissolved Oxygen	mg/l	**-**	-	-	-	-
Fluoride	mg/l	**n/a**	-	-	-	0.21
Iron	mg/l	**0.4 - 664**	-	-	-	12
Lead	µg/l	**<40 - 280**	-	-	-	<2
Magnesium	mg/l	**18 - 470**	-	-	-	39
Manganese	mg/l	**0.1 - 23.2**	-	-	-	3.4
Mercury	ug/l	**<0.1 - 1.0**	-	-	-	<0.05
Nickel	mg/l	**<0.03 - 0.33**	-	-	-	-
Odour	-	**-**	-	musty	-	-
Orthophosphate	mg/l	**-**	-	-	-	0.03
pH	pH unit	**6.4 - 8.0**	-	7.1	-	6.6
Phenols	mg/l	**-**	-	<0.05	-	<0.05
Phosphorus (Total)	mg/l P	**-**	-	-	-	1.3
Potassium	mg/l	**2.7 - 1480**	-	-	-	12
Sodium	mg/l	**12 - 3000**	-	-	-	22
Sulphate	mg/l	**<5 - 739**	-	-	-	298
T.O.C.	mg/l	**2.8 - <5690**	-	-	-	-
Temperature (on site)	°C	**-**	-	21	-	15
Total Oxidised Nitrogen	mg/l N	**-**	-	<0.19	-	<0.18
Zinc	mg/l	**<0.01 - 6.7**	-	-	-	0.02
Faecal Coliforms	CFU per 100 ml	**-**	-	0	-	0
Total Coliforms	CFU per 100 ml	**-**	-	**>100**	**-**	**>100**
Leachate Level	(m)	**-**	-	-	-	-
Depth	(m)	**-**	-	-	-	-
Visual Description	-	**-**	-	Brown, lots of suspended solids	-	-

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:**			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 30/01/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 986 - 999	
			Mean Temperature: 20C	
Results				
Sample Station Number	**CH_4** (%v/v)	**CO_2** (%v/v)	**O_2** (%v/v)	**Comments:**
G1	0.00	0.10	20.70	
G2	0.00	**2.70**	15.10	
G3	0.00	0.20	20.70	
G4	0.00	**6.60**	7.60	
G6	0.00	**4.10**	14.10	
Ballygahan Adit	0.00	0.00	20.90	
Ballymurtagh Adit	0.00	0.00	20.90	
G7	0.00	**4.60**	14.00	
G8	0.00	0.60	20.00	
GW2/04	0.00	0.30	20.40	
RC 6	0.00	0.00	20.90	
GW1/04	0.00	0.00	20.90	
GW1/05	0.00	0.80	19.60	
GW2/05	0.00	**1.70**	19.40	
FLARE	**29.00**	**31.00**	0.00	
TWIN SHAFTS	0.00	0.00	20.90	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling: 02/03/09**		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 996 - 1008	
			Mean Temperature: 7.6C	
Results				
Sample Station Number	**CH_4** (%v/v)	**CO_2** (%v/v)	**O_2** (%v/v)	**Comments:**
G1	0.00	0.60	20.00	
G2	0.00	**1.90**	16.70	
G3	0.00	0.30	20.60	
G4	0.00	0.20	20.30	
G6	0.00	**4.60**	13.10	
Ballygahan Adit	0.00	0.00	20.70	
Ballymurtagh Adit	0.00	0.00	20.80	
G7	0.00	**3.20**	15.20	
G8	0.00	0.30	20.30	
GW2/04	0.00	0.40	19.80	
RC 6	0.00	0.00	20.70	
GW1/04	0.00	0.00	20.60	
GW1/05	0.00	1.00	19.10	
GW2/05	0.00	**1.70**	18.60	
FLARE	**20.50**	**26.00**	0.50	
TWIN SHAFTS	0.00	0.40	20.40	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 30/03/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 1001 - 1012	
			Mean Temperature: 9.5C	
Results				
Sample Station Number	**CH_4**	**CO_2**	**O_2**	**Comments:**
	(%v/v)	**(%v/v)**	**(%v/v)**	
G1	0.00	0.40	20.40	
G2	0.00	0.00	20.80	
G3	0.00	0.50	20.30	
G4	0.00	0.00	20.80	
G6	0.00	**4.50**	13.80	
Ballygahan Adit	0.00	0.00	20.80	
Ballymurtagh Adit	0.00	0.00	20.70	
G7	0.00	**3.50**	15.60	
G8	0.00	0.00	20.80	
GW2/04	0.00	0.40	19.40	
RC 6	0.00	0.00	20.80	
GW1/04	0.00	0.00	20.70	
GW1/05	0.00	0.90	19.60	
GW2/05	0.00	**1.80**	18.70	
FLARE	**25.00**	**29.00**	0.80	
TWIN SHAFTS	0.00	0.00	20.80	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:**			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling: 29/04/09**		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 986-999	
			Mean Temperature: 8.8℃	
Results				
Sample Station Number	**CH_4**	**CO_2**	**O_2**	**Comments:**
	(%v/v)	**(%v/v)**	**(%v/v)**	
G1	0.0	0.6	20.0	
G2	0.0	0.0	20.7	
G3	0.0	0.6	20.0	
G4	0.0	0.2	20.2	
G6	0.0	**3.7**	13.2	
Ballygahan Adit	0.0	0.0	20.8	
Ballymurtagh Adit	0.0	0.0	20.5	
G7	0.0	**2.7**	15.8	
G8	0.0	0.1	20.6	
GW2/04	0.0	0.2	19.4	
RC 6	0.0	0.0	20.6	
GW1/04	0.0	0.0	20.5	
GW1/05	0.0	1.4	18.6	
GW2/05	0.0	**1.7**	18.3	
FLARE	**17.5**	**25.0**	1.4	
TWIN SHAFTS	0.0	0.0	20.6	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling: 28/05/09**		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 1012 - 1025	
			Mean Temperature: 20℃	
Results				
Sample Station Number	**CH_4**	**CO_2**	**O_2**	**Comments:**
	(%v/v)	**(%v/v)**	**(%v/v)**	
G1	0.0	0.4	20.0	
G2	0.0	0.1	20.7	
G3	0.0	1.4	18.4	
G4	0.0	0.0	20.5	
G6	0.0	**3.3**	13.4	
Ballygahan Adit	0.0	0.0	20.8	
Ballymurtagh Adit	0.0	0.0	20.7	
G7	0.0	**5.2**	12.5	
G8	0.0	0.0	20.4	
GW2/04	0.0	0.0	20.6	
RC 6	0.0	0.0	20.5	
GW1/04	0.0	0.0	20.4	
GW1/05	0.0	0.9	19.0	
GW2/05	0.0	**1.8**	18.5	
FLARE	**23.0**	**29.0**	0.1	
TWIN SHAFTS	0.0	0.0	20.5	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling: 26/06/09**		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 995 - 1007	
			Mean Temperature: 17.5℃	

Results				
Sample Station Number	**CH_4**	**CO_2**	**O_2**	**Comments:**
	(%v/v)	**(%v/v)**	**(%v/v)**	
G1	0.0	0.2	20.4	
G2	0.0	0.1	20.6	
G3	0.0	0.6	19.9	
G4	0.0	0.0	20.9	
G6	0.0	**4.1**	12.8	
Ballygahan Adit	0.0	0.0	20.7	
Ballymurtagh Adit	0.0	0.1	20.7	
G7	0.0	**3.5**	15.4	
G8	0.0	0.1	20.8	
GW2/04	0.0	0.2	20.4	
RC 6	0.0	0.0	20.8	
GW1/04	0.0	0.1	20.2	
GW1/05	0.0	1.5	18.9	
GW2/05	0.0	**2.1**	17.6	
FLARE	**21.5**	1.3	28.0	
TWIN SHAFTS	0.0	0.0	20.9	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:**			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 28/7/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** November 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 990 - 1003	
			Mean Temperature: 17.3℃	
Results				
Sample Station Number	**CH_4** (%v/v)	**CO_2** (%v/v)	**O_2** (%v/v)	**Comments:**
G1	0.0	0.5	20.3	
G2	0.0	0.0	20.8	
G3	0.0	**2.3**	17.3	
G4	0.0	**5.4**	10.0	
G6	0.0	**2.6**	13.7	
Ballygahan Adit	0.0	0.0	20.9	
Ballymurtagh Adit	0.0	0.0	20.8	
G7	0.0	**3.2**	15.4	
G8	0.0	0.6	20.0	
GW2/04	0.0	0.0	20.9	
RC 6	0.0	0.2	20.6	
GW1/04	0.0	0.0	20.8	
GW1/05	0.0	**1.6**	18.4	
GW2/05	0.0	0.3	20.4	
FLARE	19.5	**26.0**	1.5	
TWIN SHAFTS	0.0	0.0	20.9	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 28/8/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** November 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 1003 - 1018	
			Mean Temperature: 14.0℃	
Results				
Sample Station Number	**CH_4** (%v/v)	**CO_2** (%v/v)	**O_2** (%v/v)	**Comments:**
G1	0.0	0.0	20.9	
G2	0.0	0.0	20.8	
G3	0.0	1.2	18.7	
G4	0.0	0.8	19.3	
G6	0.0	**4.6**	12.2	
Ballygahan Adit	0.0	0.1	20.7	
Ballymurtagh Adit	0.0	0.0	20.9	
G7	0.0	**4.5**	12.3	
G8	0.0	0.4	20.3	
GW2/04	0.0	0.2	20.6	
RC 6	0.0	0.0	20.8	
GW1/04	0.0	0.0	20.8	
GW1/05	0.0	1.3	19.0	
GW2/05	0.0	0.2	20.3	
FLARE	**28.5**	**30.0**	2.0	
TWIN SHAFTS	0.0	0.0	20.8	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 29/9/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** November 2009			
	Last Field Calibration: August 2008			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:**	
			Mean Temperature: 18.1 °C	
Results				
Sample Station Number	**CH_4**	**CO_2**	**O_2**	**Comments:**
	(%v/v)	**(%v/v)**	**(%v/v)**	
G1	0.0	0.0	20.6	
G2	0.0	0.1	20.1	
G3	0.0	1.1	18.8	
G4	0.0	**8.0**	9.1	
G6	0.0	**3.8**	14.0	
Ballygahan Adit	0.0	0.1	20.5	
Ballymurtagh Adit	0.0	0.0	20.7	
G7	0.0	**3.5**	15.2	
G8	0.0	0.5	19.3	
GW2/04	0.0	0.1	20.5	
RC 6	0.0	0.0	20.7	
GW1/04	0.0	0.1	20.3	
GW1/05	0.0	0.4	20.1	
GW2/05	0.0	**3.9**	15.2	
FLARE	**19.0**	**29.0**	1.3	
TWIN SHAFTS	0.0	0.0	20.6	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:**			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 30/10/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** December 2010			
	Last Field Calibration: December 2009			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 995 - 1006	
			Mean Temperature: 14.5℃	
Results				
Sample Station Number	**CH_4** (%v/v)	**CO_2** (%v/v)	**O_2** (%v/v)	**Comments:**
G1	0.0	0.3	20.4	
G2	0.0	0.5	19.9	
G3	0.0	0.7	20.2	
G4	0.0	**7.3**	12.1	
G6	0.0	**4.5**	13.5	
Ballygahan Adit	0.0	0.1	20.7	
Ballymurtagh Adit	0.0	0.0	20.8	
G7	0.0	**2.5**	16.4	
G8	0.0	0.8	19.1	
GW2/04	0.0	0.4	19.5	
RC 6	0.0	0.0	20.9	
GW1/04	0.0	0.1	20.4	
GW1/05	0.0	1.0	19.4	
GW2/05	0.0	**3.2**	16.0	
FLARE	20.0	**29.0**	0.5	
TWIN SHAFTS	0.0	0.0	20.8	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 27/11/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** December 2010			
	Last Field Calibration: December 2009			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 980 - 993	
			Mean Temperature: 5.3℃	
Results				
Sample Station Number	**CH_4** (%v/v)	**CO_2** (%v/v)	**O_2** (%v/v)	**Comments:**
G1	0.0	0.1	20.8	
G2	0.0	0.7	19.4	
G3	0.0	0.5	20.3	
G4	0.0	**2.3**	16.4	
G6	0.0	**4.3**	13.5	
Ballygahan Adit	0.0	0.0	20.7	
Ballymurtagh Adit	0.0	0.0	20.8	
G7	0.0	**2.6**	16.4	
G8	0.0	0.0	20.9	
GW2/04	0.0	0.5	19.6	
RC 6	0.0	0.0	20.8	
GW1/04	0.0	0.0	20.6	
GW1/05	0.0	0.3	19.8	
GW2/05	0.0	0.6	20.0	
FLARE	23.0	**29.0**	0.7	
TWIN SHAFTS	0.0	0.0	20.9	

LANDFILL GAS MONITORING FORM				
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow			
Licence no.: W0011-01				
Licensee: Wicklow Co. Co.				
Date of Licensing:	**Date of sampling:** 23/12/09		**Time of Sampling:**	
Instrument used: G A 2000	**Date Next Full Calibration:** December 2010			
	Last Field Calibration: December 2009			
Monitoring Personnel: Seamus Breslin	**Weather:**		**Barometric pressure:** 969 - 982	
			Mean Temperature: -2.0 ℃	
Results				
Sample Station Number	**CH_4**	**CO_2**	**O_2**	**Comments:**
	(%v/v)	**(%v/v)**	**(%v/v)**	
G1	0.0	0.0	20.8	
G2	0.0	**2.8**	14.5	
G3	0.0	0.3	20.5	
G4	0.0	1.1	19.9	
G6	0.0	**5.1**	12.1	
Ballygahan Adit	0.0	0.0	20.9	
Ballymurtagh Adit	0.0	0.0	20.8	
G7	0.0	**2.8**	15.7	
G8	0.0	0.7	19.8	
GW2/04	0.0	0.5	19.9	
RC 6	0.0	0.0	20.8	
GW1/04	0.0	0.1	20.6	
GW1/05	0.0	0.0	20.8	
GW2/05	0.0	0.9	19.0	
FLARE	18.5	**22.0**	1.6	
TWIN SHAFTS	0.0	0.0	20.8	

LANDFILL GAS MONITORING FORM	
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow
Waste Licence no.: W0011-01	
Licensee: Wicklow Co. Co.	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009
	Last Field Calibration: August 2008
Monitoring Personnel: Seamus Breslin	

Results

Date	Sample Station Number	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Pressure ATM	Temp C
09/01/2009	Site Office	0.00	0.00	20.90	1012	5.70
16/01/2009	Site Office	0.00	0.00	20.80	990	7.40
23/01/2009	Site Office	0.00	0.00	20.90	966	5.10
30/01/2009	Site Office	0.00	0.00	20.80	989	8.50
06/02/2009	Site Office	0.00	0.00	20.80	982	3.60
12/02/2009	Site Office	0.00	0.00	20.90	1010	9.20
19/02/2009	Site Office	0.00	0.00	20.80	1006	4.50
27/02/2009	Site Office	0.00	0.00	20.80	1005	9.60
06/03/2009	Site Office	0.00	0.00	20.80	988	10.00
13/03/2009	Site Office	0.00	0.00	20.80	1001	8.60
20/03/2009	Site Office	0.00	0.00	20.80	1016	9.10
27/03/2009	Site Office	0.00	0.00	20.90	982	5.50

Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow
Waste Licence no.: W0011-01	
Licensee: Wicklow Co. Co.	
Instrument used: G A 2000	**Date Next Full Calibration:** August 2009
	Last Field Calibration: August 2008
Monitoring Personnel: Seamus Breslin	

Results

Date	Sample Station Number	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Pressure ATM	Temp C
03/04/2009	Site Office	0.00	0.00	20.80	1001	11.80
09/04/2009	Site Office	0.00	0.00	20.80	984	9.70
17/04/2009	Site Office	0.00	0.00	20.90	999	8.90
24/04/2009	Site Office	0.00	0.00	20.70	995	13.80
01/05/2009	Site Office	0.00	0.00	20.80	1003	10.30
08/05/2009	Site Office	0.00	0.00	20.80	991	12.50
15/05/2009	Site Office	0.00	0.00	20.70	986	17.90
22/05/2009	Site Office	0.00	0.00	20.70	999	14.10
29/05/2009	Site Office	0.00	0.00	20.70	1016	17.70
05/06/2009	Site Office	0.00	0.00	20.70	997	17.20
12/06/2009	Site Office	0.00	0.00	20.80	1005	12.40
19/06/2009	Site Office	0.00	0.00	20.70	1008	14.80
26/06/2009	Site Office	0.00	0.00	20.80	999	17.50

LANDFILL GAS MONITORING FORM	
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow
Waste Licence no.: W0011-01	
Licensee: Wicklow Co. Co.	
Instrument used: G A 2000	**Date Next Full Calibration:** November 2009
	Last Field Calibration: August 2008
Monitoring Personnel: Seamus Breslin	

Results

Date	Sample Station Number	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Pressure ATM	Temp C
03/07/2009	Site Office	0.00	0.00	20.80	1001	21.00
10/07/2009	Site Office	0.00	0.00	20.90	1003	17.00
17/07/2009	Site Office	0.00	0.00	20.80	998	18.20
23/07/2009	Site Office	0.00	0.00	21.00	983	13.80
31/07/2009	Site Office	0.00	0.00	20.90	1000	14.70
07/08/2009	Site Office	0.00	0.00	20.90	1008	17.90
14/08/2009	Site Office	0.00	0.00	20.80	999	17.40
21/08/2009	Site Office	0.00	0.00	20.80	1002	16.20
28/08/2009	Site Office	0.00	0.00	20.90	995	14.00
04/09/2009	Site Office	0.00	0.00	20.80	997	16.20
11/09/2009	Site Office	0.00	0.00	20.80	1025	19.20
18/09/2009	Site Office	0.00	0.00	20.90	1005	14.20
25/09/2009	Site Office	0.00	0.00	20.90	1014	14.30

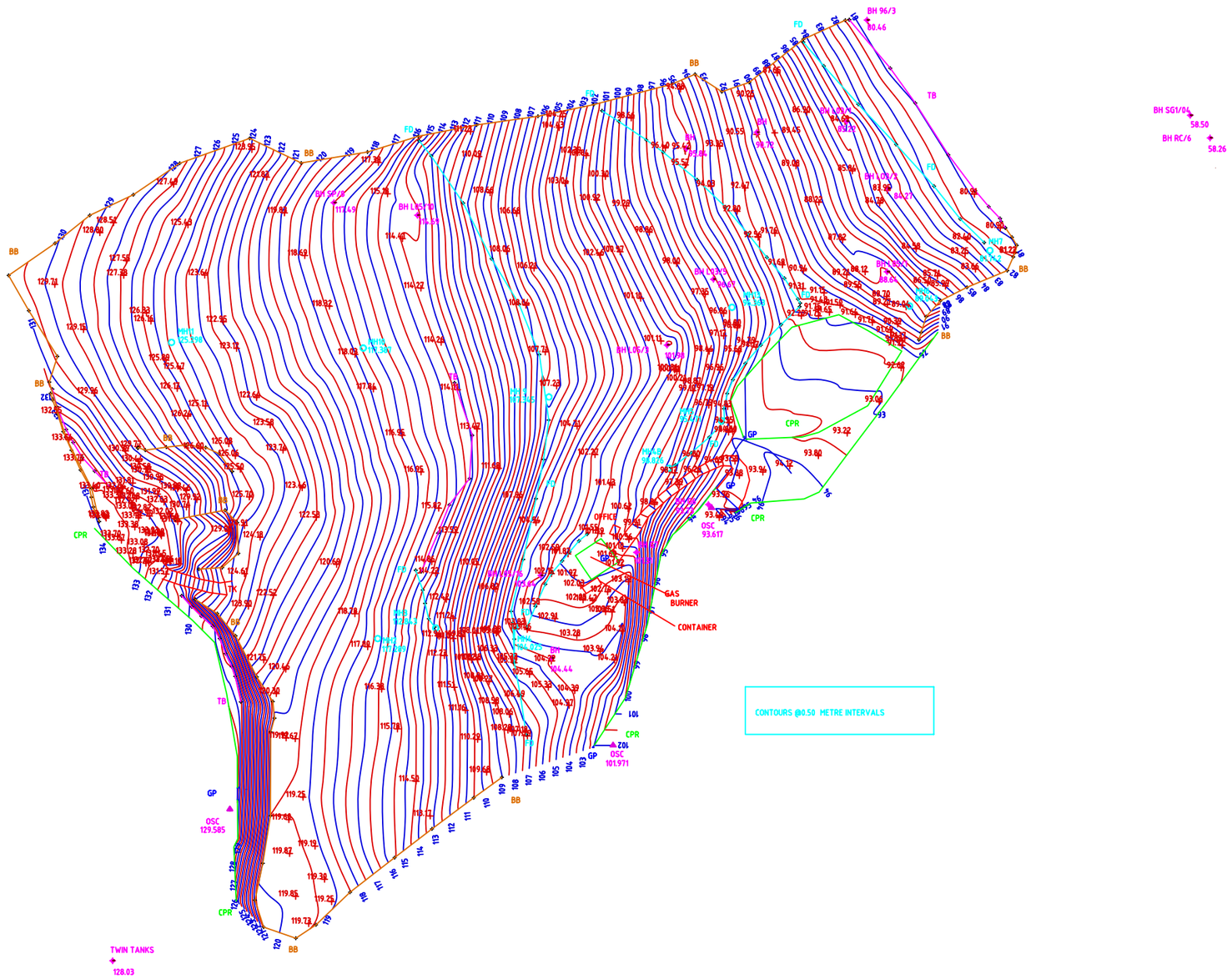
LANDFILL GAS MONITORING FORM	
Facility Name: Ballymurtagh Landfill	**Facility Address:** Ballymurtagh, Avoca, Co. Wicklow
Waste Licence no.: W0011-01	
Licensee: Wicklow Co. Co.	
Instrument used: G A 2000	**Date Next Full Calibration:** December 2010
	Last Field Calibration: December 2009
Monitoring Personnel: Seamus Breslin	

Results

Date	Sample Station Number	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	Pressure ATM	Temp C
02/10/09	Site Office	0.00	0.00	20.70	1006	14.2
09/10/09	Site Office	0.00	0.00	20.90	998	12.0
16/10/09	Site Office	0.00	0.00	20.90	1921	13.7
23/10/09	Site Office	0.00	0.00	20.70	991	14.7
30/10/09	Site Office	0.00	0.00	20.90	999	14.5
06/11/09	Site Office	0.00	0.00	20.80	982	11.6
13/11/09	Site Office	0.00	0.00	20.80	982	7.5
20/11/09	Site Office	0.00	0.00	20.90	993	11.2
27/11/09	Site Office	0.00	0.00	20.90	984	5.3
04/12/09	Site Office	0.00	0.00	20.80	992	6.2
11/12/09	Site Office	0.00	0.00	20.90	1016	9.7
18/12/09	Site Office	0.00	0.00	20.90	1009	2.5
23/12/09	Site Office	0.00	0.00	20.90	973	0.2
31/12/09	Site Office	0.00	0.00	20.90	993	1.6

APPENDIX B

Site Survey



BALLYMURTAGH LANDFILL
TOPOGRAPHICAL SURVEY 2009

SURVEY CARRIED OUT IN
NATIONAL GRID
CO-ORDINATE SYSTEM (1975)
JUNE 2009

APPENDIX C

E-PRTR

Environmental Protection Agency

AER Returns Worksheet

Version 1.1.10

REFERENCE YEAR	2009

1. FACILITY IDENTIFICATION

Parent Company Name	Wicklow County Council
Facility Name	Ballymurtagh Landfill Facility
PRTR Identification Number	W0011
Licence Number	W0011-01

Waste or IPPC Classes of Activity

No.	class_name
	Use of waste obtained from any activity referred to in a preceding
4.11	paragraph of this Schedule.
3.1	Deposit on, in or under land (including landfill).
	Storage prior to submission to any activity referred to in a preceding
	paragraph of this Schedule, other than temporary storage, pending
3.13	collection, on the premises where the waste concerned is produced.
	Land treatment, including biodegradation of liquid or sludge discards
3.2	in soils.
	Biological treatment not referred to elsewhere in this Schedule which
	results in final compounds or mixtures which are disposed of by
	means of any activity referred to in paragraphs 1. to 10. of this
3.6	Schedule.
3.7	##
	The treatment of any waste on land with a consequential benefit for
4.10	an agricultural activity or ecological system.
	Storage of waste intended for submission to any activity referred to in
	a preceding paragraph of this Schedule, other than temporary
	storage, pending collection, on the premises where such waste is
4.13	produced.
	Recycling or reclamation of organic substances which are not used
	as solvents (including composting and other biological transformation
4.2	processes).
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.
	Use of any waste principally as a fuel or other means to generate
4.9	energy.

Address 1	Ballymurtagh, Ballygahan Upper, Ballygahan Lower
Address 2	Tinnahinch
Address 3	Co. Wicklow
Address 4	
Country	Ireland
Coordinates of Location	-6.22452 52.8711
River Basin District	IEEA
NACE Code	3832
Main Economic Activity	Recovery of sorted materials
AER Returns Contact Name	Seamus Breslin
AER Returns Contact Email Address	sbreslin@wicklowcoco.ie
AER Returns Contact Position	Facility Manager
AER Returns Contact Telephone Number	087 2301627
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

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

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

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

4.1 RELEASES TO AIR

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR								
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	SSC	Gas Sim 2	6521.62	75300.0	0.0	68778.38
03	Carbon dioxide (CO2)	C	SSC	Gas Sim 2	1741212.0	3731999.579	0.0	1990787.579

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

SECTION B : REMAINING PRTR POLLUTANTS

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

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

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

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

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

Additional Data Requested from Landfill operators

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

Landfill: Ballymurtagh Landfill Facility

Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour	
			Method Code	Designation or Description		
Total estimated methane generation (as per site model)	720940.328	C	SSC	Gas Sim 2 - Statistics	N/A	
Methane flared	645640.328	C	OTH	Gas Sim 2 & calcs	500.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	75300.0	C	SSC	Gas Sim 2 - PI Report	N/A	

4.2 RELEASES TO WATERS

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

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

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

SECTION B : REMAINING PRTR POLLUTANTS

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

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

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

RELEASES TO WATERS								
POLLUTANT					QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
240	Suspended Solids	C	OTH	Flow Meter and monitoring results	2385.0	2385.0	0.0	0.0

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

4.3 RELEASES TO WASTEWATER OR SEWER

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER								
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

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

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

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER								
POLLUTANT		METHOD			QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

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

4.4 RELEASES TO LAND

SECTION A : PRTR POLLUTANTS

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

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

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

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

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

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	20 01 01	No	86.42	Cardboard	R13	M	Weighed	Onsite in Ireland	Bailey Waste,WPT 9/4	Rosemount Business Park,.,Dulin 11,.,Ireland		
Within the Country	20 01 01	No	150.46	Newsprint	R13	M	Weighed	Onsite in Ireland	Bailey Waste,WPT 9/4	Rosemount Business Park,.,Dulin 11,.,Ireland		
Within the Country	15 01 05	No	2.58	Tetra Pak	R13	M	Weighed	Onsite in Ireland	Bailey Waste,WPT 9/4	Rosemount Business Park,.,Dulin 11,.,Ireland		
Within the Country	20 01 02	No	99.023	Glass	R13	M	Weighed	Onsite in Ireland	Greenstar,W0053-03	Fassaroe,Bray,Co Wicklow,.,Ireland		
Within the Country	20 01 39	No	51.186	Plastic	R13	M	Weighed	Onsite in Ireland	RecycleNet ,49/2001(Kildare County Council) (WPC 21-07B)	Rathangan,Co Kildare,.,.,Ireland		
Within the Country	20 01 39	No	1.75	Polystyrene	R13	M	Weighed	Onsite in Ireland	RecycleNet ,49/2001(Kildare County Council) (WPC 21-07B)	Rathangan,Co Kildare,.,.,Ireland		
Within the Country	20 01 40	No	15.251	Steel Food cans	R13	M	Weighed	Onsite in Ireland	Leon Arklow,(WPT8/308) (ESS1254504/07A)	Hammond Lane,Dublin,.,.,Ireland		
Within the Country	20 01 40	No	28.96	Scrap metal	R13	M	Weighed	Onsite in Ireland	Leon Arklow,(WPT8/308) (ESS1254504/07A)	Hammond Lane,Dublin,.,.,Ireland		
Within the Country	**20 01 33**	**Yes**	10.848	Batteries	R13	M	Weighed	Onsite in Ireland	Returnbatt Ltd,ESS/15/5408C	Unit 35,Kildare Enterprise Centre,Melitta Road,Co Kildare,Ireland	Returnbatt Ltd,ESS/15/5408C,Unit 35,Kildare Enterprise Centre,Melitta Road,Co Kildare,Ireland	Unit 35,Kildare Enterprise Centre,Melitta Road,Co Kildare,Ireland
Within the Country	20 01 35	Yes	0.014	Mobile phones	R13	M	Weighed	Onsite in Ireland	Jack & Jill Foundation,CHY12405	Johnstown Manor,Johnstown,Naas,Co Kildare,Ireland	Jack & Jill Foundation,CHY12405,Johnstown Manor,Johnstown ,Naas,Co Kildare,Ireland	Johnstown Manor,Johnstown ,Naas,Co Kildare,Ireland
Within the Country	20 01 25	No	52.952	WEEE	R13	M	Weighed	Onsite in Ireland	Cedar Resource Managament Ltd,ESS/15/54/74/08B	Site No 14A1,Greenogue Business Park,Rathcoole,Co Dublin,Ireland		
Within the Country	20 01 21	Yes	0.484	Bulbs & Tubes	R13	M	Weighed	Onsite in Ireland	Irish Lamp Recycling Ltd,ESS/15/54/51/07C	Blackpark,Kilkenny Road,Athy,Co Kildare,Ireland	Irish Lamp Recycling Ltd,ESS/15/54/51/07C,Black park,Kilkenny Road,Athy,Co Kildare,Ireland	Blackpark,Kilkenny Road,Athy,Co Kildare,Ireland
Within the Country	20 01 25	No	1.45	Cooking oil	R13	M	Weighed	Onsite in Ireland	Enva ,ESS15/54/05D	Clonminam Industrial Estate,Portlaoise,Co Laois,.,Ireland		
Within the Country	20 01 26	Yes	2.0	Waste Engine oil	R13	M	Weighed	Onsite in Ireland	Enva ,ESS15/54/05D	Clonminam Industrial Estate,Portlaoise,Co Laois,.,Ireland	Enva ,ESS15/54/05D,Clonminam Industrial Estate,Portlaoise,Co Laois,.,Ireland	Clonminam Industrial Estate,Portlaoise,Co Laois,.,Ireland
Within the Country	08 03 13	No	0.01	Inkjet Cartrides	R13	M	Weighed	Onsite in Ireland	Jack & Jill Foundation,CHY12405	Johnstown Manor,Johnstown,Naas,Co Kildare,Ireland		
Within the Country	19 12 03	No	3.917	Aluminium Cans	R13	M	Weighed	Onsite in Ireland	Greenstar,W0053-03	Fassaroe,Bray,Co Wicklow,.,Ireland		
Within the Country	20 03 01	No	7.57	Mixed Municipal waste	R13	M	Weighed	Onsite in Ireland	Arklow Waste Disposal,ESS/15/54/05D	Rampere Landfill,Rampere,Co Wicklow,.,Ireland		
Within the Country	20 01 11	No	23.84	Textiles	R13	M	Weighed	Onsite in Ireland	National Council for the Blind (Mrs Quinn's Charity Shop),ESS/15/54/365/08B	Unit T5B Toucher Business Park,Newhall,Naas,Kildare,Ireland		
Within the Country	20 01 99	No	1.056	Aerosol cans	R13	M	Weighed	Onsite in Ireland	Cedar Resource Managament Ltd,ESS/15/54/74/08B	Site No 14A1,Greenogue Business Park,Rathcoole,Co Dublin,Ireland		

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

APPENDIX D

Water Balance Calculations

Medium precipitation, Covered cells
Completed cell with topcover

Surface flow %= 65
Evaporation factor = 1

Unit of data: mm

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year
precipitation	59.6	57.9	24.4	74.1	53.2	72.8	111.0	68.2	64.4	35.2	184.2	11.2	816.2
surface run-off	39	38	16	48	35	47	72	44	42	23	120	7	531
infiltration	21	20	9	26	19	25	39	24	23	12	64	4	286
potential evapotranspiration	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12
infiltration-pot. evaporation	9	20	9	26	19	25	39	24	23	12	64	4	
waterdeficit (*)	0	0	0	0	0	0	0	0	0	0	0	0	
actual evaporation	12	0	0	0	0	0	0	0	0	0	0	0	12
leachate, infiltration-act. evaporation	9	20	9	26	19	25	39	24	23	12	64	4	274
equalization, factor 12	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	22.8	273.8

APPENDIX E

ECOLOGY REPORT

Monitoring report on Ballymurtagh Landfill, Avoca, Co Wicklow

Terrestrial Flora & Fauna

July 2009

1. INTRODUCTION

This description and assessment of terrestrial ecology is written as part of the monitoring protocol for the closed landfill at Ballymurtagh. It has been prepared to comply with a condition of Wicklow County Council's waste licence from the EPA.

The site was visited in May 2009 and a walkover survey carried out to cover the entire area as well as the near surroundings. A previous similar visit had been made in July 2007 and also when the landfill was active, in 1998.

The report is arranged in the same order as in 2007 so any changes will be apparent.

2. DESCRIPTION OF SITE

The landfill occupies a gap in the valley side above the Avoca River which was created by an opencast mining operation and is now filled and capped. It slopes generally in an easterly direction, culminating in a steep slope of 20-30^{o} above the recycling depot. There are small drops also to the margins where the original schistose rock or hillside is exposed. Two flatter parts on the SE margin are occupied by the gas flaring plant and a settlement lagoon taking surface run-off. There is also an 'island' of pre-existing rock at the south-western end around a capped mine shaft, covered by pine and birch trees.

2.1 Vegetation

The surface has been sown with grasses into which other species are now spreading, including trees and bushes at the eastern, more sloping end. The soil has been compacted by machinery but is well covered by vegetation except at the western end beyond the zone of filling where the surface is gravelly (Photo 1). Along the western margin there is also a narrow strip of sandy ground which is probably high in metal content from the exposed rocks nearby. In 2009 there is possible evidence of toxicity here for a short distance of 5m or so into the site (Photo 2). The growth of scutch *Elytrigia repens* and bent grasses *Agrostis stolonifera*, *A.capillaris* is somewhat depressed while glaucous sedge *Carex flacca* appears to flourish. This effect could also be related to waterlogging from flows off the surroundings as the preceding weeks had been very wet.

A possibly related pattern is also emerging in the gorse *Ulex europaeus* which is colonising the NW corner. Here a proportion of the outer bushes die off after a few years of growth with the result that they never reach above 50cm of so (Photo 3). Closer to the corner the growth is better, up to 1.5m. This again may have a hydrological or soil cause rather than any toxicity.

The main part of the site has a mixed cover of grasses with some broad-leaved species. The species list for 2007 is compared with 2009 below. Both are in rough order of abundance and stem from the same type of walkover transect

2007		2009
Holcus lanatus		*Festuca rubra*
Lolium perenne		*Holcus lanatus*
Festuca rubra		*Anthoxanthum odoratum*
Agrostis capillaris		*Poa pratensis*
Anthoxanthum odoratum		*Elytrigia repens*
Trifolium repens		*Agrostis capillaris*
Medicago lupulina		*Lolium perenne*
Trifolium pratense		*Vicia sativa*
Vicia sativa		*Trifolium pratense*
Vicia cracca		*Rumex crispus*
Rumex crispus		*R.obtusifolius*
R.obtusifolius		*Lotus corniculatus*
Epilobium parviflorum		*Medicago lupulina*
Daucus carota		*Cirsium arvense*
Hypochoeris radicata		*Stellaria graminea*
Stellaria graminea		*Calliergon cuspidatum*
Cirsium vulgare		*Lotus pedunculatus*
C.palustre		*Epilobium parviflorum*
Juncus bufonius		*Cardamine pratensis*
Prunella vulgaris		*Ulex europaeus*
Centaurium erythraea		*Ranunculus acris*
Lotus corniculatus		*Bellis perennis*
Trifolium dubium		*Juncus effusus*
Deschampsia cespitosa		*Deschampsia cespitosa*
Viola arvensis		*Ranunculus repens*
		Potentilla reptans
		Juncus conglomeratus

The front slope has nutritionally richer soil and recent tree planting has resulted in superficial soil disturbance (Photo 4). The trees species used include birch, ash and oak with a little hawthorn. In undisturbed places in between, cocksfoot *Dactylis glomerata*, scutch *Elytrigia repens* and timothy *Phleum pratense* grow with the red fescue and Yorkshire fog and some soft rush *Juncus effusus* and ribwort plantain *Plantago lanceolata*. Disturbed ground adds

Cerastium glomeratum	sticky mouse-ear
Medicago lupulina	black medick
Trifolium dubium	yellow trefoil
Hypochaeris radicata	catsear
Vicia sativa	early vetch
Geranium dissectum	cut-leaved cranesbill
Tortula, *Bryum*, *Barbula* spp	moss species

The upper trees are planted along a new bank and drain in which water accumulates towards the south. This allows floating sweet grass *Glyceria fluitans*, jointed rush *Juncus articulatus* and a single plant of pendulous sedge *Carex pendula* into the vegetation.

The established trees (Photos 5,6) on the slope are now 3-4m in height and include birches *Betula pubescens* and *B.pendula*, pines *Pinus contorta*, *P.sylvestris*, and willows *Salix cinerea* and a little *S.aurita*. The gorse is now 2m high and the shaded conditions suit

Rubus fruticosus	bramble
Cytisus scoparius	broom
Anthoxanthum odoratum	sweet vernal grass
Agrostis capillaris	common bent
Polytrichum commune	a moss
Lotus pedunculatus	greater birdsfoot trefoil
Vicia sepium	bush vetch
Cirsium arvense	creeping thistle
Chamerion angustifolium	rose-bay
Rhytidiadelphus squarrosus	a moss
Calluna vulgaris	ling
Blechnum spicant	hard fern
Dryopteris affinis	scaly male fern

At the base ragwort *Senecio jacobaea*, greater stitchwort *Stellaria holostea*, sorrel *Rumex acetosa* and hedge St John's wort *Hypericum maculatum* grow amongst planted alder and beech.

Willows and gorse also occur as a narrow strip under the cliff at the northern edge of the landfill. Here they grow with the horsetails *Equisetum arvense*, *E.telmateia*, nettle *Urtica dioica*, winter heliotrope *Petasites fragrans*, wild rose *Rosa canina*, pheasant berry *Leycesteria formosa* and butterfly bush *Buddleja davidii*. Nearby there is a little bare ground without tall grass on which clovers *Trifolium repens*, *T.dubium* red fescue *Festuca rubra*, the moss *Calliergon cuspidatum* and yellow sedge *Carex viridula* are found

Tree growth is also seen on the island of original surface at the western end. A group of shore pine *Pinus contorta* grow here with downy- *Betula pubescens* and silver-birches *B.pendula* – the source of many of the seedlings at this end. There is also a tree of holly *Ilex aquifolium* and rowan *Sorbus aucuparia* along with bramble *Rubus fruticosus*, greater stitchwort *Stellaria holostea*, wood sage *Teucrium scorodonia*, bracken *Pteridium aquilinum* and ling *Calluna vulgaris*.

The only other feature of the site is the small lagoon on the SE side. Surrounded by red fescue *Festuca rubra* and sweet vernal grass *Anthoxanthum odoratum* this supports

Potamogeton natans	broad-leaved pondweed
Callitriche sp	water starwort
Lemna minor	common duckweed

Juncus articulatus	jointed rush
Juncus effusus	soft rush
Agrostis stolonifera	creeping bent
Glyceria fluitans	floating sweet grass
Rumex crispus	curled dock
R.obtusifolius	broad-leaved dock

2.2 Surrounding habitat

No changes were seen in the surrounding lands except for a reduction in weed species along the western end.

3. FAUNA

The grassland fauna consists primarily of insects and the ringlet and meadow brown have been noted in the past. Mammals are present, in the form of hare and rabbit though their grazing influence is small. Visiting species include fox and sika deer though the absence of browsing damage on the broad-leaved trees suggests their numbers are very low.

The birds seen on or over the landfill have been raven, jackdaw, wood pigeon, pheasant, goldfinch, linnet and meadow pipit. A pair of meadow pipits was nesting on site in 2009. The habitat may favour nesting linnets in future in gorse but the upland site probably would reduce potential numbers. Whitethroat would also be expected.

Frogs breed in the lagoon on the southern margin where there are also two dragonfly species the common darter *Sympetrum striolatum* and ruddy darter *S.sanguineum*.

4. ASSESSMENT

The vegetation and habitat on site suggest that the landfill is still effectively isolated below the capping material and causes little if any impact on the surface or the surroundings. Changes in the grass cover reflect a decline in nutrient status, presumably from the natural leaching experienced in a high rainfall area. The cover has become more dense and only one annual species *Vicia sativa* is now prominent, rather than three in the past. It may be noted that only one introduced species *Carex pendula* occurs on the main surface and this has appeared since 2007 because of the new tree planting. At the margins however three others persist – winter heliotrope *Petasites fragrans*, butterfly bush *Buddleja davidii* and pheasant berry *Leycesteria formosa*.

The amount of exposed gravel at the western margin of the site is noted and may require attention in time depending on the growth of vegetation in the next few years.

The additional tree planting has caused minor soil disturbance and changes in surface water hydrology though these will be assimilated in due course. Hawthorn, ash and oak have been used in addition to the more widely successful birch and willow.

Colonisation by new species is also noticed in the lagoon on the southern side where four new plants have appeared, probably brought in by birds. Three waterplants and one rush are involved and they will allow for a greater range of invertebrates.

Changes in the large fauna have been minimal in the two years and the upper parts of the site still have a very small number of birds.

The prognosis for the site is a gradual extension of the tree growth but also the further colonisation by plant and animal species from the surroundings.

In terms of the restoration of the mining site the situation now is considerably better than when first visited in 1998. The surface now is stabilised and its vegetation coming to resemble that on the rest of the valley side, run-off from the area has been managed and a smaller area of the old mining site is exposed to weathering and mineral loss. This must result in less mine drainage entering the Avoca River below.

Photo 1. Vegetation effect at western end caused by run-off from surroundings

Photo 2. Gravel exposed at western end outside filled area

Photo 3. Gorse at NW corner of landfill. Note thin growth on outer fringe

Photo 4. New planting above existing trees on eastern slope

Photo 5. Eastern slope in 2007 (August)

Photo 6. Eastern slope in 2009 (May)

APPENDIX F

ENVIRONMENTAL NOISE SURVEY

RPS-MCOS

Ballymurtagh Landfill, Co. Wicklow

Environmental Noise Survey

Report Date:
11th November 2009

EURO environmental services
Unit 35A Boyne Business Park, Drogheda, Co. Louth

Report No. 2040/M22 Rev.1

1.0 Introduction

EURO environmental services carried out a noise survey at the Ballymurtagh Landfill. Monitoring was conducted at 2 different locations around the facility as part of the requirements of the current Waste Licence, W0011-01.

According to the waste licence (W0011-01), activities on site shall not give rise to noise levels off site, at noise sensitive locations, which exceed the sound pressure limits of 55 dB(A) during the day and 45dB(A) at night.

The civic waste facility operates between 10.00am and 16.00pm, Tuesday to Saturday. The landfill is capped so the main activity that gives rise to noise levels is the operation of the gas flare, which runs 24 hours a day. Local traffic contributes significantly to noise levels in the surrounding area.

2.0 Duration and Measurements of Surveying

The daytime broadband noise survey was carried out between 14.51 and 17.01 hours on Friday, 30th October 2009. The following measurements were carried out at each site:

- Daytime Broadband measurements $L(A)_{eq}$, $L(A)_{10}$, $L(A)_{90}$ and LC_{peak} over a 30-minute period.
- Daytime 1/3 Octave Band measurements over a 30-minute period.

2.1 Description of Measurement Parameters

2.1.1 **L_{eq} Values**: L_{eq} (t) values represent the continuous equivalent sound level over a specified time (t). This value expresses the average levels over time and is a linear integral.

2.1.2 **L_{90} and L_{10} Values**: The L_{90} and L_{10} are statistical values which represent the sound levels exceeded for a percentage of the measurement time. L_{10} indicates the sound levels exceeded for the 10% of the monitoring period while L_{90} indicates the sound levels exceeded for 90% of the monitoring period. The L_{90} value is a good indication of background noise levels.

2.1.3 **Tonal and Impulsive Characteristics**: Tonal noise is characterised in accordance with ISO 1996-2, which indicates that a noise source being tonal at a particular frequency is either clearly audible or exceeds the level of the adjacent bands by 5dB or more. An impulsive noise is of short duration (typically less than 1 second), it is brief and abrupt, its startling effect causes greater annoyance than would be expected from a simple measurement of sound pressure level. For example an instantaneous bang/thud that may be associated with pile driving, hammering etc.

3.0 Weather Conditions

Weather conditions during the noise monitoring survey was cold, with constant rainfall and slightly breezy with wind speeds of <5m/sec during the survey. Temperatures ranged from 10-12 °C.

4.0 Location of Monitoring Points

4.1 Monitoring Point NSL 1

The meter was positioned at the nearest house approximately 2m from the roadway leading up to the landfill and approximately 150m from the landfill entrance. The monitoring point was clearly marked.

4.2 Monitoring Point NSL 4

This monitoring point was located at the back of Wicklow County Council's work yard on the R752. The meter was positioned behind the outhouses approximately 25m from the Avoca River.

5.0 Sources of noise

5.1 Vehicle movements

The main vehicle movements in the vicinity are those along the main road in the area, the R752. Traffic was the dominant noise source for monitoring points, NSL1 and NSL4.

5.2 Rainfall

Rain falling and running along the ground also contributed to elevating noise levels at both monitoring locations NSL1 and NSL4.

6.0 Methodology

The noise survey was carried out in accordance with ISO 1996/1/2/3 - Acoustics - Description and Measurement of Environmental Noise.

Reference was also made to the guidance document issued by the EPA entitled "Environmental Noise Survey Guidance Document" EPA 2003.

Broadband measurements were analysed for 30-minute intervals. Daytime measurement range was set at 30-90dB. 1:3 Octave measurements were conducted for a 30-minute period.

7.0 Equipment

The equipment used was a Cirrus CR:831A serial No. B14907FF Type 1 integrating averaging sound level meter, with selective 1:1 or 1:3 octave band measurements.

The meter was fixed to a tripod 1.3 meters above the ground level and the microphone was protected using a windshield. The microphone cartridge type was an MK224, Serial No. 990785 with open circuit sensitivity level of 45.4 mV per Pa.

7.1 Calibration

Calibration was carried out on site using an acoustic calibrator at 94dBA. The meter was calibrated before and after the monitoring round.

8.0 Noise Monitoring Data

Monitoring Point	Date / Time	Sampling Interval (Minutes)	L(A)eq	L(A)10	L(A)90	Comments
NSL1	30/10/2009 14:51	30	59	62	54	No site operations from the Landfill facility could be heard at this location. Rain falling and running along the ground and wind rustling through trees were audible sounds recorded. Several cars passing within two meters of the noise meter was the loudest of audible noise at this monitoring location. Traffic from the main road approximately 500 meters away was also slightly audible.
NSL4	30/10/2009 16:01	30	57	61	50	Most noise at this monitoring point came from frequent traffic passing on the R752. Rain falling on the ground and water flowing in the Avoca River (25m away) could be heard rushing downstream crashing off the boulders and riverbed. No noise was audible from the landfill facility at this monitoring location. Wind rustling through the trees and bushes was also continuous throughout the survey period.

9.0 Conclusions

The recommended limit for broadband noise measurements set out by the International Standards Organisation is 55 dB(A) for day time.

From noise measurements taken at two specified noise-monitoring locations in and around the Ballymurtagh Landfill site, it was determined that the levels of noise measured at NSL1 and NSL4 exceeded the recommended day-time limits set within the waste licence (W0011-01). Noise audible at NSL1 was mainly from vehicle movement on the Main Road, and passing vehicles in close proximity to the monitoring location. There was no noise audible from the activities at the landfill site. Noise from the landfill flare was not audible at NSL1. Frequent traffic movements on the R752 contributed to significantly elevate noise levels at the NSL4 monitoring location.

A tonal component was detected at monitoring location NSL4 at a frequency of 250 Hz (48 dB). The source of this tonal component is attributable to the frequent passage of vehicles along the R752 road.

David Kelly
Field Services Manager

Aadil Khan
Environmental Technical Manager

11th November 2009

Appendix 1: Broadband Monitoring Data

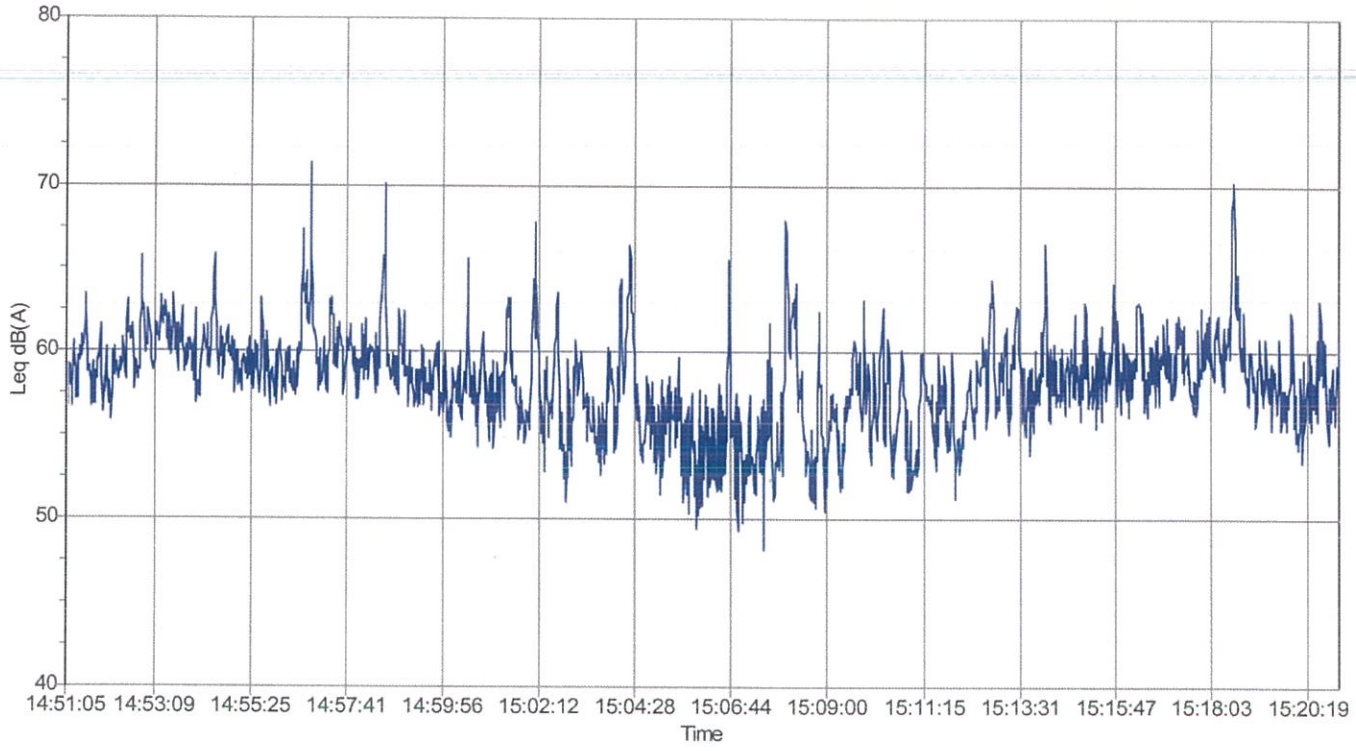
Measurement Report

Measurement Details

Date and Time:	30/10/2009 14:51
Sound Level Meter:	Cirrus Research plc
Run Duration:	00:30:00 hh:mm:ss
Range:	50-110 dB
Overload:	no
Location:	Ballymurtagh Landfill NSL1 Broadband

Data

Leq	59.3 dBA	L1.0	65.6 dBA
Lepd	47.3 dBA	L10.0	62.0 dBA
LAE	91.7 dBA	L50.0	58.0 dBA
LAFmax	73.4 dBA	L90.0	53.5 dBA
Peak	95.8 dBC	L95.0	52.2 dBA
		L99.0	50.5 dBA



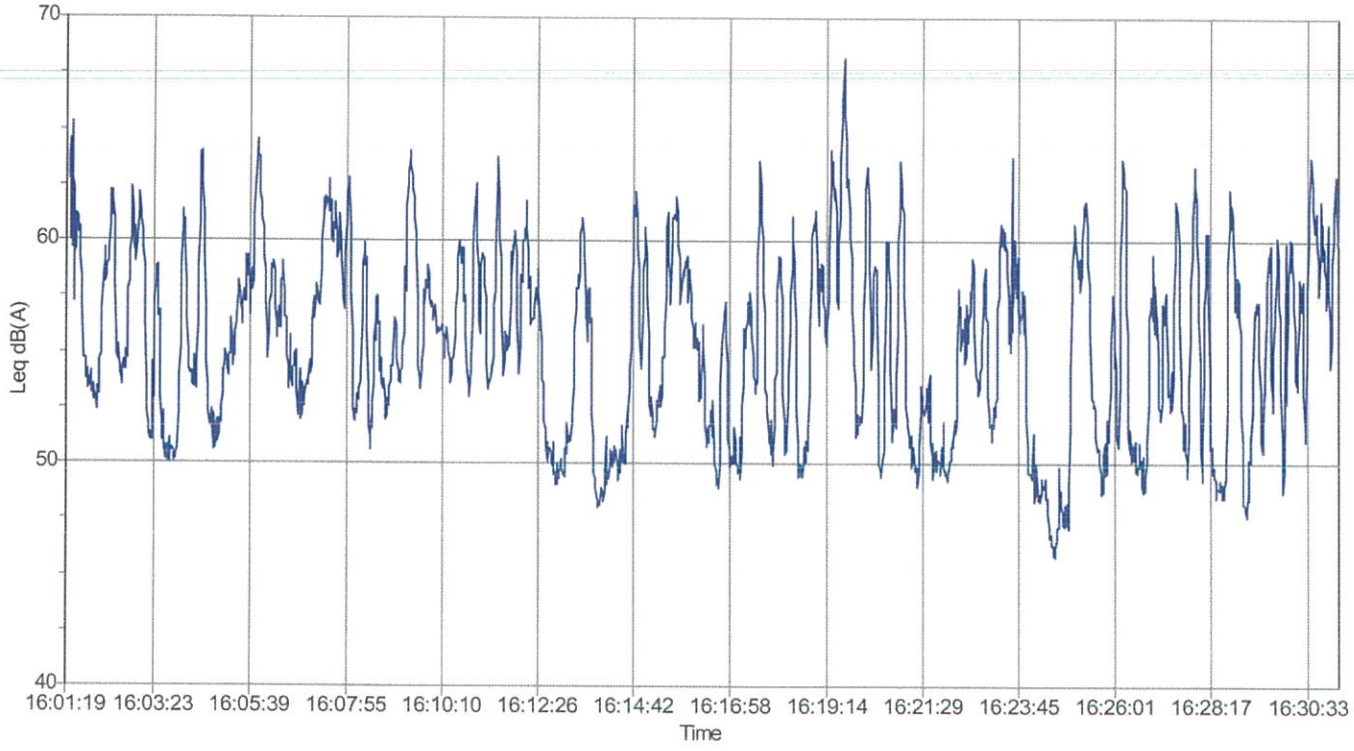
Measurement Report

Measurement Details

Date and Time:	30/10/2009 16:01
Sound Level Meter:	Cirrus Research plc
Run Duration:	00:30:00 hh:mm:ss
Range:	50-110 dB
Overload:	no
Location:	Ballymurtagh Landfill NSL4 Broadband

Data

Leq	57.3 dBA	L1.0	63.8 dBA
Lepd	45.3 dBA	L10.0	60.9 dBA
LAE	89.7 dBA	L50.0	55.3 dBA
LAFmax	70.8 dBA	L90.0	49.8 dBA
Peak	103.0 dBC	L95.0	49.0 dBA
		L99.0	47.3 dBA



Appendix 2: 1/3 Octave Spectra

Measurement Report

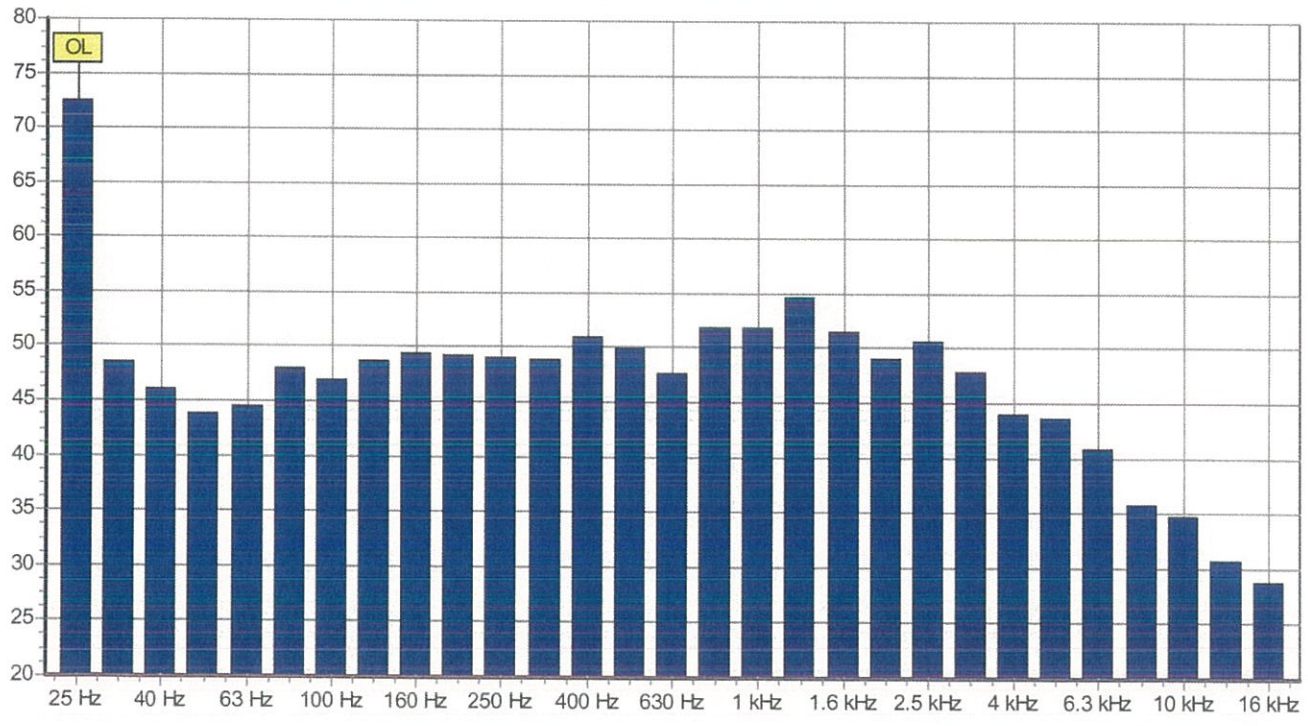
Measurement Details

Date and Time:	30/10/2009 15:22
Sound Level Meter:	Cirrus Research plc
Run Duration:	00:29:52 hh:mm:ss
Range:	50-110 dB
Location:	Ballymurtagh Landfill NSL1 1/3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
25 Hz	72.5 dB	56	yes	250 Hz	49.1 dB	56		2.5 kHz	50.5 dB	56	
31 Hz	48.5 dB	56		315 Hz	48.9 dB	56		3.15 kHz	47.8 dB	56	
40 Hz	46.0 dB	56		400 Hz	50.9 dB	56		4 kHz	44.0 dB	56	
50 Hz	43.8 dB	56		500 Hz	49.9 dB	56		5 kHz	43.6 dB	56	
63 Hz	44.5 dB	56		630 Hz	47.7 dB	56		6.3 kHz	40.9 dB	56	
80 Hz	48.0 dB	56		800 Hz	51.8 dB	56		8 kHz	35.8 dB	56	
100 Hz	46.9 dB	56		1 kHz	51.8 dB	56		10 kHz	34.7 dB	56	
125 Hz	48.7 dB	56		1.25 kHz	54.6 dB	56		12.5 kHz	30.6 dB	56	
160 Hz	49.4 dB	56		1.6 kHz	51.5 dB	56		16 kHz	28.8 dB	56	
200 Hz	49.3 dB	56		2 kHz	49.0 dB	56					

Band	Leq,t	Time s	Overload
LAeq	56.1 dBA	56	
LCeq	60.1 dBC	56	



Measurement Report

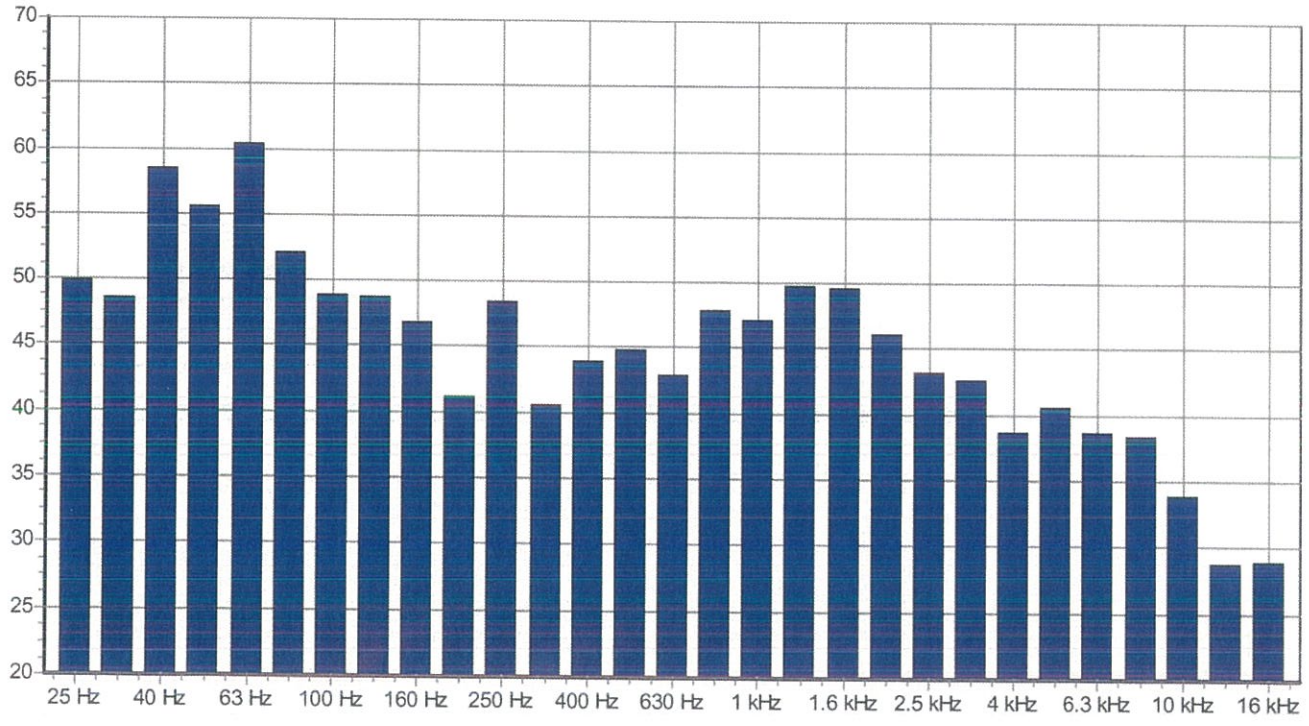
Measurement Details

Date and Time:	30/10/2009 16:31
Sound Level Meter:	Cirrus Research plc
Run Duration:	00:29:52 hh:mm:ss
Range:	50-110 dB
Location:	Ballymurtagh Landfill NSL4 1/3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
25 Hz	49.9 dB	56		250 Hz	48.4 dB	56		2.5 kHz	43.2 dB	56	
31 Hz	48.5 dB	56		315 Hz	40.5 dB	56		3.15 kHz	42.6 dB	56	
40 Hz	58.5 dB	56		400 Hz	43.9 dB	56		4 kHz	38.7 dB	56	
50 Hz	55.5 dB	56		500 Hz	44.9 dB	56		5 kHz	40.5 dB	56	
63 Hz	60.3 dB	56		630 Hz	42.8 dB	56		6.3 kHz	38.6 dB	56	
80 Hz	52.0 dB	56		800 Hz	47.9 dB	56		8 kHz	38.4 dB	56	
100 Hz	48.9 dB	56		1 kHz	47.1 dB	56		10 kHz	33.9 dB	56	
125 Hz	48.7 dB	56		1.25 kHz	49.8 dB	56		12.5 kHz	28.7 dB	56	
160 Hz	46.8 dB	56		1.6 kHz	49.6 dB	56		16 kHz	28.9 dB	56	
200 Hz	41.2 dB	56		2 kHz	46.0 dB	56					

Band	Leq,t	Time s	Overload
LAeq	59.9 dBA	56	
LCeq	69.7 dBC	56	



APPENDIX G

EMISSIONS TO ATMOSPHERE

RPS, Ballymurtagh Landfill

Ballygahan, Tinnahinch, Co Wicklow

Emissions to Atmosphere
Report No:
2040/M21 rev2

Waste Licence No. W0011-01

Report Date
21/12/2009

EURO environmental services

Unit 35, Boyne Business Park, Drogheda, Co. Louth
Phone: +353 41 98 45440

Report for the Periodic Monitoring of Emissions to Air

Part 1: **Executive Summary**

Waste Licence No: W0011-01

Job Quote Number AAAQ6501-01

Operator Name	Installation	Phone	Contact Name
Ballymurtagh Landfill	Ballygahan	01 4882900	Paddy Lambe
	Tinnahinch	087 2301627	Seamus Brestin
	Co Wicklow		
		Fax	
		01 2020707	

Monitoring Dates: 29/09/2009

Monitoring Organisation : EURO environmental services
Unit 35A, Boyne Business Park, Greenhills, Drogheda, Co. Louth. Ireland

Ph: + 353 41 98 45440 Fax : + 353 41 98 46171 Email : air@euroenv.ie

UKAS Registration number: 2802

Report Date: 21/12/2009

Written By	Ewa Piatek	**Approved By**	Geoff Fitzpatrick
MCERTS Reg.	MM07 799	**MCERTS Reg.**	MM07 801
Competency	Level 1	**Competency**	Level 2
Function	Field Services Supervisor	**Function**	Manager
Endorsements	TE1, TE2	**Endorsements**	TE1,TE2,TE3,TE4

Signed: Ewa Piatek ..... Signed: .....

Contents

1 Part 1: Executive Summary

1.1 Monitoring Objectives

The monitoring was carried out on behalf of Wicklow Co Co as requested by their representative Paddy Lambe from RPS. Air Emission Monitoring was carried out on the 28/09/2009 between 12:00 and 16:00 at Flare Ballymurthagh Landfill. Parameters measured were Nitrogen Oxides, Oxides of Sulphur, Carbon Monoxide, TA Luft Organics Class I, II, III, Chloride as HCl and Fluoride as HF.
Particulates measurement was requested also but Technicians could not carry out measurement as port diameter was too small.

Substances to be monitored	Flare
Nitrogen Oxides as NO_2	54.2 mg/m^3
Oxides of Sulphur asSO_2	16.9 mg/m^3
Carbon Monoxide - CO	219.4 mg/m^3
TA Luft Organics Class I	<LOD
TA Luft Organics Class II	<LOD
TA Luft Organics Class III	<LOD
Chloride (HCl)	1.8 mg/m^3
Fluorides (as HF)	0.7 mg/m^3

Equipment used

Nitrogen Oxides, Carbon Monoxide, Oxides of Sulphur were measured by Horiba Potable Flue Gas Analyzer. Equipment was calibrated on site against certified calibration gases. Measurement was carried out for a 30 minutes period.

Chloride and Fluoride monitoring consists of extracting a volume of gas from the stack using SKC pumps and mini impingers set. Sampling was carried out for a 30 minutes period with air flow rate 1.5 l/min.

TA Luft Organics Class I, II, III, monitoring consists of extracting a volume of gas using SKC Pumps from the stack using an extraction via sorbent tube. Sampling was carried out for a 30 minutes period with air flow rate 0.2 l/min.

1.2 Special Monitoring Requirements

Particulates measurement was not carried out as port diameter was too small. Actual port diameter is 20mm for Particulates measurements minimum 100mm port is recommended.

1.3 Monitoring Results

The table presents the atmospheric emissions from the tests undertaken on behalf of Wicklow Co Co at Ballymurtagh Landfill. The results were measured from the sample positions downstream of the Flare.

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Uncertainty	Units	Date of Sampling	Start/End Times	Method Reference	Operating Status	Accreditation Status
Flare	NO_x	800	54.2	+/-6.60	mg/m^3	28/09/2009	15:20-15:50	BS EN 14792	As Normal	N/A
Flare	O_2	-	8.46	+/-0.30	%	28/09/2009	15:20-15:50	BSEN 14789:2005	As Normal	N/A
Flare	CO	650	152.5	+/-26.66	mg/m^3	28/09/2009	15:20-15:50	BS EN 15058:2006	As Normal	N/A
Flare	SO_x	-	16.9	+/-2.13	mg/m^3	28/09/2009	15:20-15:50	BS EN 6069-4.4	As Normal	N/A
Flare	TA Luft Organics Class I	20	<LOD	N/A	mg/m^3	28/09/2009	12:20-12:50	BS EN 13649	As Normal	N/A
Flare	TA Luft Organics Class II	100	<LOD	N/A	mg/m^3	28/09/2009	12:20-12:50	BS EN 13649	As Normal	N/A
Flare	TA Luft Organics Class III	150	<LOD	N/A	mg/m^3	28/09/2009	12:20-12:50	BS EN 13649	As Normal	N/A
Blank	HCl	-	<LOD	N/A	mg/m^3	28/09/2009	13:25-13:28	BS EN 1911 parts 1-3	As Normal	N/A
Flare	HCl	50	1.8	N/A	mg/m^3	28/09/2009	13:35-14:05	BS EN 1911 parts 1-3	As Normal	N/A
Blank	HF	-	<LOD	N/A	mg/m^3	28/09/2009	12:38-12:41	BS ISO 15713	As Normal	N/A
Flare	HF	5	0.7	N/A	mg/m^3	28/09/2009	12:46-13:46	BS ISO 15713	As Normal	N/A

Additional Information
** Analysis carried out by EURO Environmental Services*
***The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.*
****Result reported at Reference Conditions*

Emission Point Reference	Reference Conditions			
Flare	Temperature: 273 K	Pressure: 101.3 hPa	Moisture: dry	Oxygen: 3%

1.4 Operating Information

Emission Point Reference	Date	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load	Comparison of operator CEMS and Periodic Monitoring Results			
								Substance	CEMS Result	Periodic Result	Units
Flare	28/09/2009	Flare	As required	Landfill Gas	N/A	None	Full	As per table 1.3	N/A	As per table 1.3	mg/m^3

1.5 Monitoring Deviations

Emission Point Reference	Substance Deviations	Monitoring Deviations	Other Relevant Information
Flare	None	Particulates and duct gas velocity profile not carried out due too small sampling port diameter. HF sampling carried out using TSI pump and PTTF impingers system. HCl sampling carried out using TSI pump.	None

Comments on monitoring procedures

- Particulates monitoring not carried out due too small port diameter.

Comment	If No, WHY?
Did the sampling location meet the standard?	No, Sampling port too small.
Were all the sampling points obtainable?	Yes
Were all parameters sampled?	No, Particulates sampling not carried out due too small port size.
Was monitoring carried out in full accordance to the specified standards and SOP's?	No, Velocity, pressure measurement not taken.

1.6 Summary and Conclusions

Air Emission Monitoring was carried out at Flare Ballymurthagh Landfill. Parameters measured were Nitrogen Oxides, Oxides of Sulphur, Carbon Monoxide, TA luft Organics Class I, II, III, Chloride as HCl and Fluoride as HF.

Nitrogen Oxides, Carbon Monoxide were measured by Horiba. Reading is taken on site in ppm. Data were calculated to mg/m^3 and reference oxygen.
Nitogen Oxide result is 54.2 mg/m^3 and the result is below Emission Limit Value as per Waste Licence W0011-01. Result for Carbon Monoxide is 152.5 mg/m^3 it complies with the Emission Limit Value. Oxides of Sulphur result is 16.9 mg/m^3, there is no Emission Limit Value for this parameter.

Chloride and Fluoride monitoring consists of extracting a volume of gas from the stack using extraction into sorbent solution. Result for Chloride is 1.8mg/m^3as HCl and is below Emissions Limit Value. Fluoride results is 0.7 mg/m^3 as HF. The result for HF is also below Emission Limit Value as per Waste Licence W0011-01.

TA Luft Organics Class I, II, III, monitoring consists of extracting a volume of gas from the stack using an extraction via sorbent tube. The volume of extracted air was 6L. Results were lower than the limit of detections for this method

The particulates measurement was not carried out due to the sampling port being too small to cary out this method to standard.

Report for the Periodic Monitoring of Emissions to Air

Part 2 Supporting Information

Waste Licence Number:	W0011-01
Operator:	RPS – Ballymurtagh Landfill
Installation:	Ballygahan, Tinnahinch, Co Wicklow
Monitoring Dates:	28/09/2009

Organization and Monitoring Team Details

EURO environmental services
Unit 35
Boyne Business Park
Drogheda
Co. Louth

Phone: 041 9845440
Fax: 041 9846171
E-mail address: air@euroenv.ie

Appendix 1

Sampling Personnel

Name:	Responsibility:	Competency:	Technical Endorsement(s):	MCERT Number:
Piotr Nadany	Technician	Level 1	TE1	MM07 881
Lisa Doyle	Technician	Trainee	-	MM091208

Substances Monitored

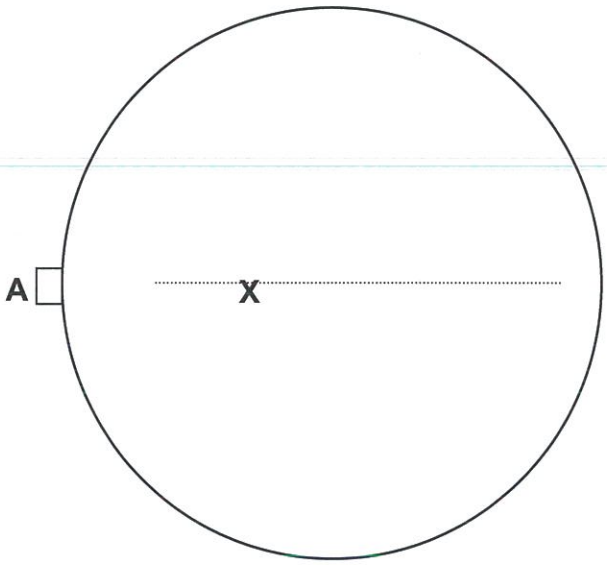
Substance	Standard Method	EURO SOP
VOC (speciated)	BS EN 13649:2002	EM 107
Hydrogen Chloride	BS EN 1911 parts 1-3 (modified)	EM 148
Hydrogen Fluoride	BS ISO 15713 (modified)	EM 129
Carbon Monoxide	BS EN 15058	EM161
Nitrogen Oxides	BS EN 14792	EM 161
Oxygen	BS EN 14789	EM 161
Oxides of Sulphur	BS EN 6069-4.4	EM 161

Equipment Checklist References

Equipment	Reference Number
TSI Pumps	EM140, EM147
Horiba	EM209

Appendix 2

Diagram of Sampling Location (not to scale)



Monitoring result calculations and uncertainty calculations