ANNUAL ENVIRONMENTAL REPORT

FOR

MARLINSTOWN LANDFILL

2010

WASTE LICENCE NO. W0071-02

Prepared By: -

Environment Section,
Westmeath County Council,
County Buildings,
Mullingar,
Co. Westmeath.

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1. INTRODUCTION

This is the tenth Annual Environmental Report (AER) for Marlinstown Landfill, Mullingar, County Westmeath, which is operated by Westmeath County Council (Council). The AER is prepared in response to Schedule E of Waste Licence W0071-02 issued to the Council by the Environmental Protection Agency (Agency) on 9th January 2004.

The AER describes the site activities for the period from 1st January 2010 to 31st December 2010. The content of the AER is based on Schedule G of the Waste Licence W0071-02.

It should be noted that disposal of all waste at Marlinstown Landfill ceased on the 31st December 2002 in accordance with Waste Licence (W0071-01). Recycling at Marlinstown and the acceptance of Household Waste from private vehicles for transport off-site for disposal at Ballydonagh Landfill, Athlone, Co. Westmeath, ceased on the 13th January 2007.

The facility address is: -

Marlinstown Landfill,
Marlinstown Bog,
Mullingar,
County Westmeath.

The Council's Address is: -

Westmeath County Council,
County Buildings,
Mullingar,
County Westmeath.

2. SITE DESCRIPTION

2.1 Site Description

The site is located approximately 3 km east of Mullingar in the southwest corner of Marlinstown Bog. The facility occupies an area of some 9 ha (22 acres) most of which has been used for landfill.

2.2 Waste Management Activities

Disposal of all waste at Marlinstown Landfill ceased on the 31st December 2002 in accordance with Waste Licence (W0071-01). The site operated as a Civic Amenity Centre up to January 13th 2007. The landfill had been in operation from 1963 to 31st December 2002. It is estimated that the total volume of waste disposed at the site was approximately 461,500 tonnes.

2.3 Local Environmental Conditions

A meteorological report for the period January to December 2010 for the meteorological station at Mullingar is included in Appendix 1. The report includes daily rainfall, air temperature, wind (speed and direction), relative humidity, barometric pressure, monthly evaporation and potential evapotranspiration totals.

3. EMISSION MONITORING AND CONTROL

The Council carries out an environmental monitoring programme at the facility to assess the significance of emissions from site activities. The monitoring programme includes groundwater, surface water, landfill gas, leachate and dust. With the agreement of the EPA the requirement to monitor noise is no longer necessary. The results of all monitoring carried out in the reporting period have been submitted to the Agency. An overview of the monitoring results for the reporting period, and comparisons with previous monitoring results, are presented in this section. The results are discussed in the context of the impact of the emissions on the environment and compared with available data on background and or ambient conditions.

3.1 Groundwater

3.1.1 Site Geology & Hydrogeology

The subsurface at the site is composed of peat, which ranges in thickness from 1 metre (m) in the North West of the site to 8.5 m in the north east of the site. The peat is underlain by glacial tills ranging in thickness from 4.3 m to19.7 m. In the north of the site there is 10m thickness of coarse gravels. The overburden overlies the bedrock, which comprises Waulsortian limestone, basinal limestones and mudstones of the Tobercolleen formation.

The basinal limestones underlying the western half of the site and the Waulsortian limestones underlying the south-eastern corner of the site are classed as a 'locally important aquifer-generally moderately productive'. The mudstones underlying the eastern part of the site are classified as a 'poor aquifer-generally unproductive except for local zones'.

The groundwater flow in both formations is generally from the southwest to the northeast. There is local mounding of the shallow groundwater beneath the landfill.

3.1.2 Monitoring Locations

The Council monitors groundwater quality in 10 monitoring wells in the general vicinity of the site. The wells are located in the overburden and the bedrock aquifers up and down gradient of the site. The well locations are shown in Appendix 2.

Wells BH31 (Deep) and BH32 (Shallow) are up gradient of the site on the southern side of the Mullingar bypass. BH2 (S) and BH1 (D), although located up gradient, are

considered to be within the zone of influence of the landfill due to proximity and the effect of localised mounding of the shallow groundwater beneath the landfill.

The perimeter wells BH3 (D) and BH4 (S) are considered as down gradient due to the localised mounding of the shallow groundwater beneath the site.

Wells BH 13 (D), BH14 (S), BH15 (D) and BH16 (S) are all down gradient and located on the forest road to the north of the site.

3.1.3 Monitoring Programme

Groundwater levels are monitored at monthly intervals. Water quality is monitored at quarterly and annual intervals for a range of different parameters. The range of analysis is as specified in Schedule D (table D.5.1) of the Waste Licence and includes pH, electrical conductivity, organic, inorganic, metals and non-metals parameters. The sampling and analysis is carried out in accordance with recognised quality assurance and control procedures.

The full details of all the monitoring events including the sampling techniques, analytical methods and results are included in the quarterly monitoring reports submitted to the Agency. Summary tables of all of the data and graphs of indicator parameters are included in Appendix 2.

3.1.3.1 Groundwater Levels

The groundwater level data confirm the direction of groundwater flow in both the overburden and the bedrock is locally generally northwards, and that there is localised mounding in the overburden in the area of the site.

3.1.3.2 Groundwater Quality

The monitoring data for the up gradient wells BH31 (D) and BH32 (S) indicate good quality water in respect of parameters TOC and Chlorine. However, the Ammonia results for BH32 were higher this year, with the exception of the Q1 reading, than in previous years. The levels, in the range 0.09 to 0.34 mg/l N, exceeded the EPA guide value of 0.15mg/l N on 3 occasions. The TOC levels were low, in the range of 0.7 to 4.8 mg/l Cl. The Chloride results were in the range of 12.6 mg/l Cl to 21mg/l Cl for both monitoring locations which is in line with the typical value for Irish groundwaters of 20mg/l Cl.

The water quality was somewhat uncertain in the up gradient wells BH1 (D) and BH2 (S). The ammonia levels in both wells were less than 0.1mg/l N and the TOC levels were less than 4.6 mg/l which indicates good quality, however, the ranges for Chloride (29 to 174 mg/l Cl indicate less satisfactory quality.

The data for the perimeter wells BH3 (D) and BH4 (S) show that the quality is broadly similar to last year. The shallow well BH4 had much higher readings for Ammonia (6.84 to 8.31 mg/l N) than the deep well BH3 (0.04 to 0.45 mg/l N). There was a similar disparity in respect of the TOC readings with BH4 having high levels (13.7 to 16 mg/l), while BH3 had lower levels of 0.9 to 2.6 mg/l. The chloride figures were low, in the range of 10 to 28mg/l Cl. There is some impact on the overburden from the site leachate at this location.

In the down gradient locations the poorest quality water is in the deep well BH13 with the ammonia levels particularly high (30.88 mg/l N in Q2 and 34.8 mg/l N in Q3). The chloride levels are also high in the range of 25 to 82mg/l Cl, as are the TOC levels (19.1 to 34.7 mg/l). The shallow well BH14 has relatively high levels of ammonia, in the range of 2.41 to 3.61mg/l N. The TOC levels are also higher than in most other wells, in the range 19.5 to 40.6mg/l. The chloride values at BH14 (S) are low, less than 20mg/l Cl.

At the two other down gradient locations there are some relatively poor readings in relation to ammonia, for example BH15 (D) had readings in the range of 1.61 to 3.03mg/l N while BH16 (S) had readings in the range of 0.49 to 0.73mg/l N. The TOC levels at both locations are high in the range 48 to 112 mg/l. Results for these wells indicate a slight reduction in quality compared to last year.

Using Ammonia as the main parameter for comparison there is generally a slight reduction in water quality on the 2009 figures for the six down gradient wells. The readings for three of the four up gradient wells are similar to 2009 with the exception of BH32 (S) which had marginally higher readings than for 2010. The annual groundwater monitoring results and graphs are included in Appendix 2.

The Annual groundwater analysis results are presented in Appendix 2 along with the standards used for comparison. The results are compared with the limit values from the Drinking Water Regulations (S.I. No. 278 of 2007) and the EPA Interim Guideline Values (IGVs) set out in the EPA report "Towards Setting Guideline Values for the Protection of Groundwater in Ireland (2001)". The results that exceed these limits are highlighted.

Analysis for List I/II organic compounds were determined for samples at BH1, BH14 and BH16. All parameters were below the limit of detection with the exception of those listed in Table 3.1.

Table 3.1: List I/II compounds detected in BH1, BH14 and BH16

Parameters	Units	BH1	BH14	BH16
Naphthalene	ug/l	0.023	<0.04	<0.10
Total PAH	ug/l	0.023	<0.04	<0.10
Bis(2-ethylhexyl)phthalate	ug/l	<5.0	41	26.6

Naphthalene and PAC levels are below the limits specified in The Drinking Water Regulations (S.I. No. 278 of 2007). The EPA Interim Guidelines values specify a limit of 5.0ug/l for phthalates. The levels of Bis(2-ethylhexyl)phthalate in BH14 and BH16 at 41.0ug/l and 26.6 ug/l exceeds this limit. BH14 and BH16 may

require further analysis if the level of phthalates is in exceedance of standards in the next monitoring round.

3.1.4 Estimated Annual and Cumulative Quantity of Emissions to Groundwater

The site is not provided with an engineered lining system but a leachate collection lagoon and collection sumps have been constructed and are operating successfully. Leachate is pumped to the lagoon and tankered off-site to Mullingar Wastewater Treatment Plant for treatment. However, there is the potential for the direct discharge of leachate to groundwater. The groundwater monitoring programme indicates that the that leachate is impacting on groundwater quality as results in the down gradient wells are inferior to those upstream as discussed in 3.1.3.2 above.

There are two distinct water-bearing formations beneath the site. The uppermost formation is the peat and glacial tills. The bedrock underlying the tills forms the lower formation. It is considered likely that leachate discharges directly to the upper water bearing formation. However, the thickness and low permeability of the tills retards and attenuates the discharge to the bedrock formation.

Leachate may also discharge to the site surface water drainage system. Surface water is a potential source of groundwater recharge and as such provides a possible pathway for indirect discharge to groundwater. It is not possible, based on the available information, to estimate the recharge contribution of the surface water drainage system to the groundwater beneath the site.

3.1.5 Control Measures

The Council has monitoring programmes for groundwater (3.1.3) and leachate (3.3.2) in place. Phase 2 Capping contract works due to have been carried out in the past 2 years have not taken place due to access difficulties at the site. This work will go ahead in early 2011 as these difficulties have been resolved.

3.2 Surface Water Quality Monitoring

Surface water from the site drains to the Marlinstown stream. The stream is fed by numerous bog drains. The main stream draining the site runs from east to west along the southern boundary before turning north through the western part of the site. It turns west and flows along the northern boundary for a short distance before turning northwards again. The stream swings eastwards and flows for approximately 2.6 km to join the Riverstown River. The Riverstown River is a tributary of the River Deel which itself is a tributary of the Boyne.

3.2.1 Monitoring Locations

The Council monitors surface water quality in 4 locations (SW1, SW2, SW3 and SW5) as shown in Appendix 3. SW1 and SW2 are located on drains upstream of the site, SW5 is on the Marlinstown Stream immediately downstream of the site. SW3 is also located on the Marlinstown stream approximately 0.7 km downstream of the site.

3.2.2 Monitoring Programme

The monitoring is conducted at weekly, quarterly and annual intervals in accordance with Licence conditions and includes weekly visual inspections and monthly in situ and laboratory testing. The range of analysis is as specified in Schedule D.5.1 of the Waste Licence and includes dissolved oxygen, pH, electrical conductivity, and organic and inorganic parameters.

The sampling and analysis is carried out in accordance with recognised quality assurance and control procedures. The detailed monitoring results are presented in the quarterly monitoring reports submitted to the Agency in the reporting period. Graphs of indicator parameters for each monitoring location are included in Appendix 3.

3.2.2.1 Surface Water Quality

The sampling point SW1 is upstream on a small drain flowing towards the Landfill from the south. The flow is generally low and in summer it can be stagnant. The water at this point is sometimes of poor quality. This may be accounted for by the low flow, the occasional stagnant nature of the drain, and the unavoidable disturbance of solids when taking the sample. The BOD readings varied from a low of <1mg/l in Q1 and Q4 to a high 18 mg/l in Q2 (evidence of hydrocarbons in sample). The level of SS in Q2 and Q3 were particularly high at 337 mg/l and 228 mg/l respectively. Ammonia was higher (2.02 mg/l N) than normal in Q2.

The sampling point SW2, located on the stream west of the site, is a more representative example of upstream water. It has a steady flow throughout the year. The water quality is satisfactory and complies with A2 values as set out in the EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1988[S.I. No. 294 of 1989]. The quality would reach A1 standards were it not for an elevated ammonia level of 0.70mg/l in Q1.

The water quality at SW5 immediately downstream of the Landfill, while slightly inferior to SW2 upstream, is satisfactory. It would attain A1 quality (SS, Chloride and BOD levels are low), but for one elevated Ammonia reading of 2.38 mg/l in Q1.

The further downstream surface water location SW3 is broadly similar in quality to SW5 with elevated Ammonia reading of 1.97mg/l in Q1. The downstream water quality is very similar to last year.

The annual monitoring event included a comprehensive range of laboratory analysis as outlined in Schedule D of the Licence W0071-02. All parameters were within the A1 Category requirements of the EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989 with the exception of iron and manganese. Both iron and manganese met the A2 Category requirements. The annual monitoring results and standards are included in Appendix 3.

3.2.3 Control Measures

The Council has a monitoring programme for leachate (3.3.2) in place. Phase II capping contract works, which will go ahead in early 2011, will cover the old recycling centre area and will further reduce the likelihood of contamination of the surface water.

3.3 Leachate

Leachate is a contaminated liquid generated when waste comes into contact with water. The sources of the water typically includes rainfall, surface water runoff and groundwater. At Marlinstown the primary source of leachate generation is rainfall. There may be limited surface water infiltration around the margins of the waste.

3.3.1 Monitoring Locations

A total of eight leachate monitoring wells are located in the Landfill. They are BH21 and BH26 in the uncapped area and gas extraction wells GEW31, GEW28, GEW25, GEW23, GEW18 and GEW20 in the capped area of the Landfill. There is damage to the pipes of wells GEW18 and GEW31. As a result no monitoring of these wells has taken place in the past 2 years. The well locations are shown in Appendix 4.

3.3.2 Monitoring Programme

Leachate levels are monitored weekly. Leachate quality is monitored at quarterly and annual intervals for a range of different parameters. The range of analysis is as specified in Schedule D.5.1 of the Waste Licence and includes pH, electrical conductivity, and organic, inorganic and microbiological parameters. The sampling and analysis is carried out in accordance with recognised quality assurance and control procedures.

The full details of all the monitoring events including the sampling techniques, analytical methods and results are included in the quarterly reports submitted to the Agency. Summary tables of the data for each location are included in Appendix 4.

3.3.2.1 *Leachate Levels*

The level monitoring did not identify any significant fluctuations in leachate levels in boreholes BH21, BH22, GEW20 and GEW23. In boreholes GEW25 and GEW28 there are doubts about the accuracy of the results, see data in Appendix 4. Levels in GEW18 and GEW31 could not be determined due to pipe damage in the wells.

3.3.2.2 *Leachate Quality*

Every quarter a visual and odour inspection is carried out at the leachate monitoring wells. Annually 3 locations (Leachate lagoon, BH21 and GEW28) are monitored for the range of organic and inorganic parameters defined in the Waste Licence W0071-01. No sample could be collected from BH21 as the pipe was restricted. The results are consistent with leachate generated at a municipal waste landfill in various stages of the waste degradation lifecycle. The leachate from GEW is more concentrated than that in the lagoon. This is due to groundwater infiltration to the leachate at some sections of the landfill. The COD level in GEW28 was 2340mg/l compared to 209mg/l in the lagoon. Similarly, there were high readings of Chloride (1180mg/l Cl) and Conductivity (10,400uS/cm) at GEW28 compared to the much lower readings of 198mg/l Chloride and 1990uS/cm Conductivity for the lagoon. For full annual monitoring analysis see Appendix 4.

3.3.3 *Leachate Volumes*

The water balance calculations give an estimate of the amount of leachate generated for 2010. These calculations forms the basis for the estimation of cumulative totals over the lifetime of the landfill

The water balance calculates the volume of leachate generated at the site on a monthly basis based solely on rainfall data. It was considered that the potential for surface water infiltration was insignificant. The water balance methodology is described below and the calculations shown on Table 3.2 and 3.3

The water balance calculations are based on the methodology specified in the Agency's Landfill Site Design Manual. The calculation used is as follows: -

$$Lo = [ER(A) + LW + IRCA + ER(l)] - [aw]$$

Lo = leachate produced (m^3)
ER = effective rainfall (m) (Use actual rainfall (R) for active cells)
A = area of cell (m^2)
LW = liquid waste (also includes excess water from sludges) (m^3)
IRCA = infiltration through restored and capped areas (m)

l = surface area of lagoon (m^2)
a = absorptive capacity of waste (m^3/t)
W = weight of waste deposited (t/a)

The meteorological data used was from the meteorological station at Mullingar. Given the history of filling at the site the entire site was included in the calculations. Meteorological data is presented in Appendix 1.

Where the evapotranspiration rate was higher than the total rainfall a conservative zero effective rainfall was assumed. In the restored area (70,000 m^2) the infiltration rate of the rainfall was assumed to be zero due to the permanent capping being completed on this area of the landfill in March 2005. In the unrestored area (20,000 m^2 approx) a conservative estimate of 25% of the annual rainfall figure was used to calculate the infiltration in the temporary capped area. The Civic amenity area does not form part of the temporary capped area for calculation purposes as it is paved. The 20,000 m^2 covers the area from the civic amenity area to the entrance gate.

The estimated volume of leachate generated for the reporting period is 3736 m^3 (Table 3.2). Cumulative annual figures are given in Table 3.3. The quantity of leachate removed off site for treatment in the reporting period is shown in Table 3.1 below.

2010 Leachate Volumes Removed from Site. Table 3.1

Month	Volume of Leachate Removed (m^3)
January	0
February	437
March	82
April	246
May	452
June	180
July	0
August	720
September	450
October	270
November	720
December	180
Total	**3736**

3.3.4 Control Measures

The Council has a leachate monitoring programme (3.3.2) in place. Leachate is being pumped from the landfill to the holding lagoon and tankered off-site for treatment. Phase II capping contract works, which will go ahead in early 2011, will cover the old recycling centre area and will further reduce the amount of leachate being produced.

Table 3.2: 2010 Annual Leachate Volume Calculations

Month	Restored Area (m^2)	Unrestored Area (m^2)	Actual Rainfall (m)	Effective Rainfall (m) ER	[1]Infiltration Through Restored Area (m^3) IRCA	[2]Infiltration Through Unrestored Area (m^3) IRCA	Weight of Waste Deposited (Tonnes) W	Leachate Produced (m^3) Lo
January	70,000	20,000	0.0450	0.0407	0.00	203.50	0.0	203.50
February	70,000	20,000	0.0419	0.0311	0.00	155.50	0.0	155.50
March	70,000	20,000	0.0820	0.0514	0.00	257.00	0.0	257.00
April	70,000	20,000	0.0538	0.0000	0.00	0.00	0.0	0.00
May	70,000	20,000	0.0395	0.0000	0.00	0.00	0.0	0.00
June	70,000	20,000	0.0505	0.0000	0.00	0.00	0.0	0.00
July	70,000	20,000	0.1500	0.0795	0.00	397.50	0.0	397.50
August	70,000	20,000	0.0474	0.0000	0.00	0.00	0.0	0.00
September	70,000	20,000	0.1645	0.1231	0.00	615.50	0.0	615.50
October	70,000	20,000	0.0594	0.0362	0.00	181.00	0.0	181.00
November	70,000	20,000	0.1252	0.1187	0.00	593.50	0.0	593.50
December	70,000	20,000	0.0372	0.0345	0.00	172.50	0.0	172.50
Total			0.8964	0.5152		2,576		2576

Notes:
(1) The 70,000 m^2 Restored Area was permanently capped by the end of March 2005 so the infiltration rate since from the rainfall is 0.

(2) Effective rainfall figures, at a 25% infiltration rate, were used to calculate the infiltration through the unrestored fill area

Table 3.3 - 2010 Cumulative Leachate Volume Calculations

Year	Active Area (m^2)	Active area Infiltration (m^3)	Waste Input tonnes	Restored area (m^2)	Rest. area Infiltration (m^3)	Unrestored area (m^2)	Unrest. area Infiltration (m^3)	Total Water (m^3)	Cumulative water (m^3)	Absorptive Capacity Input (m^3)	Cumulative Absorptive Capacity (m^3)	Total Volume Sludge	Cumulative Volume Sludge (tonnes	Annual Leachate (m^3)	Cumulative Leachate (m^3)
2001	2000	1330	30058.2	8,000	639	80000	25576	29948	29948	1803	1803	2402	2402	28144	28144
2002	2000	2425	32383.7	8,000	1614	80000	64551	68606	98554	1943	3747	15	2417	66663	94807
2003	0	0	0	70,000	5493	0	0	5493	104047	0	3747	0	0	5493	100300
2004	0	0	0	70,000	7317	0	0	7317	111364	0	3747	0	0	7317	107617
2005	0	0	0	70,000	3210	20,000	2583	5793	117157	0	3747	0	0	5793	113410
2006	0	0	0	70,000	0	20,000	3037	3037	120194	0	3747	0	0	3037	116447
2007	0	0	0	70,000	0	20,000	2621	2621	122815	0	3747	0	0	2621	119068
2008	0	0	0	70,000	0	20,000	3256	3256	126071	0	3747	0	0	3256	122324
2009	0	0	0	70,000	0	20,000	3599	3599	129670	0	3747	0	0	3599	125923
2010	0	0	0	70,000	0	20,000	2576	2576	132246	0	3747	0	0	2576	128499

(1) The 70,000 m2 Restored Area was permanently capped by the end of March 2005 so the infiltration rate since is 0.

(2)Effective rainfall figures were used to calculate the infiltration through unrestored fill area (past the civic waste area and to the west of the site out to entrance gate) a 25% infiltration rate was used for the unrestored area. Temporary Capping with 600mm soil.

3.4 Landfill Gas

Landfill gas is produced during the breakdown of waste within the landfill. It is a by-product of the digestion, by anaerobic bacteria, of the organic component of the waste. Landfill gas comprises a mixture of different gases. Methane and carbon dioxide (in the ratio of 3:2) are the main components, with small concentrations of a wide variety of compounds. The number and ratio of gases at any one time depends on the breakdown process which occurs in stages and which is subject to controlling factors. These factors include: -

- Physical dimension of the site,
- Type and input rate of waste deposited,
- Waste age,
- Moisture content, pH, temperature and density of wastes,
- Application of cover, compaction and capping.

3.4.1 Monitoring Locations

The Council monitors landfill gas at 32 permanent monitoring wells (G1 to G32, Appendix 5) at locations in and around the landfill and in Hamill's shop. It must be noted that these wells are between 8 and 12 years old and some of them appear to be impaired. This is observed when suction is applied to the well by the gas monitor in excess of the normal 30 to 60 seconds monitoring time. The initial level of methane/carbon dioxide drops off sharply as the suction is applied. This was confirmed for a number of wells in March of this year when the EPA in conjunction with DCU installed continuous monitoring meters at these wells. Most wells, including G26, were pulling a vacuum during the monitoring event so gas analysis was not possible. This monitoring was only continued at G27 (high CO2) and is in place at the end of the year. Therefore, there is some uncertainty in regard to the accuracy of the data from these wells. It is planned, as part of the Phase 2 capping contract, that all these wells will be replaced.

Since May 2006 the Council have been monitoring the level of Gas at G26 (south of the Landfill and to the west of the Service Station) daily because of high gas levels being recorded at this well. In June 2006 the Council installed 5 temporary Piezometers (G33 to G37 inc.) around the perimeter of G26 to fully investigate possible gas migration in this area. In October 2007 the Council installed 20 gas monitoring/vent wells inside the landfill site but outside the perimeter of the waste body (see appendix 8). Eleven of the wells are on the south side adjacent to Hamill's shop while the remaining ones are to the north of the site. Monitoring of the wells adjacent to Hamills in 2008 and 2009 showed very low levels of gas. In mid 2009 the caps were removed from these wells so that any gas present can be vented to atmosphere.

Gas extraction wells GEW1, GEW4, GEW28, and GEW24 (replaced wells G12 to G15 after Phase 1 capping) located in the fill area are also used for monitoring purposes. Wells G10 and G11 are located on the edge of the older section of the landfill (Phase 2

capping area). Monitoring locations G1 to G6 are located outside the fill area but inside the landfill perimeter. The wells G7 to G9 and G16 to G32 are located outside the landfill perimeter on the northern side to monitor for the possible migration of gas from the landfill. In October 2009 the Council installed 3 extra gas monitoring wells (G58 – G60) in Hamill's land between wells G26 and G27 to check if gas was present in this area. Summary tables of the data are included in Appendix 5.

3.4.2 Monitoring Programme

Monitoring is carried out at daily and monthly intervals in accordance with the licence conditions. Daily monitoring is carried out at Hamill's shop, at points G16, G17, G18, G26 and G33 to G37, and three times weekly at G7, G8 and G9 to monitor gas migration. The remaining wells G1 to G6, G10, G11 and G19 to G32 are monitored monthly.

The monitoring programme includes methane, carbon dioxide, oxygen, temperature and atmospheric pressure. The monitoring results are presented in the summary tables in Appendix 5.

3.4.3 Gas Quality

The average methane level in the gas wells (GEW1, GEW4, GEW24 and GEW28) of the main body of the landfill is 24% with a range of 0.1 to 70%. The average level is consistent with the average gas levels recorded at the Flare. The Methane levels in wells G10 and G11 in the older, uncapped area is much lower (average 2.3%) than those in the rest of the Landfill.

On the south side of the Landfill the perimeter wells G1 to G5 have Methane levels ranging from 0 to 46.5%, with an average level of 9.3%. The frequent high levels at these locations may indicate that gas is migrating towards the south in this area. Methane readings of 0 to 1.2% were recorded for well G6 on the north-east corner of the site.

A limit of 1% methane applies to any building on or adjacent to the facility and/or at any point located outside the body of the waste. Generally high levels of methane are recorded at wells G7, G8, G9 and G32 located to the north of the Landfill. The methane range for these wells is 0 to 58.4% with an average of 16%. However, there are 2 wells in this area G30 and G31 that have zero levels of methane. Wells G27 outside the site to the south west and G28 outside to the north east regularly have elevated levels of methane ranging from 0 to 4.4% with an average level of 1.3%.

High levels of methane gas were observed at G26 outside the facility on the southern side, with levels ranging from 0 to 56% with an average level of 24%. This is the only well in the vicinity of the petrol station that gives high methane readings. It is one of the wells that may be giving erroneous readings as described in 3.4.1 above. At G17 adjacent to the Petrol Station methane readings did not exceed 0.1% (except for one occasion – 1.35% on 12th Nov.). However, Carbon Dioxide levels are constantly high at this point, in the range of 1.0 to 31.5%. The methane levels at the in-situ gas monitoring

meter in the petrol station shop never exceeds a reading of 0.1%. There was no methane detected in the new wells G58 to G60.

3.4.4 Landfill Gas Volumes

Estimates of gas volumes generated at the site were made for a thirty-five year period.

For predictive purposes Year 1 was taken as 1999. The estimates were based on the following assumptions of waste inputs and landfill gas characteristics: -

Biodegradable waste placed	251,000 tonnes
Annual Biodegradable waste inputs	15,000 tonnes/annum
Lifetime	4 years
Time to reach steady stage production	1 year
Potential future gas production per annum	8.5 m^3/tonne of waste; years 1-10 2.0 m^3/tonne of waste; years10-40

It was assumed that in Year 1 (1999) 251,000 tonnes of the waste placed in the Landfill was generating gases, of which 122,500 tonnes was generating 8.5 m^3/tonne and 128,500 tonnes at 2 m^3/tonne. It was assumed the waste placed in 1999 would not begin producing significant volumes of gas until 2000.

It was assumed that the annual waste inputs reached steady state gas generating conditions within twelve months and that gas generation would not be impacted by reductions in moisture content following the placement of the final capping. Gas volumes will gradually reduce over the following 40 years as the biodegradable content is depleted and although gas may continue to be produced to year 50, the levels will be negligible. The projected gas yields are presented in Table 3.4.

3.4.4 Landfill Gas Control

Of the 38 extraction wells (see map no. 192-11-MTL-01 in appendix 8) in place only 25 are now producing gas at a level that can be flared. The gas output has dropped off in the past year to the extent that the Flare cuts out or has to be turned off for at least one day per week. Gas balancing is carried out fortnightly at the Landfill in order to optimise the flaring process.

Monitoring is carried out on a daily basis at Hamill's shop and the wells in the vicinity of the shop. On the northern perimeter monitoring is less frequent for wells G7 to G9 at 3 times weekly. The remaining wells are monitored on a monthly basis.

A gas fingerprinting analysis was carried out in July 2009 to try to determine the origin of the gas at G26. The report, carried out by consultants TMS, suggests that the gas may be attributable to fuel sources.

3.5 Noise Survey

In 2008 the Council obtained permission from the EPA to cease noise monitoring at Marlinstown Landfill, as the Landfill was closed and therefore, there were no activities giving rise to noise.

3.6 Dust Monitoring

Dust is monitored at three locations around the site (D1, D2, and D3) as shown on Figure 1 in Appendix 6. During the reporting period two dust monitoring events were completed in April and June. A summary table of the results is included in Appendix 6.

The levels of dust were in the range 6.2 to 13.4 mg/m3/day which is well below the licence limit of 350 mg/m^2/day. It can therefore be concluded that the quality of the ambient air in the vicinity of Marlinstown Landfill site is good, as it should be, given that there is no activity at the site.

Table 3.4 Landfill Gas Volumes

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Annual Waste Input 1 x 10^3 tonne/year	15	15	15	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumulative Waste Input 1 x 10^3 tonne/	266	281	296	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	316	311	311	311	311	311	311	311	311	311	311	311
Waste producing Gas at 8.6 m^3 / tonne	121.5	125	128	131	139	127	115	102.5	90	77	64	49	34	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste producing Gas at 2 m^3 / tonne	128 5	122	115.5	109	102 5	96	89.5	83	76 5	70	78 5	87	95.5	104	108 5	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Gas Yield m^3/yr x 10^3	1302	1319	1332	1345	1400	1284	1158	1048	927	802	707	595	483	371	217	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120

4. SITE DEVELOPMENT WORKS

4.1 Engineering Works Undertaken During the Reporting Period

There were no engineering works carried out in 2010. The planned Phase 2 capping contract was deferred to 2011 due to access problems at the site.

4.2 Site Restoration

Phase 2 of the final capping will be carried in early 2011.

4.3 Resource Consumption

The following resource was used on-site during the reporting period: -

- Electricity (24,156 kWhr)

5. ENVIRONMENTAL INCIDENTS AND COMPLAINTS

5.1 Incidents

During the reporting period there were 36 incidents recorded at the site. Twelve of these were in relation to elevated levels of Methane and Carbon Dioxide at some of the wells during the monthly and daily monitoring at gas wells G7 to G32 inclusive. The other incidents relate to the Flare cutting out on low methane or being shut down to allow a build up of gas. All incidents were notified to the Agency.

5.2 Complaints

There were no complaints received during the reporting period of 2010.

6. ENVIRONMENTAL MANAGEMENT PROGRAMME

6.1 Report on progress towards achieving the Objectives for 2010

The Environmental Management Programme (EMP) prepared for 2010 contained a schedule of objectives and targets and the means for their implementation.

6.1.1 Project 1 – Environmental Management System (EMS)

Task 1: Complete an assessment of personnel training needs by 31/08/2010.
This task was completed.

Task 2: Establish additional training if required by 31/08/2010.
This task was completed.

Task 3: Deliver the training programme by 31/12/2010.
This task was completed.

Task 4: Ensure that all procedures prepared as part of the works to meet the other Objective and Targets specified in this Schedule comply with all EMS requirements including designation of responsibility, performance assessment, corrective action and document control.
This task was completed.

6.1.2 Project 2 – Leachate Collection

Task 1: Construct a drain to intercept leachate migrating from the former Recycling area of the site. The leachate will be pumped from collection chambers located on the drain to the leachate holding lagoon. The leachate interceptor drain will be constructed by 31/10/2010.
This task was not completed and will be incorporated into the objectives and targets for 2011

6.1.3 Project 3 – Surface Water Management

Task 1:

To design and construct a surface water swale around the former Civic Amenity area of the site taking into consideration the existing ground conditions. The swale will be lined with LLDPE and will be constructed outside the leachate interceptor drain. This will be constructed by 31/10/2010.
This task was not completed and will be incorporated into the objectives and targets for 2011.

6.1.4 Project 4 – Restoration of Landfill Areas

Task 1:

Complete installation of low permeability capping system around the former Civic Amenity Area of the site incorporating a topsoil layer, a subsoil layer, an infiltration drainage layer, low permeability layer and a landfill gas collection layer. The infiltration drainage layer will tie into the perimeter surface water swale. The topsoil element of the cap will be seeded. The capping system for the former Civic Amenity Area of the site will be completed by 31/10/2010.
This task was not completed and will be incorporated into the objectives and targets for 2011.

Task 2:

Installation of two sets of gas wells within the former Civic Amenity Area of the site.
This task was not completed and will be incorporated into the objectives and targets for 2011.

Task 3:

To carry out mitigation measures for the gas migration from the site in accordance with the SEW approved by the agency.
This task was not completed and will be incorporated into the objectives and targets for 2011.

Task 4:

Keep Flare and gas extraction running during construction works.
This task was not necessary as works did not take place.

Task 5: Every precaution to be taken to ensure that any migration of gas be kept to a minimum during construction of the work. In particular method statements will be required from the contractor to show how capping work will be carried out around the existing gas extraction system.
This task was not necessary as works did not take place.

6.2 Objectives and Targets for 2011

Marlinstown Landfill

EMP - Future Targets & Objectives for 2011

Date: Feb. 2011

Objective		Projects	Target	Responsibility
1	To complete the permanent capping of Phase 2 of the landfill.	Project 1A: Installation of new combined gas / leachate extraction wells	September 2011.	Landfill Manager
		Project 1B: Construction of perimeter leachate interceptor drain around the Phase 2 area	September 2011.	Landfill Manager
		Project 1C: Installation of lined, surface water swale around the Phase 2 area	September 2011.	Landfill Manager
		Project 1D: Placing of geocomposite, subsoil and topsoil final cap to Phase 2 area	September 2011.	Landfill Manager
		Project 1E: Installation of Replacement Perimeter Gas Monitoring Wells	September 2011.	Landfill Manager
		Project 1F: Improvement of leachate storage and handling facilities	September 2011.	Landfill Manager
2	To expand and optimise the gas extraction well network in Phase 1 of the landfill.	Project 2A: Installation of 5no. New gas extraction wells in the Phase 1 area	September 2011.	Landfill Manager
		Project 2B: Carry out survey, and necessary servicing, of gas extraction network	September 2011.	Landfill Manager

6.3 Staffing Structure

The management structure for Marlinstown Landfill consists of the following:

Landfill Manager : Mr. Michael Rooney, Executive Engineer.
Deputy Manager : Mr. John Waldron, Senior Executive Technician.

The responsibilities, experience and competencies of the management team are detailed in SOP 01 in Appendix 7.

6.4 Approach to Environmental Management

6.4.1 Training

In the past year Michael Rooney has completed the following courses :

- FAS Waste Management Course
- Managing Safely for Construction Managers
- Certified First Aid Refresher Course
- Manual Handling

John Waldron has completed the following courses :

- LAPN course in Waste Prevention/Clean Technology
- Manual Handling

6.4.2 Corrective Action Implemented

No corrective action was implemented in 2010.

6.4.3 Standard Operating Procedures (SOPs)

There were no new SOPs written in 2010. Existing SOPs in relation to Corrective Action, Standard Monitoring Procedures, Emergency Response Procedure, etc are included in Appendix 7. Also included is the new Incident Report sheet issued by the EPA.

6.5 Financial Provision

Westmeath County Council will draw from reserved internal capital resources in 2011 to fund the Phase 2 restoration works and the ongoing aftercare of the landfill.

7. OTHER REPORTS

7.1 Assessment of Waste Density and Settlement

A topographic survey is used to assess the rate of settlement and to calculate the waste density. Drawing No. 144-10-02 showing the most recent survey carried out by Westmeath County Council in October 2010 and is included in Appendix 8.

APPENDIX 1

Meteorological Report

Effective Rainfall Calculation 2010 (Actual Rainfall minus Potential Evaporation)

Month	Rainfall (mm)	Potential Evapotranspiration (mm)	Effective Rainfall (mm)
Jan	45.0	4.3	40.7
Feb	41.9	10.8	31.1
Mar	82.0	30.6	51.4
Apr	53.8	54.6	-0.8
May	39.5	74.2	-34.7
Jun	50.5	88.2	-37.7
Jul	150.0	70.5	79.5
Aug	47.4	62.9	-15.5
Sep	164.5	41.4	123.1
Oct	59.4	23.2	36.2
Nov	125.2	6.5	118.7
Dec	37.2	2.7	34.5
Total	896.4	469.9	426.5

Note: The effective rainfall values for April, May, June and August are negative values, assumed to be 0

January

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	0.0	2.8	315	94	1011.5	1.0	-3.7	0.0	0.0
2	0.1	2.6	240	95	1018.5	2.4	-6.5	0.0	0.1
3	0.0	4.9	45	81	1024.5	2.7	-1.1	0.2	0.3
4	0.0	2.7	260	91	1021.4	1.0	-4.9	0.1	0.1
5	0.5	4.3	320	92	1008.9	1.3	-2.4	0.0	0.0
6	0.0	5.0	350	82	1012.8	1.3	-5.3	0.1	0.2
7	0.0	2.2	270	97	1017.5	-1.8	-7.4	0.1	0.1
8	0.0	0.9	350	97	1028.0	1.0	-9.0	0.0	0.0
9	0.0	1.8	330	97	1031.4	-0.2	-9.6	0.1	0.2
10	0.9	5.3	20	90	1025.3	1.8	-5.4	0.3	0.4
11	1.9	5.4	100	96	1016.8	1.6	0.4	0.3	0.4
12	5.8	12.8	100	90	999.4	2.9	0.5	0.5	0.7
13	4.8	5.3	100	99	996.2	3.3	0.4	0.2	0.2
14	0.5	3.7	155	97	1001.5	6.5	0.7	0.0	0.1
15	5.3	12.3	160	93	1000.0	10.5	5.4	0.5	0.6
16	5.5	7.8	205	92	996.2	9.0	2.6	0.1	0.1
17	0.0	6.4	210	90	1012.5	8.9	2.0	0.2	0.3
18	0.0	5.3	215	92	1020.5	10.2	2.5	0.1	0.2
19	2.2	9.5	125	89	1013.1	6.6	3.7	0.4	0.5
20	3.9	3.3	175	95	1008.7	7.7	1.0	0.0	0.1
21	7.7	10.4	145	97	1006.6	10.0	1.0	0.2	0.4
22	0.2	2.5	220	95	1015.0	8.4	-1.6	0.0	0.1
23	0.0	1.0	270	99	1024.2	1.1	-3.9	0.0	0.0
24	0.0	1.6	235	100	1026.2	0.9	-2.3	0.1	0.2
25	0.0	1.6	345	99	1034.0	5.3	-2.1	0.1	0.1
26	0.0	0.9	185	95	1041.4	6.1	-3.8	0.0	0.2
27	0.6	5.1	255	95	1033.1	9.2	1.8	0.2	0.3
28	1.9	6.7	285	94	1016.8	7.8	4.1	0.2	0.3
29	3.1	7.4	315	87	1001.6	7.6	0.4	0.1	0.2
30	0.0	3.2	290	93	1005.7	3.7	-2.7	0.1	0.2
31	0.1	4.2	290	94	1009.4	4.2	-2.1	0.2	0.3
Total	45.0							4.3	

February

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	0.0	4.6	215	94	1014.4	6.4	-0.4	0.2	0.4
2	5.6	5.9	250	94	1005.8	8.5	4.3	0.2	0.4
3	6.7	5.0	110	94	1004.4	8.7	0.7	0.4	0.5
4	10.0	7.7	120	97	994.7	8.8	0.2	0.3	0.4
5	3.5	5.3	120	91	994.3	9.0	2.5	0.3	0.5
6	0.2	2.3	295	99	1016.7	6.6	1.2	0.3	0.4
7	0.0	4.9	95	100	1022.2	5.3	1.2	0.3	0.4
8	0.1	4.5	65	90	1017.8	3.6	0.7	0.3	0.5
9	0.0	4.1	25	75	1019.6	4.7	-1.7	0.5	0.7
10	0.0	2.5	340	79	1023.7	5.4	-2.4	0.5	0.7
11	0.0	2.5	335	84	1028.4	5.5	-4.5	0.4	0.6
12	0.0	2.8	330	89	1029.4	6.6	0.0	0.4	0.6
13	0.0	1.9	330	87	1028.1	5.5	-1.2	0.4	0.6
14	0.0	3.2	285	95	1020.4	6.4	-2.8	0.3	0.5
15	2.0	5.0	265	93	1004.2	7.6	1.2	0.5	0.7
16	0.4	3.5	195	98	990.3	5.1	-2.1	0.4	0.6
17	0.0	2.8	50	91	990.5	6.1	-1.4	0.4	0.7
18	0.0	2.9	325	95	993.9	4.7	-2.5	0.4	0.6
19	0.1	4.1	290	97	996.2	4.7	-1.8	0.4	0.6
20	0.1	2.3	190	100	996.0	2.1	-5.2	0.3	0.4
21	0.0	1.9	250	94	991.1	1.4	-4.0	0.3	0.4
22	0.0	3.3	60	90	990.4	4.0	-5.5	0.4	0.6
23	4.2	6.5	70	88	990.0	2.6	-1.7	0.4	0.6
24	2.3	4.1	340	97	987.0	3.1	1.1	0.4	0.5
25	0.1	2.0	300	89	986.6	3.6	0.3	0.5	0.7
26	6.4	2.8	255	96	988.7	5.6	-0.2	0.6	0.8
27	0.2	2.5	85	88	991.1	7.0	-2.3	0.6	0.9
28	0.0	2.1	325	95	996.2	5.3	-2.9	0.5	0.7
Total	41.9							10.8	

March

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	0.0	1.4	225	84	1010.9	8.5	-3.9	0.6	1.0
2	0.0	4.0	90	86	1021.4	7.4	-4.9	0.7	1.1
3	0.0	3.8	120	81	1018.8	6.1	-1.9	0.6	0.9
4	0.0	3.1	25	84	1027.3	7.7	-3.4	0.8	1.1
5	0.0	2.0	315	83	1033.2	10.1	-4.5	0.9	1.3
6	0.0	2.6	340	83	1030.1	8.4	0.1	0.8	1.1
7	0.0	4.5	90	78	1032.0	6.8	-2.7	0.9	1.4
8	0.0	3.8	70	72	1031.6	7.2	-5.9	1.1	1.6
9	0.0	1.8	70	71	1033.5	8.8	-5.7	0.9	1.4
10	0.0	1.8	355	80	1033.0	7.5	-4.9	0.7	1.0
11	0.0	2.7	325	79	1029.1	8.3	-4.5	0.9	1.3
12	0.0	4.9	340	81	1028.0	9.2	4.1	1.0	1.4
13	0.0	3.7	300	79	1033.7	9.1	2.6	0.8	1.1
14	0.0	3.8	285	84	1033.2	10.9	-1.3	1.0	1.5
15	0.0	2.8	240	78	1028.5	10.6	-1.7	1.0	1.5
16	0.0	6.5	150	84	1020.4	9.1	-2.0	0.7	1.0
17	0.2	7.7	195	85	1013.3	13.4	5.6	1.2	1.6
18	1.5	12.5	165	86	1002.8	12.7	8.8	1.2	1.6
19	5.2	5.0	220	79	1005.9	10.2	5.0	1.1	1.5
20	4.1	3.8	335	80	1005.5	11.2	1.6	1.2	1.8
21	0.0	6.0	185	77	1011.3	13.1	1.3	1.3	1.9
22	5.6	9.5	215	83	1008.6	10.3	1.6	1.0	1.7
23	1.0	8.1	160	86	1008.0	9.4	2.8	1.1	1.6
24	4.9	6.2	100	82	998.0	11.9	5.4	1.3	1.9
25	8.7	6.7	80	89	994.0	12.2	5.9	1.1	1.6
26	3.4	3.7	185	87	993.5	12.7	4.7	1.3	1.8
27	0.0	5.4	275	78	1005.7	11.2	4.6	1.5	2.1
28	0.0	3.5	280	77	1006.7	10.4	2.8	1.5	2.1
29	14.4	6.5	70	94	993.6	5.0	1.7	0.4	0.7
30	24.8	9.8	300	99	984.7	2.4	0.2	0.4	0.7
31	8.2	9.9	300	84	999.2	5.3	0.5	1.3	2.2
Total	82.0							30.6	

April

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	0.7	4.9	240	84	1004.0	9.2	0.1	1.4	2.0
2	4.8	5.8	85	90	994.3	9.4	1.8	1.0	1.4
3	1.3	3.9	335	89	1000.5	7.6	1.1	1.1	1.5
4	2.7	6.9	265	82	1011.8	8.6	0.2	1.2	1.9
5	7.7	14.7	180	88	1006.2	12.3	6.8	1.1	1.8
6	20.8	6.9	270	91	1005.3	10.6	4.7	1.0	1.5
7	0.1	4.0	280	84	1022.2	11.6	1.9	1.8	2.6
8	0.0	4.1	240	84	1030.4	12.4	3.7	1.4	2.0
9	0.0	4.4	160	78	1031.8	13.6	3.3	1.7	2.4
10	0.0	5.3	150	71	1032.3	17.7	4.4	2.5	3.5
11	0.0	2.6	70	72	1031.2	17.9	1.0	2.3	3.1
12	0.0	3.8	55	69	1030.5	16.2	4.7	2.3	3.2
13	0.0	4.3	60	75	1028.8	14.1	4.8	2.0	2.8
14	0.0	4.5	55	78	1026.4	11.3	3.5	1.7	2.4
15	0.0	3.8	25	84	1027.7	11.6	2.4	1.5	2.1
16	0.0	2.7	185	74	1029.1	15.1	0.8	2.4	3.4
17	0.0	2.8	280	81	1021.6	13.6	1.2	2.1	3.0
18	1.2	2.6	320	80	1017.4	12.9	4.2	1.5	2.1
19	0.2	3.7	340	67	1019.6	11.7	3.5	2.2	3.1
20	0.0	3.5	330	70	1022.2	10.6	1.9	1.8	2.4
21	0.0	1.7	50	68	1023.9	10.7	-3.0	1.9	2.6
22	0.0	2.5	160	66	1018.6	13.8	0.7	2.4	3.3
23	0.0	5.2	170	62	1013.7	15.9	5.4	2.8	3.8
24	0.6	7.7	150	83	1012.6	14.9	5.9	1.7	2.4
25	3.5	6.3	225	87	1014.9	16.2	8.7	2.1	2.9
26	0.1	4.5	215	81	1023.3	18.0	8.1	2.3	3.1
27	0.3	9.4	160	86	1021.4	14.9	8.6	1.9	2.7
28	5.4	9.0	180	86	1012.1	16.8	9.9	1.8	2.5
29	0.1	5.0	235	80	1009.2	12.6	7.1	1.9	2.6
30	4.3	4.4	225	86	1006.3	13.8	5.9	2.0	2.8
Total	53.8							54.6	

May

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	4.8	2.0	275	87	1010.0	12.5	5.0	1.5	2.1
2	0.4	4.4	345	78	1019.8	11.2	6.1	1.9	2.5
3	0.0	4.8	340	71	1029.3	12.2	2.1	2.4	3.4
4	0.0	4.7	315	76	1031.4	12.4	4.1	1.8	2.4
5	1.8	4.9	300	90	1023.6	16.4	8.1	1.7	2.2
6	2.2	4.8	5	91	1016.4	13.4	7.8	1.3	1.7
7	0.0	6.5	60	72	1017.5	11.4	5.8	2.1	3.0
8	0.0	6.5	45	57	1019.2	14.0	3.7	3.3	4.6
9	0.0	3.0	345	73	1016.6	12.5	3.1	1.9	2.6
10	0.0	5.5	345	72	1016.8	9.9	4.0	1.9	2.6
11	2.4	3.5	325	80	1017.2	9.8	-0.1	1.8	2.5
12	0.7	3.6	340	76	1017.7	10.3	0.5	2.0	2.8
13	1.1	5.5	205	85	1010.4	11.0	4.1	1.4	2.0
14	0.1	4.8	290	78	1010.3	14.6	4.0	2.6	3.7
15	0.4	5.4	240	74	1016.2	14.1	3.0	2.3	3.3
16	0.9	4.8	280	79	1017.5	14.9	3.3	2.4	3.5
17	0.3	2.9	215	76	1024.4	15.5	5.1	2.8	3.8
18	2.7	7.2	170	93	1025.5	14.8	7.4	1.4	2.1
19	0.5	3.5	185	90	1026.1	19.5	10.6	1.9	2.5
20	0.1	2.5	195	83	1030.8	23.4	13.5	2.9	3.8
21	4.8	4.4	135	81	1030.4	22.1	12.5	3.2	4.3
22	0.0	3.2	165	73	1028.4	24.8	7.5	3.7	4.9
23	0.0	2.4	260	69	1023.4	23.8	8.2	4.3	5.7
24	0.0	4.2	15	73	1017.9	18.6	10.0	3.2	4.4
25	0.0	4.7	20	66	1015.5	15.8	5.1	3.2	4.5
26	0.0	4.8	350	65	1013.5	15.0	4.9	3.3	4.5
27	0.2	5.4	280	74	1011.6	14.2	4.2	2.8	4.0
28	0.0	3.6	225	72	1012.8	15.1	3.0	2.5	3.5
29	2.0	4.3	65	94	1006.2	13.2	8.7	1.1	1.5
30	0.1	3.7	300	73	1015.6	16.5	5.1	3.1	4.2
31	14.0	6.7	145	75	1018.6	17.5	8.1	2.6	3.6
Total	39.5							74.2	

June

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	5.1	3.8	300	83	1015.7	16.8	9.4	2.3	3.1
2	0.0	2.9	220	78	1021.6	20.6	8.3	3.8	5.1
3	0.0	6.9	135	73	1020.0	20.3	9.5	3.5	5.0
4	0.0	4.7	155	69	1016.9	21.4	12.0	3.6	4.7
5	0.6	3.3	280	75	1018.0	20.6	10.9	4.0	5.3
6	10.8	2.5	315	84	1014.8	18.1	11.8	2.2	2.8
7	5.1	5.9	80	90	1006.7	16.6	10.3	1.9	2.7
8	3.5	5.1	55	97	1001.0	15.9	12.0	1.3	1.7
9	8.7	6.0	45	95	1007.5	14.4	11.7	1.0	1.4
10	0.0	4.3	35	80	1014.9	18.1	7.8	2.3	3.1
11	0.0	5.1	315	83	1014.4	18.8	8.3	2.7	3.7
12	0.0	3.8	310	69	1019.5	16.9	10.5	2.8	3.8
13	1.6	5.5	305	86	1015.8	15.2	9.2	2.3	3.3
14	0.0	3.5	320	80	1023.4	18.5	8.2	2.4	3.2
15	0.0	2.5	40	68	1030.1	20.6	8.5	3.9	5.2
16	0.0	3.3	260	73	1027.7	21.3	10.1	3.7	4.9
17	0.0	2.5	330	76	1025.3	21.7	13.4	3.0	3.9
18	0.0	3.8	330	77	1023.6	20.1	11.6	2.8	3.7
19	0.0	5.3	340	67	1022.3	18.5	8.4	3.8	5.2
20	0.0	3.4	315	65	1023.4	21.7	5.7	4.3	5.9
21	0.0	3.4	225	67	1022.0	24.5	9.3	4.7	6.2
22	0.0	4.3	215	72	1021.4	21.7	9.7	3.5	4.8
23	2.3	4.7	190	82	1019.2	19.8	13.3	2.2	2.9
24	0.4	2.7	245	80	1019.4	19.4	10.8	2.6	3.5
25	0.0	3.7	170	80	1016.8	19.6	11.0	2.1	2.8
26	1.5	6.0	160	79	1013.4	22.1	13.8	3.2	4.2
27	0.0	6.7	205	72	1014.9	20.6	11.8	4.0	5.6
28	8.0	4.7	175	97	1016.3	18.8	11.1	1.4	1.9
29	0.2	2.0	305	79	1019.3	19.8	10.0	3.4	4.4
30	2.7	7.3	170	81	1014.6	22.2	13.5	3.5	4.7
Total	50.5							88.2	

July

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	10.8	9.2	210	78	1002.8	20.8	14.1	3.1	4.4
2	0.5	7.8	210	76	1006.0	19.0	11.3	3.2	4.5
3	0.1	6.3	215	77	1015.8	17.9	10.5	2.7	3.7
4	3.0	9.8	250	78	1012.5	18.6	12.3	2.7	4.1
5	0.4	4.5	280	76	1022.7	18.2	9.2	3.1	4.2
6	0.3	7.5	185	88	1019.8	17.3	8.8	1.3	2.0
7	1.1	7.7	220	75	1013.0	18.0	12.2	3.0	4.2
8	3.5	6.6	205	86	1014.4	17.3	10.7	2.2	3.1
9	19.5	4.7	220	91	1012.0	17.5	12.4	1.8	2.4
10	16.0	5.8	50	96	1009.4	18.4	12.0	1.1	1.6
11	2.0	5.1	265	79	1012.4	17.2	10.0	2.7	3.7
12	0.0	2.3	75	77	1013.3	19.1	9.1	2.7	3.5
13	3.2	6.0	85	88	1005.8	18.4	10.4	1.9	2.6
14	7.7	6.5	115	88	994.3	19.2	13.0	2.4	3.3
15	22.9	4.2	220	94	994.3	16.9	11.8	1.7	2.3
16	16.3	6.2	275	82	1002.8	15.9	11.0	2.6	3.7
17	0.4	6.1	235	78	1015.5	18.6	10.9	2.9	3.9
18	14.5	5.5	205	96	1015.6	18.6	13.2	1.3	1.8
19	2.2	6.0	185	83	1013.0	21.0	13.3	2.8	3.8
20	3.2	3.0	210	84	1008.1	18.8	12.1	2.6	3.4
21	10.3	3.2	15	94	1004.1	17.6	12.5	1.7	2.2
22	1.2	4.4	345	85	1014.6	17.6	11.5	2.0	2.6
23	0.1	2.4	245	78	1021.4	17.8	7.5	2.6	3.4
24	0.2	4.8	205	88	1019.1	21.2	12.7	2.4	3.2
25	0.4	4.3	265	92	1019.1	20.3	13.8	1.9	2.5
26	0.2	5.3	255	91	1018.5	22.0	15.5	2.4	3.3
27	0.6	4.7	255	83	1017.6	18.8	13.2	2.6	3.6
28	0.3	4.7	265	85	1018.7	17.7	12.1	2.4	3.3
29	0.1	2.9	280	86	1018.8	17.0	12.2	1.6	2.1
30	6.3	4.1	245	94	1011.6	17.9	13.4	1.4	1.8
31	2.7	4.5	275	89	1010.7	16.2	12.3	1.9	2.6
Total	150.0							70.5	

August

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	0.3	3.2	265	85	1014.5	18.3	12.2	2.1	2.8
2	0.1	2.7	245	86	1019.5	15.5	10.1	1.3	1.6
3	2.2	4.7	275	87	1014.7	16.0	10.6	1.6	2.3
4	7.0	5.5	305	86	1011.0	17.3	10.8	2.6	3.6
5	0.2	4.8	265	82	1012.9	18.6	12.0	2.6	3.5
6	5.4	6.2	225	93	1007.6	16.7	12.5	1.7	2.4
7	0.2	4.4	305	85	1016.7	17.5	12.3	1.9	2.5
8	0.0	3.5	215	84	1019.9	19.0	8.7	2.5	3.3
9	3.6	5.3	235	83	1010.9	18.0	10.4	2.6	3.6
10	0.3	5.9	300	79	1008.9	18.0	10.0	3.0	4.2
11	0.0	4.6	295	85	1015.5	17.3	9.4	2.2	3.1
12	0.4	5.6	315	83	1021.6	16.1	11.8	1.9	2.5
13	0.0	4.5	320	79	1024.4	15.5	10.9	1.7	2.2
14	0.0	3.0	325	81	1023.4	17.3	8.8	1.8	2.4
15	0.0	2.0	325	77	1024.9	23.0	7.4	2.8	3.8
16	6.1	3.6	215	96	1018.9	15.8	8.2	0.9	1.3
17	1.1	4.5	305	83	1011.7	16.9	11.3	1.8	2.4
18	2.1	5.5	230	86	1005.9	16.8	10.6	2.3	3.2
19	1.8	6.0	200	91	1004.2	17.9	11.2	1.5	2.2
20	2.2	8.0	240	82	1004.9	19.2	11.2	2.1	3.2
21	0.7	6.2	215	85	1013.3	19.1	11.5	2.1	2.8
22	5.8	3.6	215	89	1010.6	18.7	10.8	1.9	2.5
23	5.7	5.0	250	88	1000.7	15.3	9.6	1.8	2.6
24	1.4	6.6	295	87	1007.0	16.6	9.2	1.6	2.3
25	0.0	3.1	65	84	1012.0	16.5	4.5	1.9	2.6
26	0.0	3.2	360	80	1009.9	18.4	7.4	2.0	2.6
27	0.0	3.6	310	80	1016.0	17.7	8.4	2.2	3.0
28	0.3	5.8	285	83	1022.4	17.1	8.9	2.0	2.8
29	0.5	5.7	335	75	1022.2	15.5	8.2	1.9	2.7
30	0.0	3.0	95	75	1027.4	17.3	4.3	2.4	3.3
31	0.0	4.0	155	78	1024.3	19.1	4.5	2.4	3.2
Total	47.4							62.9	

September

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	0.0	4.3	150	78	1020.3	19.7	7.7	2.3	3.0
2	0.0	4.9	130	70	1019.6	21.6	8.4	2.9	3.9
3	0.0	6.5	135	76	1018.6	21.1	9.7	2.7	3.7
4	6.5	6.3	140	94	1015.9	17.6	12.6	0.9	1.2
5	7.6	8.8	130	91	1010.5	18.4	13.7	1.5	2.2
6	61.0	7.3	125	98	998.8	16.1	13.6	0.6	0.8
7	19.4	4.6	205	95	994.8	14.9	10.9	1.0	1.4
8	1.9	5.0	170	91	1001.0	18.1	10.9	1.6	2.3
9	10.1	4.8	225	92	1012.2	17.6	10.9	1.6	2.2
10	9.2	4.8	205	92	1008.6	18.6	14.1	1.4	1.9
11	5.9	4.4	280	91	1011.8	17.3	10.6	1.6	2.2
12	0.7	4.9	275	87	1023.9	15.9	9.1	1.4	2.0
13	11.0	9.8	225	96	1017.7	18.6	12.9	0.9	1.2
14	5.6	8.0	265	82	1013.0	15.9	9.6	1.4	2.2
15	0.4	7.5	285	86	1012.2	15.2	9.1	1.5	2.2
16	0.4	4.7	295	84	1015.7	16.0	8.6	1.8	2.4
17	0.3	2.8	295	87	1020.9	14.3	4.5	1.3	1.9
18	4.7	5.9	210	97	1017.4	13.3	4.1	0.5	0.8
19	1.5	6.5	220	93	1008.5	16.7	12.8	1.1	1.5
20	0.3	5.7	225	87	1009.7	19.3	12.8	1.7	2.3
21	0.1	7.4	160	88	1013.3	18.1	12.1	1.4	1.9
22	5.6	5.7	200	92	1008.2	19.8	11.0	1.5	2.0
23	2.1	5.1	315	93	1005.5	15.2	11.0	1.1	1.5
24	0.0	5.0	350	76	1016.2	12.7	7.8	1.3	1.8
25	0.0	2.9	350	73	1022.4	10.7	7.0	1.0	1.4
26	0.0	2.5	65	77	1019.1	12.1	3.5	1.1	1.5
27	0.0	4.5	140	81	1015.1	15.2	3.3	1.5	2.2
28	9.9	5.0	155	96	1012.1	14.5	7.2	0.6	0.9
29	0.2	2.3	260	89	1012.6	16.2	5.8	1.2	1.7
30	0.1	5.7	155	91	1007.5	14.8	5.2	1.1	1.5
Total	164.5							41.4	

October

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	2.2	8.0	210	84	993.2	14.2	7.8	1.1	1.6
2	5.1	7.0	175	90	995.2	14.6	7.7	1.1	1.5
3	0.4	4.2	210	91	992.0	16.0	7.2	1.1	1.5
4	2.2	7.6	195	92	992.4	14.6	5.9	0.8	1.2
5	0.1	7.8	190	79	991.7	14.5	9.0	1.5	2.0
6	0.1	5.8	205	85	999.7	15.0	4.4	1.2	1.6
7	0.2	8.6	150	83	1010.2	16.9	8.7	1.4	1.9
8	0.0	9.1	105	87	1010.0	19.4	13.7	1.4	1.8
9	0.0	10.1	80	90	1013.6	15.0	12.3	0.9	1.2
10	0.0	7.0	70	89	1015.6	13.2	10.7	0.7	0.9
11	0.3	5.5	70	87	1021.5	16.8	8.3	1.1	1.5
12	0.3	2.3	65	95	1023.1	14.5	3.3	0.7	1.0
13	0.2	1.2	45	98	1023.9	9.5	4.8	0.5	0.6
14	0.0	1.5	340	88	1024.6	10.9	8.5	0.6	0.8
15	0.1	3.8	315	87	1023.5	14.2	7.8	0.7	0.9
16	0.1	1.9	320	86	1025.6	13.2	1.1	0.6	1.0
17	0.8	3.4	215	91	1025.1	13.2	0.1	0.6	0.8
18	0.8	5.3	265	88	1019.6	12.6	9.0	0.7	0.9
19	1.0	4.8	280	88	1016.7	10.8	3.1	0.6	0.9
20	0.0	3.5	285	83	1023.7	9.7	0.0	0.6	1.0
21	0.0	4.3	225	88	1021.3	11.7	1.6	0.7	0.9
22	6.4	6.0	205	95	1011.3	10.7	5.0	0.3	0.5
23	1.3	3.2	315	92	1006.5	11.5	2.6	0.5	0.8
24	0.0	2.3	320	89	1020.9	10.3	-1.4	0.5	0.8
25	1.3	5.6	160	84	1024.4	9.8	-3.7	0.5	0.8
26	11.1	9.5	205	95	1010.8	16.3	9.5	0.6	0.8
27	2.9	7.5	210	90	1009.0	12.2	7.5	0.6	0.8
28	2.6	9.5	175	93	1003.1	14.2	6.4	0.4	0.7
29	18.6	6.4	205	94	987.5	13.6	5.8	0.6	0.7
30	0.2	3.7	180	93	991.0	12.8	2.5	0.4	0.7
31	1.1	3.0	15	93	1003.5	11.2	5.0	0.4	0.5
Total	59.4							23.2	

November

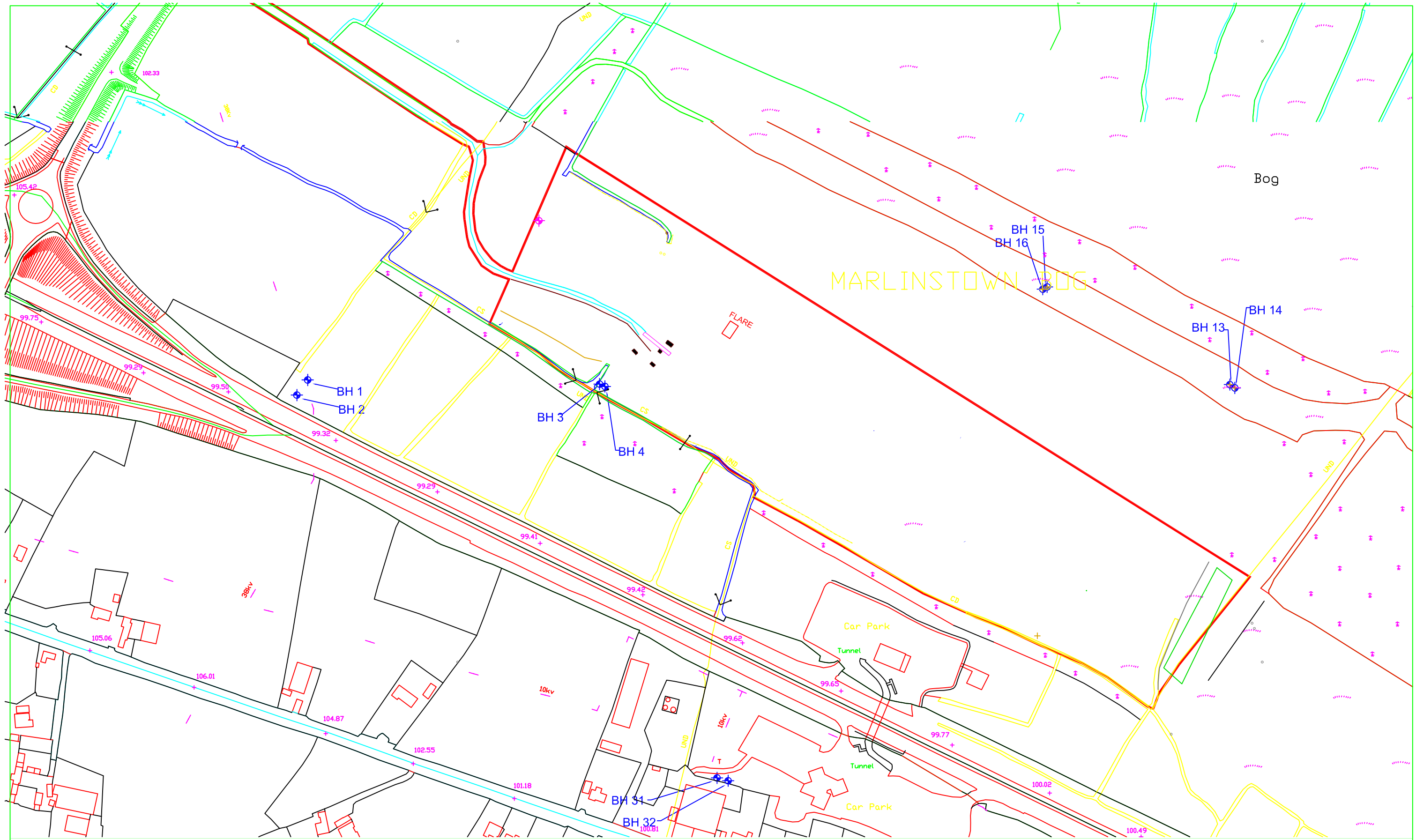
Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	6.3	6.5	200	93	1008.9	13.0	0.9	0.4	0.5
2	11.8	9.8	225	91	1001.2	12.5	9.3	0.5	0.7
3	8.0	5.0	220	96	1006.9	14.3	7.5	0.4	0.5
4	19.2	10.1	235	97	1009.4	14.8	11.7	0.3	0.5
5	2.4	5.6	230	93	1017.4	10.6	7.8	0.4	0.5
6	2.9	3.3	285	93	1017.4	7.5	2.6	0.2	0.4
7	11.5	8.0	225	93	1004.1	6.9	0.7	0.2	0.3
8	4.6	5.3	190	97	966.4	8.0	2.6	0.0	0.1
9	8.6	7.3	25	87	987.4	8.4	1.9	0.4	0.6
10	1.0	4.7	180	87	999.2	7.5	-2.3	0.2	0.3
11	11.3	14.0	245	83	977.6	10.2	7.0	0.4	0.6
12	0.3	7.6	240	84	988.4	9.1	4.6	0.5	0.6
13	1.8	5.1	215	95	988.9	6.4	2.7	0.3	0.4
14	0.0	1.3	215	96	995.9	3.5	-1.6	0.2	0.2
15	0.5	2.5	220	90	1011.2	8.2	-2.0	0.2	0.3
16	4.1	9.0	135	89	1010.6	8.9	1.8	0.3	0.5
17	7.4	12.3	140	88	991.5	9.9	6.5	0.4	0.4
18	4.0	8.7	200	92	995.1	9.9	4.3	0.2	0.3
19	0.2	3.0	135	93	1007.8	9.7	0.6	0.1	0.2
20	0.0	4.8	55	92	1015.2	8.6	4.3	0.3	0.4
21	0.0	3.7	15	89	1018.1	6.0	1.4	0.1	0.1
22	0.1	3.2	330	95	1015.6	7.3	0.3	0.1	0.2
23	0.0	2.7	330	95	1016.9	7.5	2.1	0.1	0.2
24	0.0	3.2	335	94	1015.2	5.4	-0.6	0.0	0.1
25	1.8	4.6	320	89	1016.7	5.0	-1.3	0.0	0.0
26	0.0	4.6	300	93	1011.5	3.5	-1.9	0.0	0.1
27	0.0	4.2	360	87	1010.0	2.3	-2.2	0.2	0.3
28	0.0	2.4	335	94	1008.1	0.0	-5.1	0.0	0.0
29	0.0	2.7	10	95	1015.7	2.2	-4.6	0.0	0.1
30	17.4	5.3	45	90	1019.7	1.4	-2.9	0.2	0.3
Total	125.2							6.5	

December

Day	Rainfall (mm)	Wind Speed (Knots)	Wind Direction (Degrees from North)	Relative Humidity (%)	MSL Pressure (hPa)	Max. Temp. (Degrees Celsius)	Min. Temp. (Degrees Celsius)	Potential Evapotranspiration (Penman)	Evaporation (mm)
1	0.5	4.4	5	83	1018.1	-0.7	-5.0	0.1	0.2
2	0.2	3.8	345	90	1017.6	0.3	-9.9	0.0	0.1
3	1.6	3.6	205	91	1007.8	0.4	-8.9	0.1	0.2
4	0.0	1.6	300	94	1003.9	1.1	-6.3	0.0	0.0
5	0.0	1.4	220	93	1007.7	-0.3	-8.8	0.0	0.0
6	3.6	2.4	195	95	1002.5	-0.2	-3.1	0.0	0.0
7	0.0	2.4	335	96	1007.9	-0.2	-6.0	0.2	0.2
8	0.0	1.9	315	98	1021.4	-1.0	-9.3	0.0	0.0
9	0.0	1.9	220	98	1033.4	3.9	-8.6	0.1	0.1
10	0.4	3.3	265	98	1033.9	5.3	2.8	0.0	0.1
11	0.7	2.0	270	96	1029.5	5.3	-1.9	0.1	0.2
12	0.0	3.5	90	90	1025.8	5.6	-0.7	0.0	0.0
13	0.0	2.3	85	91	1029.1	3.9	-1.5	0.2	0.3
14	0.0	2.1	325	90	1038.1	4.4	0.2	0.0	0.1
15	0.1	3.1	295	95	1040.7	5.4	1.7	0.2	0.3
16	2.4	7.3	275	90	1017.3	7.6	-2.4	0.2	0.3
17	1.2	5.3	275	98	1001.9	-0.2	-2.7	0.0	0.0
18	0.0	2.6	290	97	992.9	-2.3	-9.8	0.0	0.0
19	0.0	1.8	45	95	996.5	0.0	-10.0	0.0	0.0
20	0.0	1.6	335	96	1002.6	-5.0	-10.9	0.0	0.0
21	0.0	1.2	330	96	1006.1	-5.7	-13.3	0.0	0.0
22	0.0	1.7	340	97	1012.5	-2.6	-8.3	0.0	0.0
23	0.0	2.1	325	96	1020.1	-1.8	-7.1	0.0	0.0
24	0.0	1.8	305	95	1026.4	-3.5	-11.0	0.0	0.0
25	0.0	0.8	130	92	1029.5	-0.4	-13.7	0.0	0.0
26	10.3	8.2	155	94	1018.3	5.1	-6.4	0.2	0.3
27	12.9	10.5	165	97	1003.0	7.7	5.4	0.3	0.5
28	0.6	5.2	165	98	1005.8	10.6	6.4	0.1	0.2
29	2.6	4.8	165	98	1014.6	8.9	6.6	0.2	0.3
30	0.1	3.8	70	96	1023.7	8.3	5.6	0.2	0.3
31	0.0	1.0	55	95	1027.1	7.2	5.1	0.3	0.4
Total	37.2							2.7	

APPENDIX 2

Groundwater



LEGEND

SITE BOUNDARY
GROUND WATER MONITORING WELLS

REVISION	DESCRIPTION	DATE

WESTMEATH COUNTY COUNCIL

TITLE

MARLINSTOWN LANDFILL

SUB-TITLE

GROUNDWATER MONITORING LOCATIONS NOV. 09

SURVEYED	NA	SCALE	N.T.S.
DRAWN	JV	DATE	9/11/09
CHECKED	MR		
APPROVED	PJC	DATUM	MALIN

DRAWING NO. MRL_GW_09

ENVIROMENT DEPARTMENT
CHURCH VIEW
MULLINGAR.
TEL 044 3333

2010 Ground Water In-Situ Monitoring

Q1

Well ID Sample ID	Conductivity (µS/cm@20 ^{0}C)	Temperature (^{0}C)	Dissolved Oxygen Mg/L O^2	Water Level mbgl	Odour & Visual
BH1	880		1.8	1.47	No odour, clear
BH2	1020		1.6	1.42	No odour, clear
BH3	461		1.7	2.22	No odour, clear
BH4	684		2.0	3.02	Very cloudy, brown cream colour,high suspended solids (SS)
BH13	297		1.7	3.55	Slight yellow tint, no SS
BH14	405		2.9	3.28	Slight yellow tint, no SS
BH15	525		1.1	2.48	Very yellow/brown. SS. No noticeable smell.
BH16	450		0.9	2.6	Very yellow/brown. Medium conc. SS. Faint smell.
BH 31	513		2.0	2.48	Slightly opaque/cloudy
BH32	670		1.9	2.91	No odour, white SS.

Q2

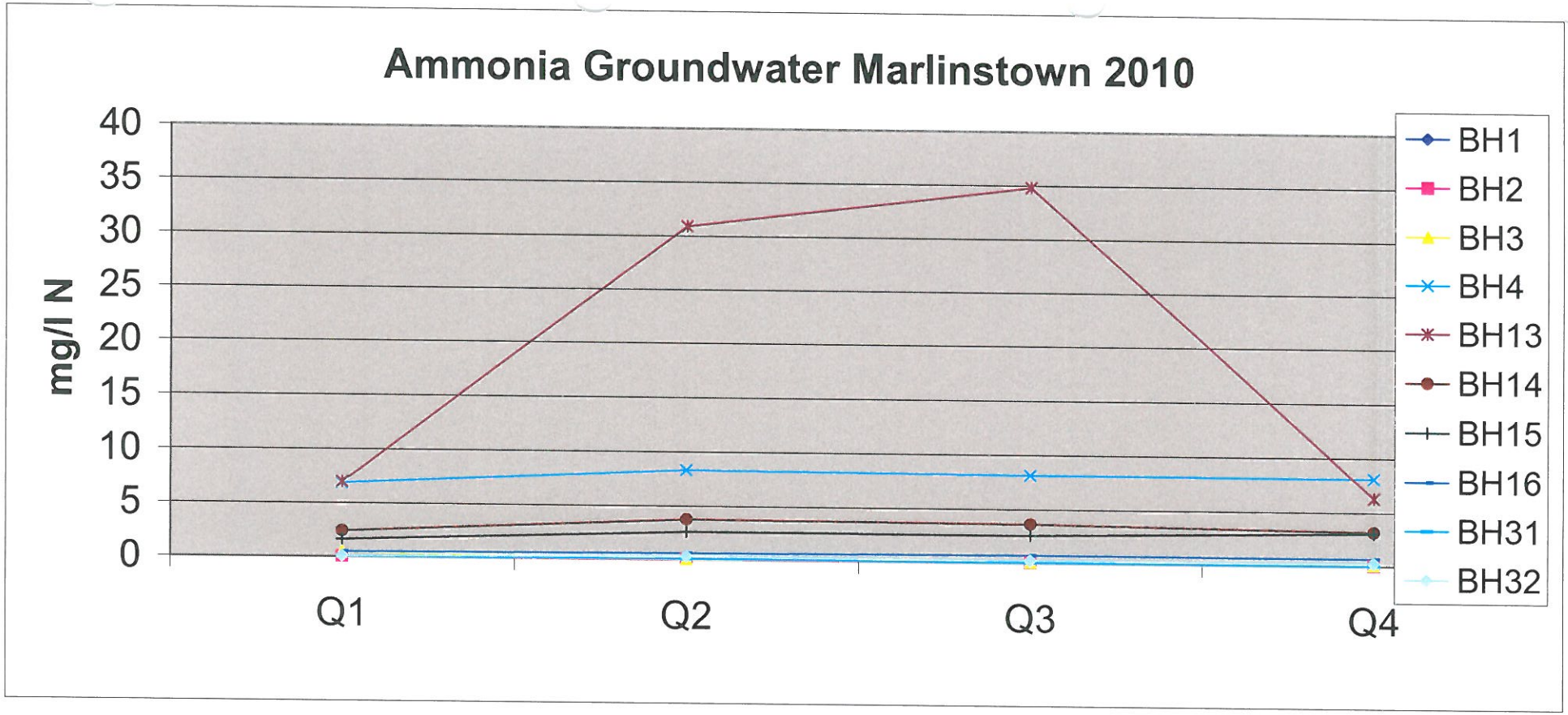
Well ID Sample ID	Conductivity (µS/cm@20 ^{0}C)	Temperature (^{0}C)	Dissolved Oxygen Mg/L O^2	Water Level mbgl	Odour & Visual
BH1	924	10.1	1.3	1.96	No odour, clear
BH2	1160	10.3	3.4	1.95	Very opaque. Brown SS.
BH3	467	11.0	1.4	2.46	Clear
BH4	743	10.4	3.1	3.1	Light brown. Very cloudy and opaque.
BH13	929	10.4		3.8	Light brown. No SS
BH14	309	10.2	1.2	3.5	Light brown. Brown SS.
BH15	625	10.2	0.7	3	Brown colour, cloudy appearance.
BH16	515	8.6	<0.5	3.19	Brown colour, no SS.
BH 31	533	10.9	<0.5	2.84	Clear
BH32	683	10.4	1.3	3.06	Slightly opaque. White SS.

Q3

Well ID Sample ID	Conductivity (µS/cm@20 ^{0}C)	Temperature (^{0}C)	Dissolved Oxygen Mg/L O^2	Water Level mbgl	Odour & Visual
BH1	907		1.8	1.85	No odour, clear
BH2	1090		1.7	1.85	No odour, clear
BH3	445		2.7	2.4	No odour, clear
BH4	687		1.3	3.04	Light yellow tint. Some black SS.
BH13	1110		0.8	3.75	Light yellow, some SS.
BH14	347		0.8	3.45	Light brown, no SS.
BH15	628		0.7	2.98	Light brown, no SS.
BH16	536		<0.5	3.2	Light creamy brown colour. High dissolved solids.
BH 31	485		1.4	2.85	Slightly opaque
BH32	592		1.0	2.96	Slightly opaque

Q4

Well ID Sample ID	Conductivity (µS/cm@20 ^{0}C)	Temperature (^{0}C)	Dissolved Oxygen Mg/L O^2	Water Level mbgl	Odour & Visual
BH1	804		2.6	1.54	Clear water, no noticeable smell
BH2	854		2.3	1.42	Clear water, no noticeable smell
BH3	465		2.9	2.05	Clear water, no noticeable smell
BH4	732		1.4	2.85	No smell, turbid
BH13	627		1.7	3.49	Low suspended solids, clear, no smell
BH14	536		1.5	3.23	Yellow colour, some suspended solids
BH15	618		4.6	2.4	Brown colour, some suspended solids
BH16	585		<0.5	2.63	Yellow colour, low suspended solids
BH 31	521		3.2	2.26	Clear water, low suspended solids, no smell
BH32	714		1.6	2.62	Clear water, low suspended solids, no smell


Ammonia Groundwater Marlinstown 2010
mg/l N
40
35
30
25
20
15
10
5
0
Q1
Q2
Q3
Q4
BH1
BH2
BH3
BH4
BH13
BH14
BH15
BH16
BH31
BH32

Groundwater Lab Monitoring 2010

Q1	Parameter	Units	Methodology	BH1	BH2	BH3	BH4	BH13	BH14	BH15	BH16	BH31	BH32
16/03/2010	TOC	mg/l C	Spectrophotometry	4.6	3.7	2.6	16.0	19.1	19.5	48.4	112.0	3.1	4.8
	Chloride	mg/l C	Titration	87.0	162.0	14.0	17.0	29.0	13.0	26.0	27.0	15.0	21.0
	pH		Electrometry	7.3	7.4	7.6	7.1	6.4	6.5	7.3	7.3	7.7	7.3
	Ammonia	mg/l N	Spectrophotometry	0.05	0.04	0.45	6.84	6.96	2.41	1.61	0.49	0.05	0.09

Q2	Parameter	Units	Methodology	BH1	BH2	BH3	BH4	BH13	BH14	BH15	BH16	BH31	BH32
30/06/2010	TOC	mg/l C	Spectrophotometry	3.0	2.8	1.7	14.2	23.1	40.6	54.8	54.5	1.5	3.3
	Chloride	mg/l C	Titration	72.1	174.0	14.8	19.9	73.5	18.6	46.2	24.5	12.6	19.0
	pH		Electrometry	7.3	7.4	7.6	7.1	7.0	6.3	7.4	7.4	7.7	7.4
	Ammonia	mg/l N	Spectrophotometry	0.10	0.04	0.04	8.31	30.88	3.77	2.59	0.60	0.08	0.34

Q3	Parameter	Units	Methodology	BH1	BH2	BH3	BH4	BH13	BH14	BH15	BH16	BH31	BH32
25/08/2010	TOC	mg/l C	Spectrophotometry	3.9	3.6	2.0	13.7	31.6	32.9	48.8	48.4	2.4	4.0
	Chloride	mg/l C	Titration	112.0	159.0	15.0	21.7	82.3	19.8	49.9	28.3	13.1	17.7
	pH		Electrometry	8.20	8.60	8.70	8.50	8.40	8.10	8.60	8.60	8.60	8.60
	Ammonia	mg/l N	Spectrophotometry	0.06	0.04	0.11	8.15	34.80	3.61	2.56	0.73	0.04	0.23

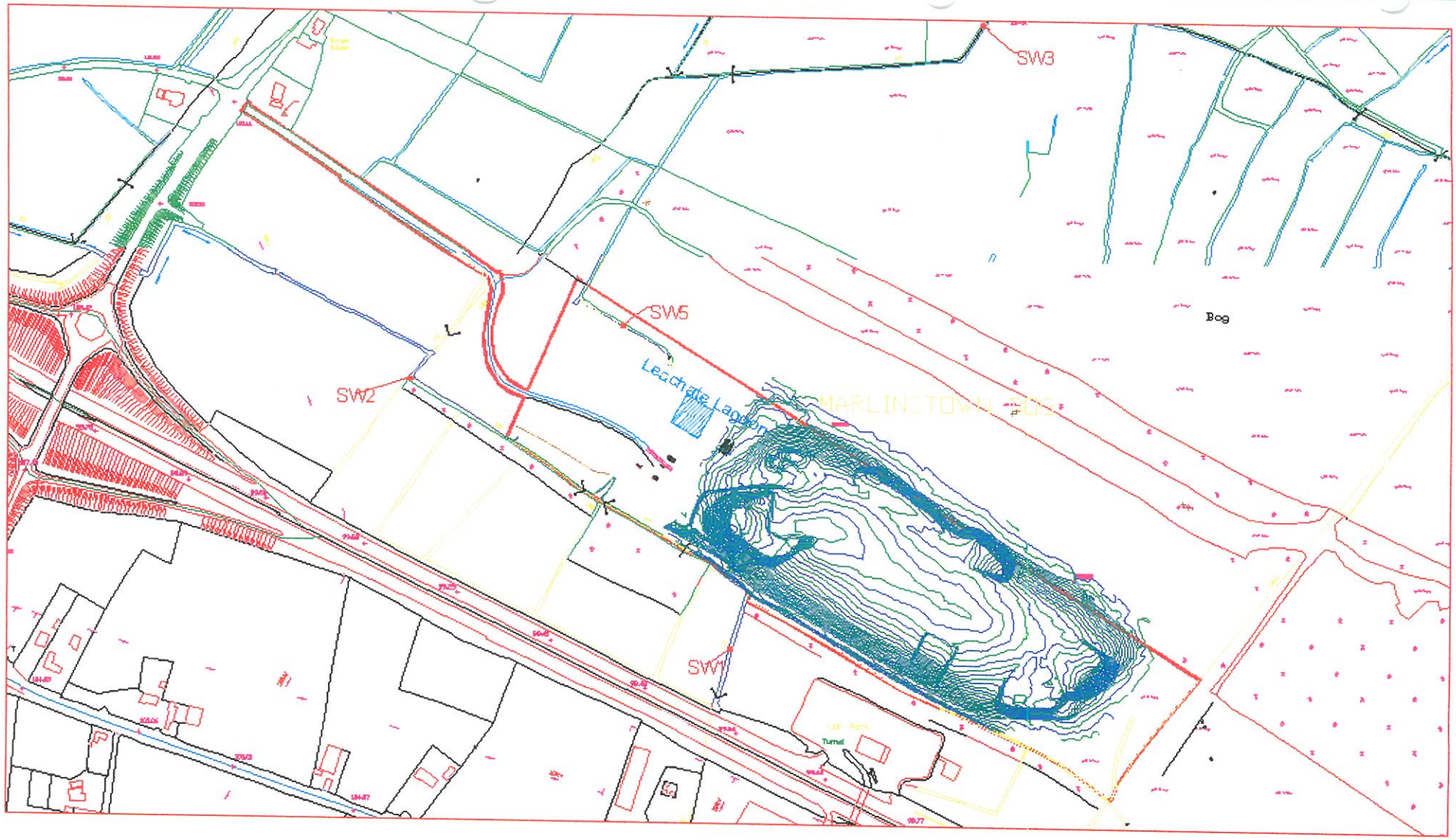
Q4	Parameter	Units	Methodology	BH1	BH2	BH3	BH4	BH13	BH14	BH15	BH16	BH31	BH32
25/11/2010	TOC	mg/l C	Spectrophotometry	1.99	2.17	0.92	13.70	34.70	25.00	54.00	63.50	0.74	2.31
	Chloride	mg/l C	Titration	29.4	55.6	14.7	19.7	25.0	17.8	30.5	23.0	13.7	17.8
	pH		Electrometry	7.10	7.40	7.70	7.10	6.80	6.70	7.20	7.30	7.60	7.20
	Ammonia	mg/l N	Spectrophotometry	0.09	<.04	0.14	8.13	6.31	3.15	3.03	0.69	<.04	0.28

Annual Groundwater Results (sampled 26/8/10)

Parameters	Units	EPA IGV Standards*	S.I. No. 278 of 2007 Standards**	BH1	BH2	BH3	BH4	BH13	BH14	BH15	BH16	BH31	BH32
Boron	mg/l	1	1	0.23	0.23	0.17	0.18	0.21	0.15	0.16	0.19	0.14	0.17
Cadmium	mg/l	0.005	0.005	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006
Calcium	mg/l	200		187	198	92.9	221	190	78.6	131	128	100	146
Chromium	mg/l	0.03	0.05	<0.0007	<0.0007	<0.0007	0.0028	0.0015	<0.0007	0.0022	0.0026	<0.0007	<0.0007
Copper	mg/l	0.03	2	0.023	0.006	0.001	0.019	0.019	0.018	<0.001	0.004	0.002	0.002
Iron	mg/l	0.2	0.2	<0.19	0.3	<0.19	9.35	11.5	4.35	8.41	6.35	<0.19	<0.19
Lead	mg/l	0.01	0.025	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Magnesium	mg/l	50	-	11	11	14	7.37	8.7	3.65	6.23	6.52	14	6.26
Manganese	mg/l	0.05	0.05	0.104	0.128	0.223	0.556	0.553	0.411	0.37	0.426	0.06	0.238
Mercury	mg/l	0.001	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	mg/l	0.02	0.02	0.035	0.01	0.002	0.006	0.058	0.011	0.007	0.006	0.006	0.017
Potassium	mg/l	5	-	10.4	6.11	0.74	2.65	19.1	1.86	10.8	10.1	0.74	3.51
Sodium	mg/l	150	200	69.6	97.9	15.7	20.7	64.3	19.2	32.2	18.3	11.1	13.5
Zinc	mg/l	0.1	-	0.054	0.021	0.005	0.027	0.017	0.048	0.008	0.014	0.009	0.01
Total Oxidised Nitrogen (N)	mg/l	-	-	1.44	1.88	0.43	<0.29	<0.29	<0.29	<0.29	<0.29	0.63	1.31
OrthoPhosphate	mg/l	0.03	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.54	<0.08	<0.08	<0.08
Sulphate as SO4	mg/l	200	250	35.6	44.9	<5.00	<5.00	<1.0	<5.00	<5.00	<5.00	10.8	13.9
Total Dissolved Solids	mg/l	1000	-	630	723	296	470	649	268	506	439	301	412
Cyanide	mg/l	0.01	0.05	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Fluoride as F	mg/l	1.0	0.8	0.3	0.3	0.4	0.1	0.2	0.1	0.3	0.3	0.2	0.2
Alkalinity as CaCO3	mg/l	-	-	391	374	257	403	550	191	303	495	255	302

APPENDIX 3

Surface Water

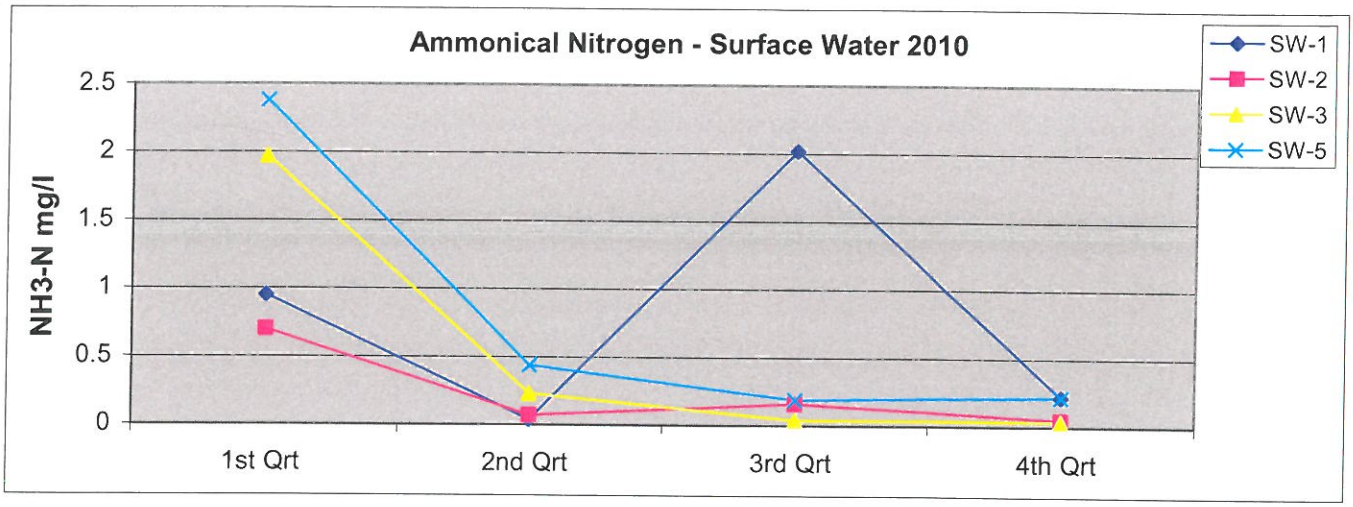


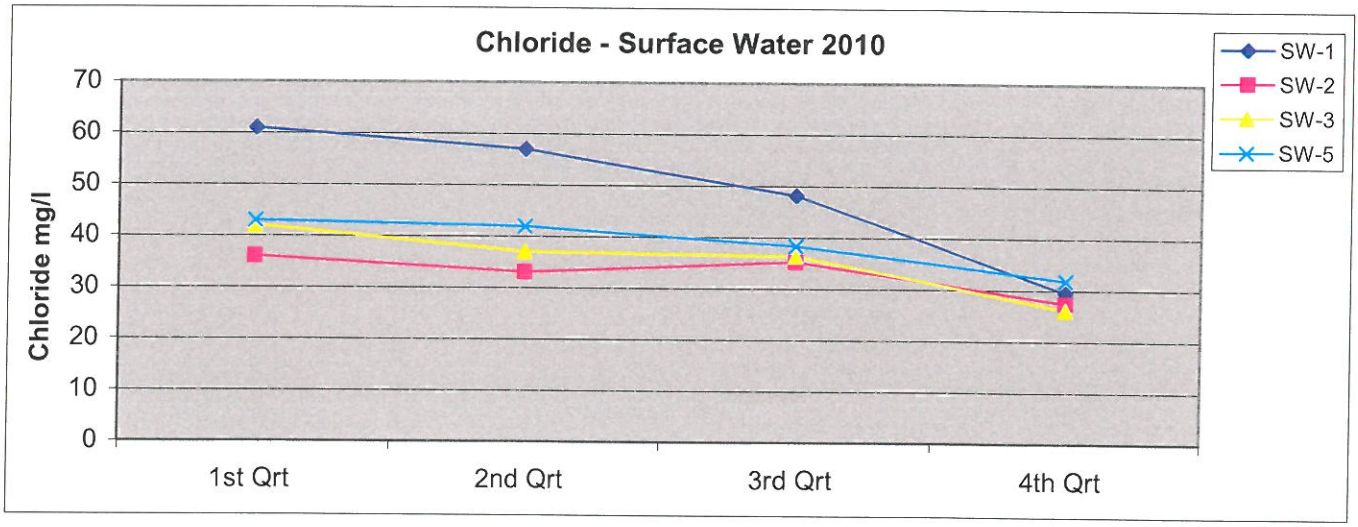
WESTMEATH COUNTY COUNCIL

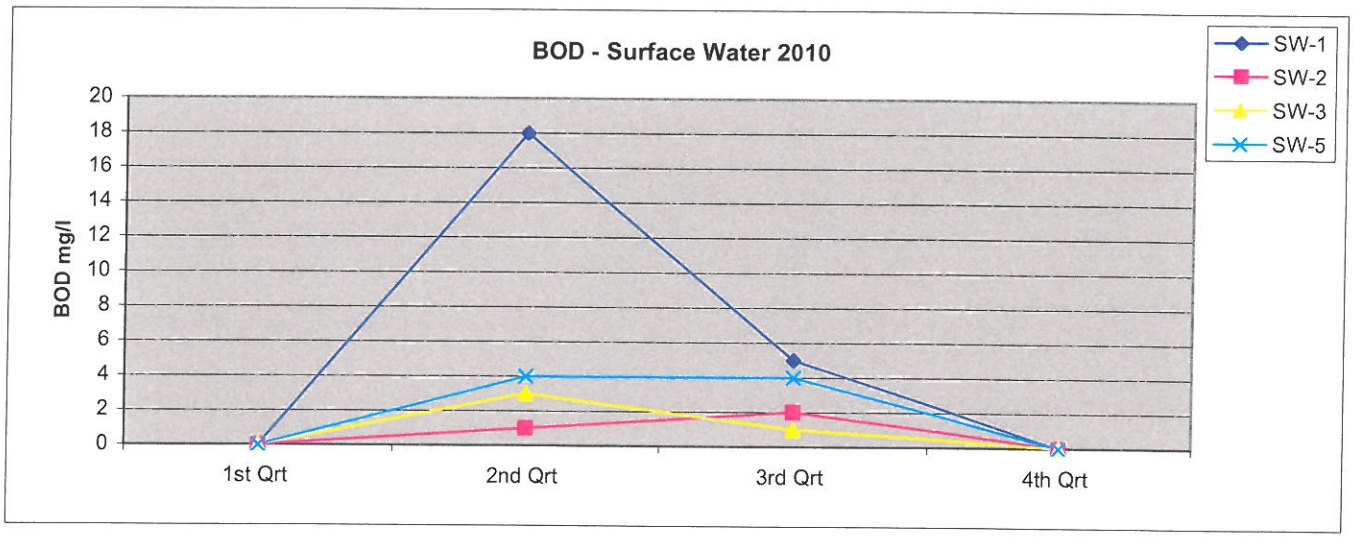
MARLINSTOWN
LANDFILL

SURFACE_WATER_MONITORING_POINTS
POST_CAPPING_WORKS

MRL_SW_2


Ammonical Nitrogen - Surface Water 2010
NH3-N mg/l
2.5
2
1.5
1
0.5
0
1st Qrt
2nd Qrt
3rd Qrt
4th Qrt
SW-1
SW-2
SW-3
SW-5


Chloride - Surface Water 2010
Chloride mg/l
70
60
50
40
30
20
10
0
1st Qrt
2nd Qrt
3rd Qrt
4th Qrt
SW-1
SW-2
SW-3
SW-5


BOD - Surface Water 2010
BOD mg/l
20
18
16
14
12
10
8
6
4
2
0
1st Qrt
2nd Qrt
3rd Qrt
4th Qrt
SW-1
SW-2
SW-3
SW-5

Annual Surface Water Quality Results

			RESULTS			
Parameter	***Method***	***Units***	**SW1**	**SW2**	**SW3**	**SW5**
Boron, Total as B	WAS049	mg/l	0.3	0.35	0.29	0.31
Cadmium , Total as Cd	WAS049	mg/l	<0.0006	<0.0006	<0.0006	<0.0006
Calcium , Total as Ca	WAS049	mg/l	141	153	114	159
Chromium , Total as Cr	WAS049	mg/l	<0.0007	<0.0007	<0.0007	<0.0007
Copper, Total as Cu	WAS049	mg/l	0.002	0.002	<0.001	0.003
Iron , Total as Fe	WAS049	mg/l	0.86	0.41	0.39	1.55
Lead , Total as Pb	WAS049	mg/l	0.005	<0.005	<0.005	<0.005
Magnesium, Total as Mg	WAS049	mg/l	5.65	6.35	5.72	7.61
Manganese , Total as Mn	WAS049	mg/l	0.088	0.109	0.074	0.194
Mercury, Total as Hg	WAS013	mg/l	<0.0001	<0.0001	<0.0001	<0.0001
Nickel , Total as Ni	WAS049	mg/l	<0.002	0.002	<0.002	0.003
Potassium , Total as K	WAS049	mg/l	3.85	3.79	3.8	5.95
Sodium , Total as Na	WAS049	mg/l	19	15.6	14.7	21.3
Zinc, Total as Zn	WAS049	mg/l	0.005	0.005	0.004	0.01
Alkalinity as CaCO3	WAS025	mg/l	296	302	240	298
Nitrogen, Total Oxidised as N	WAS036	mg/l	1.36	1.05	2.6	3.08
Phosphate, Ortho as P	WAS036	mg/l	<0.08	<0.08	<0.08	<0.08
Sulphate as SO4	WAS036	mg/l	18.1	43.5	27.2	36.7

Key

Items highlighted in yellow are exceedance of Surface Water Quality Standards S.I.No. 294 of 1989
Items highlighted in pink are in exceedance of European Communities (Quality of Salmonid Waters) Regulations, 1988

Surface Water Standards

Parameter	**Unit**	**Quality Standards**			
		Surface Water Regulations[1]			**Water Quality Regulations[2]**
		A1	**A2**	**A3**	
Boron	mg/l	2	2	2	-
Cadmium	mg/l	0.005	0.005	0.005	-
Calcium	mg/l	-	-	-	-
Total Chromium	mg/l	0.05	0.05	0.05	0.03
Copper	mg/l	0.05*	0.1*	1*	0.03
Dissolved iron	mg/l	0.2	2	2	-
Lead	mg/l	0.05	0.05	0.05	0.01
Magnesium	mg/l	-	-	-	-
Manganese	mg/l	0.05	0.3	1	-
Mercury	mg/l	0.001	0.001	0.001	-
Nickel	ug/l	-	-	-	0.05
Potassium	mg/l	-	-	-	-
Sodium	mg/l	-	-	-	-
Zinc	mg/l	3	5	5	0.1
Alkalinity as CaCO3	mg/l	-	-	-	-
Nitrogen, Total Oxidised as N	mg/l	-	-	-	-
Phosphates	mg/l	0.5	0.7	0.7	-
Sulphate	mg/l	200	200*	200*	-

[1]S.I. No. 294/1989 — European Communities (Quality of Surface Water Intended For The Abstraction of Drinking Water) Regulations, 1989.

[2]S.I. No. 12/2001 - Water Quality (Dangerous Substances) Regualtions 2001

* A departure from the quality standards referred to in article 3 (1) may be granted by the Minister to a sanitary authority where exceptional meteorological or geographical conditions have arisen.

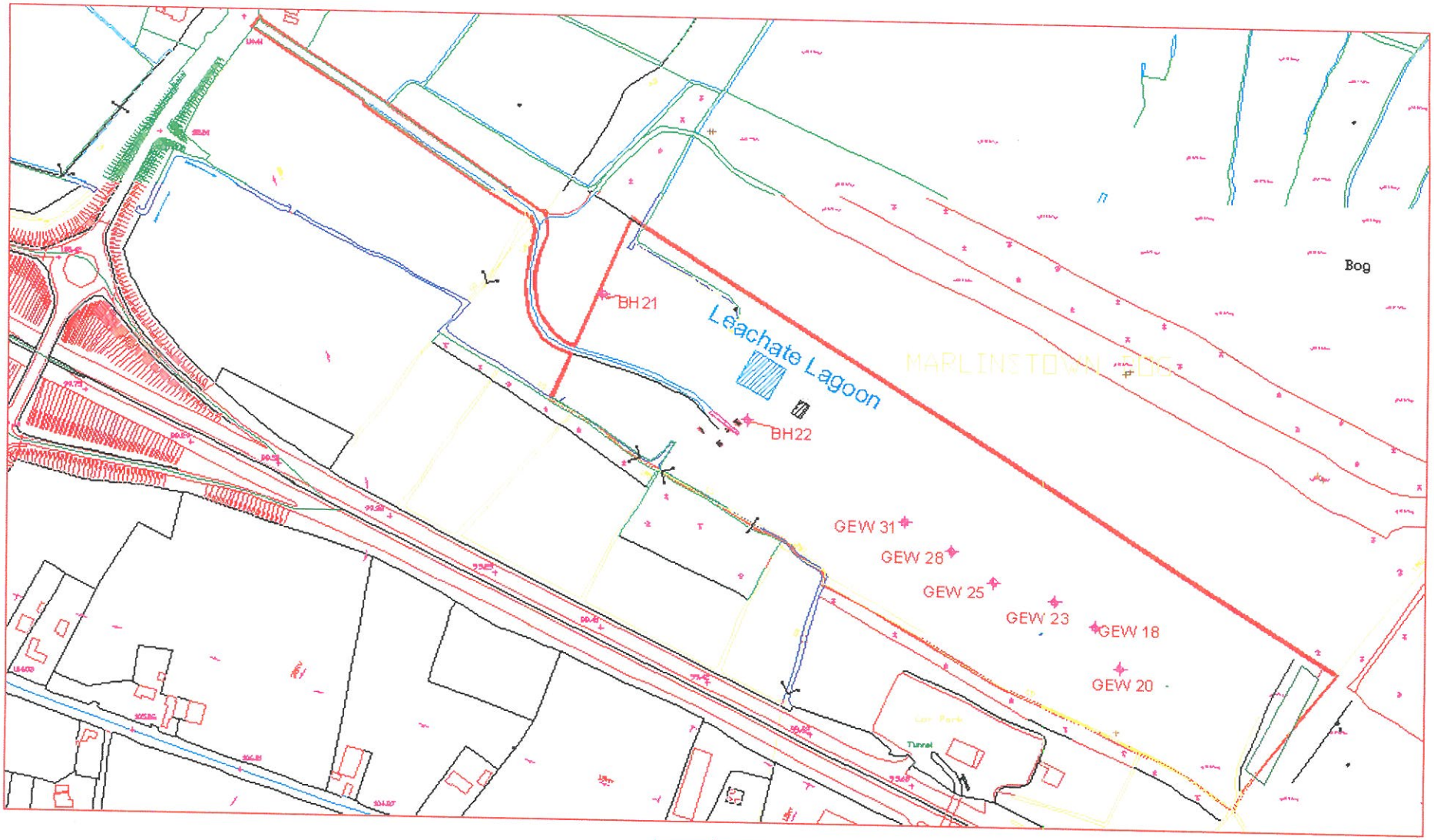
Category A1: Simple physical treatment and disinfection, e.g. rapid filtration and disinfection.

Category A2: Normal physical treatment, chemical treatment and disinfection, e.g. prechlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).

Category A3: Intensive physical and chemical treatment, extended treatment and disinfection, e.g. chlorination to break-point, coagulation, flocculation, decantation, filtration, adsorption (activated carbon), disinfection (ozone, final chlorination).

APPENDIX 4

Leachate



WESTMEATH COUNTY COUNCIL

MARLINSTOWN LANDFILL

LEACHATE_MONITORING_POINTS POST_CAPPING_WORKS

MRL_LHS_2

Leachate Monitoring 2010

Quarter 1	Sample I D	Depth of Leachate (m)	Temp C	Odour/Visual Appearance
18/02/2010	GEW31			Pipe damaged
	GEW28	6.71		Yellow colour, slight ammonia smell
	GEW25	2.17		Yellow colour, black SS, no smell
	GEW23	1.09		Strong smell, black SS, clear colour
	GEW18	0.00		Pipe damaged
	GEW20	0.96		Grey colour, strong smell
	BH21	1.50		Clear colour, no smell
	BH22	1.90	3.6	Clear colour, no smell, orange SS

Quarter 2	Sample I D	Depth of Leachate (m)	Temp C	Odour/Visual Appearance
27/05/2010	GEW31			Pipe damaged
	GEW28	2.30	16.9	Yellow colour, slight ammonia smell
	GEW25	2.93	17	Yellow colour, slight ammonia smell
	GEW23			Not done, access problems
	GEW18			Pipe damaged
	GEW20	0.73	13.9	Grey colour, black SS, slight smell
	BH21	0.80	12	Clear colour, no smell
	BH22	0.60		Unable to sample due to bend in casing

Quarter 3	Sample I D	Depth of Leachate (m)	Temp C	Odour/Visual Appearance
08/10/2010	GEW31			Pipe damaged
	GEW28	5.15	15.7	Black colour, strong smell, white SS
	GEW25	2.60	15.8	Yellow colour, strong smell
	GEW23	0.97	11.2	Clear colour, slight smell, black SS
	GEW18			Pipe damaged
	GEW20	1.10	12.3	Clear colour, slight smell
	BH21	0.90	11.6	not sampled
	BH22	1.50		not sampled

Quarter 4	Sample I D	Depth of Leachate (m)	Temp C	Odour/Visual Appearance
15/12/2010	GEW31			Pipe damaged
	GEW28	2.08	14.4	Yellow colour, slight smell, no SS
	GEW25	4.25		No sample could be extracted
	GEW23	1.09	11.1	Black SS, slight hydrocarbon sheen
	GEW18			Pipe damaged
	GEW20	1.20	9.1	Black colour, strong smell
	BH21	1.02		not sampled
	BH22	1.13		not sampled

Cells highlighted - suspect figures- meter activating above liquid level

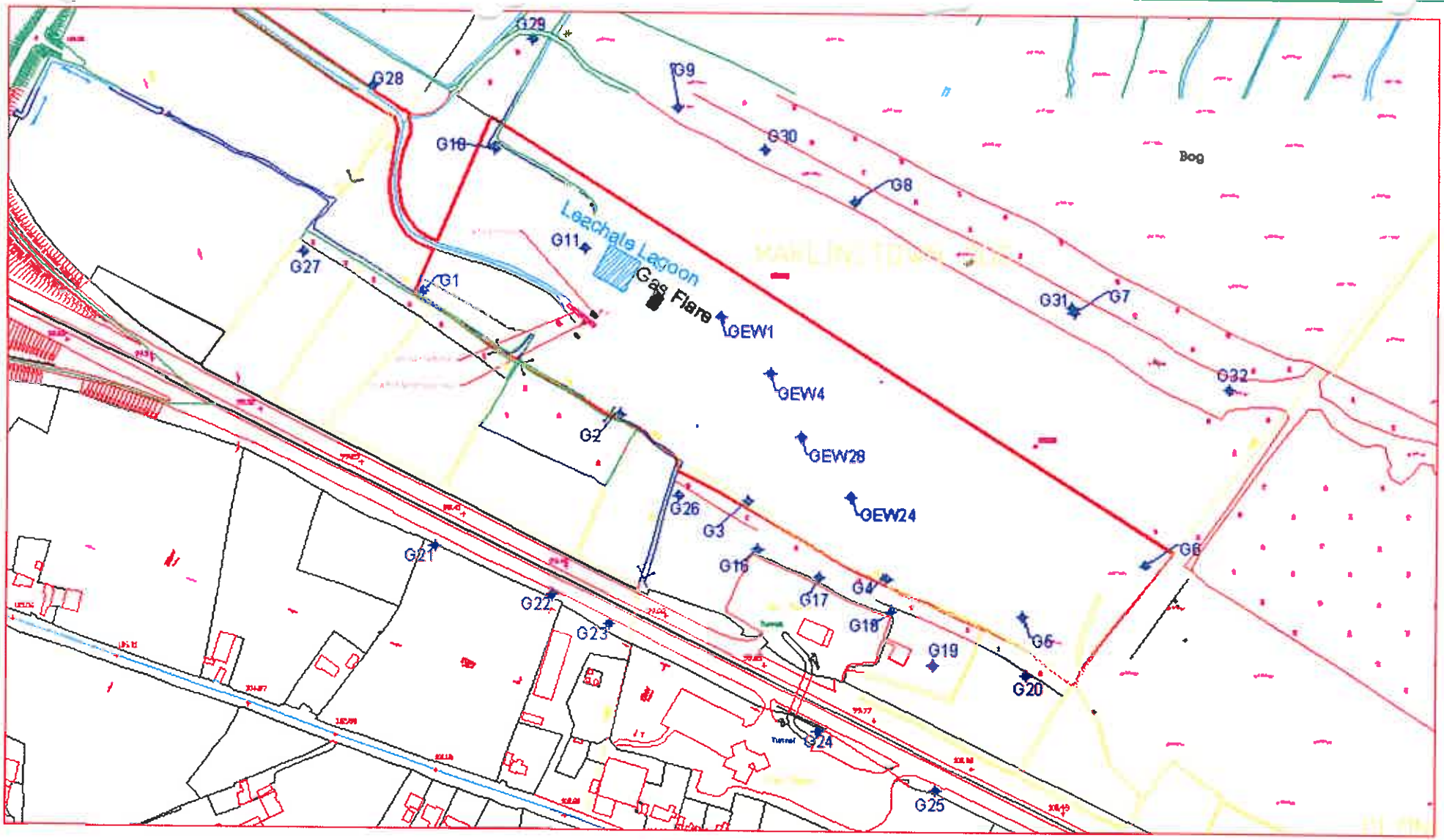
Annual Leachate Results

Parameters	Units	Leachate Lagoon	GEW28
Ammoniacal Nitrogen as N	mg/l	103	11.5
pH	pH units	8.2	8
Conductivity- Electrical 20C	uS/cm	1990	10400
Chloride as Cl	mg/l	198	1180
Phosphate, Ortho as P	mg/l	0.2	0.91
BOD + ATU (5 day)	mg/l	20	91
COD (Total)	mg/l	209	2340
Cyanide, Total as CN	mg/l	<0.009	0.009
Fluoride as F	mg/l	0.3	1
Nitrogen, total Oxidised as N	mg/l	0.9	<0.5
Sulphate as SO4	mg/l	42.5	246
Mercury, Total as Hg	mg/l	<0.0001	<0.0001
Boron, Total as B	mg/l	0.56	1.04
Cadmium , Total as Cd	mg/l	<0.0006	<0.0006
Calcium , Total as Ca.	mg/l	92.8	397
Chromium , Total as Cr	mg/l	0.0018	0.0281
Copper, Total as Cu	mg/l	<0.001	0.113
Iron , Total as Fe	mg/l	3.95	154
Lead , Total as Pb	mg/l	<0.005	0.198
Magnesium, Total as Mg	mg/l	28	134
Manganese , Total as Mn	mg/l	0.256	1.37
Zinc, Total as Zn	mg/l	0.012	2.49
Nickel , Total as Ni	mg/l	0.021	0.16
Potassium , Total as K	mg/l	88.8	543
Sodium , Total as Na	mg/l	156	1040
List I-II		*	N/S

*See Appendix 1 for detailed Laboratory Report
N/S Inadequate sample volumes for analysis

APPENDIX 5

Landfill Gas



WESTMEATH COUNTY COUNCIL

MARLINSTOWN LANDFILL

GAS_MONITORING_LOCATIONS POST_CAPPING_WORKS

MRL_GS_2

LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill	**Facility Address:** Marlinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	**Date of Sampling:** 25th January 2010
Monitoring Personnel: Mary Claire Sheridan & Mark Conaty	**Weather:** Cold, dry and sunny.
Atmospheric Pressure 1018 mb.	

RESULTS

Sample Station No.	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G2	6.5	0.2	10.4	0	0	94.5	82.8	Water pulled up through tubing
G3	14	4.3	0.6	0	0	98.4	81	
G4	0.2	1	7.6	0	0	2.8	91.1	
G5	Valve under frozen water							
G6	0.2	0.6	14.7	0	0	3.5	84.8	
G7	25	2.4	8.3	0	0	>>>	64.2	
G8	1.2	3.2	17.2	0	0	23.2	79.3	
G9	9.7	17	0.5	0	0	67.5	72.7	
G10	Valve under frozen water							
G11	0.4	0.3	19.4	0	0	79.7	9.6	Water pulled up through tubing
G16	0	0	20.8	0	0	0	79.1	
G17	0	8.1	8.5	0	0	0	83.3	
G18	0	0	20.3	0	0	0.9	79.6	
G19	0	3.2	16.8	0	0	0	79.9	
G20	7.9	1	13.3	0	0	>>>	77.7	
G21	0	0.7	19.4	0	0	0	79.8	
G22	0	0	20.6	0	0	0	79.3	
G23	0	2.4	18.2	0	0	0	79.2	
G24	0	0.6	18.8	0	0	0	80.4	
G25	0	0.5	19.9	0	0	0	79.5	
G26	10	3.9	17.2	0	0	>>>	68.8	
G27	0.9	0.6	19.3	0	0	18.4	79.1	
G28	0.2	0	15	0	0	4.5	84.9	
G30	0	0.1	20.6	0	0	0.8	72.9	
G31	0	2	16.4	0	0	0	80.9	
G32	4.5	4.9	13.7	0	0	83.3	76.8	
GEW1	0.1	0.1	20.5	0	0	1.1	79.2	
GEW4	1.9	1.2	19.5	0	2.8	39.7	77.3	
GEW24	30	9.2	2.7	0	0	>>>	58	
GEW28	23.5	16	0.7	0	5	>>>	59.7	
SHOP (/20)	0.05	0	20.9	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill	**Facility Address:** Marlinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	**Date of Sampling:** 18th February 2010
Monitoring Personnel: Mary Claire Sheridan	**Weather:** Very cold and frosty, dry and sunny.

RESULTS

Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	975	5.3	8.3	6.3	0	0	53	80	
G2	975	0.5	0.2	18.2	0	0	10	81	
G3	975	9.9	4.5	0.3	0	0	68.1	85.2	
G4	975	0	1.8	5.3	0	0	0	92.8	
G5	975	Water covering nozzle - could not sample							
G6	975	0	0	20.7	0	0	0	79.2	
G7	975	3.2	0.9	17.1	0	0	61.4	78.7	
G8	975	3.9	2.4	16.5	0	0	74.9	77.1	
G9	975	6.6	11	3.4	0	0	54.4	78.9	
G10	975	Frozen water covering nozzle - could not sample							
G11	975	Frozen water covering nozzle - could not sample							
G16	975	0	0	20.6	0	0	0.1	79.3	
G17	975	0.8	8	6.1	0	8	0	85	
G18	975	0	0	20.8	0	0	0.1	79.1	
G19	975	0	2.8	17.7	0	0	0.1	79.4	
G20	975	12.5	1.6	8.5	0	0	>>>	77.3	
G21	975	0	0.7	19.6	0	0	0	79.6	
G22	975	0	0	20.7	0	0	0	79.2	
G23	975	0	1.6	18.8	0	0	0.1	79.5	
G24	975	0	1.5	16.8	0	0	0	81.6	
G25	975	0	0.5	20.5	0	0	0	78.9	
G26	975	22	2.2	9.3	2.8	2.3	>>>	66.4	
G27	975	1.9	0.2	13.4	0	0	35.1	84.4	
G28	975	0.4	0	2.2	0	0	3.6	97.3	
G30	975	0.2	0	20.7	0	0	5.6	79	
G31	975	0	1.8	19	0	0	0	79.1	
G32	975	13	5.3	5.7	0	1.3	>>>	75.9	
GEW1	975	63	21	0.2	0	27.9	0	14.7	
GEW4	975	52	16	0.3	0	1.6	>>>	31.6	
GEW24	975	0.6	0.7	20.5	0	0	15	78	
GEW28	975	23	14	0.9	0	24.8	>>>	62	
SHOP (/20)	975	0.1	0	20.9	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

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Facility Name: Marlinstown Landfill	**Facility Address:** Marlinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	**Date of Sampling:** 15th March 2010
Monitoring Personnel: Mary Claire Sheridan	**Weather:** Sunny and dry with some overcast cloud.

RESULTS

Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	1015	1.1	11	5.1	0	0	9.9	82.7	
G2	1015	8.6	2	7.9	0	0	91.8	81.4	
G3	1015	4	8.1	0	0	0	27	87.6	
G4	1015	0	2.4	2.1	0	1.8	0	95.4	
G5	1015	Water covering nozzle - could not sample							
G6	1015	0	0	20.6	0	3.7	0	79.3	
G7	1015	21	3	4.3	0	0	>>	71.6	
G8	1015	0.4	3.5	14.6	0	0	7.4	81.4	
G9	1015	7.4	17	0.3	0	0	50.6	75.2	
G10	1015	Water covering nozzle - could not sample							
G11	1015	15.5	5.1	4.8	0	0	>>	74.5	
G16	1015	0	0.2	20.4	0	0	0	79.3	
G17	1015	Monitored by the EPA							
G18	1015	0	0	20.5	0	0	0	79.4	
G19	1015	0	3.3	17.8	0	0	0	78.8	
G20	1015	6.2	1.5	14.1	0	0	>>	78.1	
G21	1015	0	0.9	19.5	0	0	0	79.5	
G22	1015	0	0	20.3	0	0	0	79.6	
G23	1015	0	1.9	18.2	0	0	0	79.8	
G24	1015	0	0	20.4	0	0	0	79.5	
G25	1015	0	0.6	19.9	0	0	0	79.4	
G26	1015	1.7	1.4	14.6	2.2	27	31.7	82.2	
G27	1015	0.8	0.9	0	30	1.3	>>	98.2	
G28	1015	0	0	11	24	1.2	0	86.9	
G30	1015	Water pulled up through tubing							
G31	1015	0	2	18	0	0	0	79.9	
G32	1015	20.5	7.2	1.3	0	0	>>	70.9	
GEW1	1015	46.5	23	0	0	111	>>	30.9	
GEW4	1015	70	23	0	0	15.3	>>	6.9	
GEW24	1015	47.5	22	0	0	84.5	>>	30.4	
GEW28	1015	33.5	20	0	0	53.7	>>	46.4	
SHOP (/20)	1015	0.0	0	21.2	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill						**Facility Address:** Marlinstown, Mullinger, Co. Westmeath			
Licensee: Westmeath County Council						**Date of Sampling:** 20th April 2010			
Monitoring Personnel: Mary Claire Sheridan						**Weather:** Dry, bright and sunny			
RESULTS									
Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	1015	2.5	8.5	6.3	0	0	25.8	82.5	
G2	1015	3.1	2.3	0.2	0	0	21.1	94.3	
G3	1015	4.8	4.6	0.3	0	0	33.6	90.1	
G4	1015	0	1.1	0.9	0	0	0	97.9	
G5	1015	15	0.9	5.9	0	0	>>>	78.1	
G6	1015	0	0	20.6	0	0	0.1	79.3	
G7	1015	Error with Gas Meter							
G8	1015	2	4.3	13.9	0	0	37.8	79.6	
G9	1015	Error with Gas Meter							
G10	1015	16.5	6.7	0.3	0	0	>>>	76.4	
G11	1015	4	2.4	0.2	0	0	27.6	93.3	
G16	1015	0	0.3	19.8	0	0	0	79.2	
G17	1015	Monitored by the EPA							
G18	1015	0	0	20.7	0	0	0	79.2	
G19	1015	0	3.2	16.9	0	0	0	79.8	
G20	1015	3.6	1.1	13.3	0	0	67.8	81.9	
G21	1015	0	0.8	19	0	0	0	80.1	
G22	1015	0	0	20.4	0	0	0	79.5	
G23	1015	0	1.7	17.9	0	0	0	80.3	
G24	1015	0	1.2	17	0	0	0	81.7	
G25	1015	0	0.6	19.7	0	0	0	79.6	
G26	1015	28.5	8.4	3	0	0	>>>	60	
G27	1015	2	0.4	0.1	0	0	13.7	97.4	
G28	1015	0.3	0	5.6	20	1.2	2.3	94	
G30	1015	0	0	20.7	0	0	0	79.2	
G31	1015	0	2.6	17.5	0	0	0	79.8	
G32	1015	24	4.5	1.6	0	0	>>>	69.8	
GEW1	1015	25.5	13	2.6	0	0	>>>	71	
GEW4	1015	14.5	11	5.3	0	0	0	58.8	
GEW24	1015	5.8	4.3	15	0	0	>>>	69.1	
GEW28	1015	14.5	13	1.4	0	0	>>>	74.7	
SHOP (/20)	1015	0.0	0	21.1	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill	**Facility Address:** Marlinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	**Date of Sampling:** 27th May 2010
Monitoring Personnel: Mary Claire Sheridan	**Weather:** Cool, sunny, light breeze

RESULTS

Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	997	8.6	14	0.7	0	0	60.7	76.6	
G2	997	0.7	8.4	0.2	0	0	4	90.6	
G3	997	0.1	0.9	1	0	0	0	91	
G4	997	Not sampled - Gas Meter Battery Died							
G5	997	12.5	0.6	0.4	0	0	38	86	
G6	997	0.2	0	20	0	0	>>	79	
G7	997	12	2.1	0.4	0	0	83	85.4	
G8	997	0	2.8	17.8	0	0	1.7	79.3	
G9	997	15	12	0.8	95	0	0	72.1	
G10	997	8.2	7.8	0.5	0	0	58	83.4	
G11	997	Not sampled - Gas Meter Battery Died							
G16	997	0	0.8	19.8	0	0	0	79.3	
G17	997	Monitored by the EPA							
G18	997	0	0	21	0	0	0	78.9	
G19	997	0	4.9	15.9	0	0	0	79.1	
G20	997	0.8	2.5	9.6	0	0	10.9	87	
G21	997	0	1.6	19.6	0	0	0.1	78.7	
G22	997	0	0	20.7	0	0	0	79.2	
G23	997	0	2.3	19	0	0	0	78.6	
G24	997	0	0.6	19.8	0	0	>>	79.4	
G25	997	0.4	0.3	20.4	0	0	0	78.9	
G26	997	24.5	14	0.6	0	0	0	60.8	
G27	997	0.6	0.3	0.2	0	0	3.5	98.8	
G28	997	0.9	0	3.8	57	2	7.1	95.2	
G30	997	0	0.2	20.7	0	0	1.4	79	
G31	997	0	4.7	12.2	0	0	0	83	
G32	997	22	3	0.6	0	0	>>	74.3	
GEW1	997	Not sampled - Gas Meter Battery Died							
GEW4	997	Not sampled - Gas Meter Battery Died							
GEW24	997	Not sampled - Gas Meter Battery Died							
GEW28	997	Not sampled - Gas Meter Battery Died							
SHOP (/20)	997	0.0	0	21.2	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill						**Facility Address:** Marlinstown, Mullingar, Co. Westmeath			
Licensee: Westmeath County Council						**Date of Sampling:** 29th June 2010			
Monitoring Personnel: Mary Claire Sheridan						**Weather:** Warm and sunny			
RESULTS									
Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	1008	Could not move the valve							
G2	1008	45.5	23	0	0	0	>>	31.4	
G3	1008	Inaccessible							
G4	1008	Inaccessible							
G5	1008	12.5	0.5	0.1	11	0	85	86.8	
G6	1008	1.2	0	18	0	0	23.2	80.7	
G7	1008	21.5	0	0	0	0	>>	78.9	
G8	1008	0	7.7	14.7	0	0	0	77.5	
G9	1008	9.7	2.9	0	150	0	65.9	87.3	
G10	1008	7.9	18	0	12	0	53.2	74	
G11	1008	0	17	1.4	0	0	0.1	81.5	
G16	1008	0	0	19.6	0	0	0	80.3	
G17	1008	Monitored by the EPA							
G18	1008	0	0	20.6	0	0	0	79.3	
G19	1008	0	1.4	15.1	0	0	0	83.4	
G20	1008	0.8	2.5	0.2	0	0	5.5	96.4	
G21	1008	0	0.8	19.4	0	0	0	79.7	
G22	1008	0	0.2	20.2	0	0	0	79.5	
G23	1008	0	1.3	18.8	0	0	0	79.8	
G24	1008	0	0.2	19.3	0	0	0	80.4	
G25	1008	0	0.1	19.2	0	0	0	80.6	
G26	1008	20.5	0.2	0.3	0	0	>>	78.9	
G27	1008	1.3	2.5	0.1	16	0	9	96	
G28	1008	0	0	6.5	140	1.1	0	93.4	
G30	1008	0	0.3	20.7	0	0	0	78.9	
G31	1008	0	8.4	13.6	0	0	0	77.9	
G32	1008	7.9	0.2	6	48	0	76.7	85.8	
GEW1	1008	19	25	0	13	1.2	>>	55.9	
GEW4	1008	27	20	7.6	0	11.1	>>	45.3	
GEW24	1008	27.5	19	0.4	11	15	>>	53	
GEW28	1008	1.3	0	17.2	0	0	25	81.4	
SHOP (/20)	1008	0.1	0	21.1	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill	**Facility Address:** Marlinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	**Date of Sampling:** 27th July 2010
Monitoring Personnel: Mary Claire Sheridan	**Weather:** Bright, overcast, light breeze

RESULTS

Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	1005	5.80	17	3.5	0	0	48.1	73.6	
G2	1005	27	12	0	0	0	>>	60.9	
G3	1005	accessible							
G4	1005	0.00	4.8	8.4	0	0	0	86.7	
G5	1005	18	5.6	0.5	0	0	0	75.8	
G6	1005	0	0	20.9	0	0	0	79	
G7	1005	28	2.4	0	0	0	>>	69.5	
G8	1005	2	8.5	9	15	0	28.7	80.4	
G9	1005	7	21	0.6	51	0	49	71.3	
G10	1005	7.2	14	0	14	0	48.5	79.8	
G11	1005	0	1.2	18.3	0	0	0	80.4	
G16	1005	0	0.7	19.2	0	0	0	80	
G17	1005	vred by the EPA							
G18	1005	0	0.1	20.6	0	0	0	79	
G19	1005	accessible							
G20	1005	0	8.3	2.9	0	0	0	88.5	
G21	1005	0	2.4	18.5	0	0	0	79.1	
G22	1005	0	2	18.3	0	0	0	79.6	
G23	1005	0	4	16.5	0	0	0	79.4	
G24	1005	0	0.8	17.9	0	0	0	81.2	
G25	1005	0	0.5	19.6	0	0	0	79.8	
G26	1005	37	29	1.5	0	0	>>	32.9	
G27	1005	1.2	0.8	0.1	0	0	0	97.8	
G28	1005	0	0	0	833	2.3	0	99.9	
G30	1005	0	0.3	20.1	21	0	0	79.5	
G31	1005	0	7	15.1	0	0	0	77.8	
G32	1005	21	7.1	0	0	0	>>	71.8	
GEW1	1005	33.5	28	0.7	0	24.5	>>	37.7	
GEW4	1005	42.5	31	1.6	0	28.9	>>	24.8	
GEW24	1005	0.1	0.6	20.3	0	0	2.1	78.9	
GEW28	1005	27.5	25	0.4	0	3.8	>>	47	
SHOP (/20)	1005	0.1	0	21.1	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Martinstown Landfill						**Facility Address:** Martinstown, Mullingar, Co. Westmeath			
Licensee: Westmeath County Council						**Date of Sampling:** 26th August 2010			
Monitoring Personnel: Mary Claire Sheridan						**Weather:** Sunny, dry			
RESULTS									
Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	997	12.00	24	0.9	0	0	86.4	64	
G2	997	1.7	13	0	0	0	11	85.2	
G3	997	Inaccessible							
G4	997	0.00	7	1.9	0	0	0	91	
G5	997	21	4.8	0.3	0	0	>>	74.3	
G6	997	0	0.2	20.6	0	0	0	79.1	
G7	997	Submerged							
G8	997	0	5.1	17.7	0	0	0	77.1	
G9	997	12.5	24	0	139	0	83.7	63.4	
G10	997	6.6	15	0	0	0	45	78.3	
G11	997	Submerged							
G16	997	0	1	19.2	0	0	0	79.7	
G17	997	Monitored by the EPA							
G18	997	0	0.1	20.4	0	0	0	79.4	
G19	997	Inaccessible							
G20	997	0	6.6	9.6	0	0	0	83.7	
G21	997	0	1.8	19.1	0	0	0	79.2	
G22	997	0	0.2	20.3	0	0	0	79.4	
G23	997	0	3.1	18.2	0	0	0	78.6	
G24	997	0	4.2	15	0	0	0	80.6	
G25	997	0	0.8	19.5	0	0	0	75.6	
G26	997	42	26	0.1	0	0	0	31.3	
G27	997	0.8	2.4	0	0	0	5.1	96.7	
G28	997	0.3	0	0	863	2	>>	99.6	
G30	997	0	0.3	20.3	34	0	0	79.3	
G31	997	0	11	10.9	0	0	0	78	
G32	997	28.5	6	0	0	0	>>	65.4	
GEW1	997	24.5	23	0	14	4.4	>>	54.4	
GEW4	997	31.5	20	6.2	0	20.8	>>	42.2	
GEW24	997	0.3	2	18.7	0	0	6.9	78.9	
GEW28	997	27	22	1.1	0	17.3	>>	49.3	
SHOP (/20)	997	0.05	0	20.8	0	0	0	0	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Martinstown Landfill	**Facility Address:** Martinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	**Date of Sampling:** 8th October 2010
Monitoring Personnel: Mary Claire Sheridan	**Weather:** Overcast, warm, light breeze

RESULTS

Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	996	8.40	21	3.8	0	0	71.1	66.7	
G2	996	3.4	6.9	0	0	0	23.2	89.6	
G3	996	0.00	4.5	17.2	0	0	0	78.2	
G4	996	0.00	5.5	10.9	0	0	0	83.5	
G5	996	17.5	5.5	0.1	0	0	>>	76.8	
G6	996	0	0.1	20.5	0	0	0	79.3	
G7	996	49.50	1.8	0	14	0	>>	48.6	
G8	996	12	11	3.4	0	0	98.4	73.5	
G9	996	10.5	20	1.4	0	0	76.9	68	
G10	996	8.3	15	0	0	0	56.5	76.8	
G11	996	0.00	1	18.7	0	0	0	80.2	
G16	996	0	0.8	19.7	0	0	0.1	79.4	
G17	996	ired by the EPA							
G18	996	0	0	20.7	0	0	0	79.2	
G19	996	0	9	14.4	0	0	0	76.5	
G20	996	0	3.1	13.4	0	0	0.7	83.4	
G21	996	0	1.5	19.9	0	0	0	79.1	
G22	996	0	0.4	20.1	0	0	0	79.4	
G23	996	0	3.5	18.4	0	0	0	79	
G24	996	0	4.5	15.2	0	0	0	80.2	
G25	996	0	1.7	19.6	0	0	0	78.6	
G26	996	19.5	18	7.1	0	0	>>	55.3	
G27	996	2.7	0.1	0	0	0	18.7	97	
G28	996	0.8	0	3.9	850	1	7.5	95.2	
G30	996	0	0.2	19.9	0	0	0	79.8	
G31	996	0	5.9	15.7	0	0	0	78.3	
G32	996	39	5.6	0	30	0	>>	55.3	
GEW1	996	35.5	26	1	0	0	>>	37.9	
GEW4	996	35	30	0	14	55.5	>>	34.9	
GEW24	996	1	1.5	19.3	0	0	19.7	78.1	
GEW28	996	13.5	20	3.1	36	0	>>	63.3	
SHOP (/20)	996	0.05	0	21	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill	**Facility Address:** Marlinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	**Date of Sampling:** 22th October 2010
Monitoring Personnel: Mary Claire Sheridan	**Weather:** Overcast, cold, dry

RESULTS

Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	1000	46.50	27	0	13	0	>>	26.4	
G2	1000	0	12	1.6	17	0	>>	86.4	
G3	1000	0.00	11	2.7	13	0	0	86.2	
G4	1000	0.00	7.7	2.1	17	0	0	90	
G5	1000	22	4.2	0	18	0	>>	73.3	
G6	1000	0.1	0.5	20.3	19	0	0.7	79	
G7	1000	50.00	0.8	0	1062	0	>>	49.4	
G8	1000	0	4.1	17.4	191	0	0.8	78.4	
G9	1000	6.4	21	0.1	61	0	>>	72.4	
G10	1000	9.6	14	0.2	11	0	65.7	76.1	
G11	1000	0.00	2.8	13.9	12	0	0	63.2	
G16	1000	0	0.6	19.8	0	0	0	79.5	
G17	1000	bred by the EPA							
G18	1000	0	0	20.5	0	0	0	79.4	
G19	1000	0	7.4	16.3	0	0	0	76.3	
G20	1000	0.3	1.5	16.1	0	0	5.7	82	
G21	1000	0	1.8	19.4	0	0	0	78.7	
G22	1000	0	1.3	19.3	0	0	0	79.3	
G23	1000	0	3.6	18.6	0	0	0	77.7	
G24	1000	0	0.1	20.4	0	0	0	79.4	
G25	1000	0	0.6	19.9	0	1.1	0	79.4	
G26	1000	20	18	6.7	0	0	>>	55.2	
G27	1000	2.2	2.2	0	16	0	14.5	95.5	
G28	1000	0.5	0.1	9.8	1001	0	7.1	89.5	
G30	1000	0.1	0.2	20.4	86	0	2.4	79.2	
G31	1000	0	6	15.8	1062	0	>>	78.1	
G32	1000	35	6.5	0.4	1059	0	>>	58	
GEW1	1000	33.5	25	0	11	0	65.7	41.9	
GEW4	1000	32	24	2.5	49	0	>>	41.4	
GEW24	1000	20.5	24	0	31	14.9	>>	55.4	
GEW28	1000	22.5	24	0.1	36	1.5	>>	53.5	
SHOP (f20)	1000	0.05	0	21	-	-	-	-	

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LANDFILL GAS MONITORING RECORD SHEET

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Facility Name: Marlinstown Landfill						**Facility Address:** Marlinstown, Mullinger, Co. Westmeath			
Licensee: Westmeath County Council						**Date of Sampling:** 25th November 2010			
Monitoring Personnel: Mary Claire Sheridan						**Weather:** Cold and Sunny			
RESULTS									
Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	1000	11.4	14	3.8	0	0	11.6	80.9	
G2	1000	5.1	2.9	0	0	0	34.5	91.9	
G3	1000	27.50	71	0.3	0	0	>>	65	
G4	1000	7.70	4	4.2	0	0	85.7	84	
G5	1000	21	3.8	1	0	0	>>	74.7	
G6	1000	0	0.2	21.1	0	0	0	78.6	
G7	1000	48.00	1.3	2.7	0	0	>>	47.9	Flow = -2.1l/h. Pressure = -9Pa
G8	1000	2.2	5.7	11.1	0	0	35.6	80.9	Pressure and Flow = 0
G9	1000	10.5	17	1.5	0	0	78.9	70.9	Pressure= -8Pa to 0Pa. Flow = -2l/h to -0.1l/h
G10	1000	11.5	13	0.1	0	0	78.7	75.3	
G11	1000	Submerged							
G16	1000	0	0.3	20	0	0	0	79.6	
G17	1000	Monitored by the EPA							
G18	1000	0	0	20.6	0	0	0	79.3	
G19	1000	0	4.4	16.6	0	0	0	78.9	
G20	1000	1	1.4	18.1	0	0	1	79.3	
G21	1000	0	0.9	20	0	0	0	79	
G22	1000	0	0	21.4	0	0	0	78.5	
G23	1000	0	1.6	18.3	0	0	0	80	
G24	1000	0	2.5	17.7	0	0	0	79.7	
G25	1000	0	0.7	20.4	0	0	0	78.7	
G26	1000	7	6.3	15.4	0	0	>>	71.2	
G27	1000	1.9	0.6	0	0	0	0	97.2	
G28	1000	1.9	0	4.7	235	0	17.2	93.3	Pressure and Flow = <<
G30	1000	0	0.1	20.5	0	0	0	79.3	Pressure and Flow = 0
G31	1000	0	3.1	18.4	0	0	0	78.4	Pressure and Flow = 0
G32	1000	42.5	5.3	0.8	16	0	>>	51.3	Pressure and Flow = 0
GEW1	1000	32.5	23	0	0	2.9	>>	44.4	Flow and Pressure = <<
GEW4	1000	23.5	19	5.3	0	19.7	>>	52.1	Flow and Pressure = <<. Smell of sulphur
GEW24	1000	11.5	15	6.2	0	6.7	>>	59.1	Flow and Pressure = <<
GEW28	1000	18.5	22	0.3	0	2.9	>>	67.2	Flow and Pressure = <<
SHOP (/20)	1000	0.10	0	20.9					

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LANDFILL GAS MONITORING RECORD SHEET

RPS

Facility Name: Marlinstown Landfill	Facility Address: Marlinstown, Mullingar, Co. Westmeath
Licensee: Westmeath County Council	Date of Sampling: 15th December 2010
Monitoring Personnel: Mary Claire Sheridan	Weather: Cold, overcast and icy

RESULTS

Sample Station No.	Atmospheric Pressure (mb)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	LEL (%)	N_2 (%)	Comments
G1	1027	8.5	15	2.3	0	0	66	74.1	
G2	1027								
G3	1027								
G4	1027								
G5	1027								
G6	1027								
G7	1027	31	2.7	4.9	11	0	>	61.3	Flow = -2.4l/h P = -10Pa
G8	1027	3.3	6.2	10.8	0	0	49.2	79.6	
G9	1027	9.4	19	0.1	0	0	63.7	71.5	
G10	1027	8.2	7.2	7.5	20	0	87.9	77	Flow = -4 l/h and Pressue = -5Pa
G11	1027	Submerged in ice							
G16	1027	0.0	0.4	19.3				80.3	
G17	1027	Monitored by the EPA							
G18	1027	0.1	0.2	19.0				80.7	
G19	1027	0	3.6	17.6				78.8	
G20	1027	1.3	1.1	17.7				79.9	
G21	1027	0	1.5	19.3				79.2	
G22	1027	0	0.2	20.2				79.6	
G23	1027	0	1.6	19.1				79.3	
G24	1027	0	2.7	16.3				81	
G25	1027	0	0.8	19.5				79.7	
G26	1027	1.9	3.8	18.3				76	
G27	1027	Valve lever frozen							
G28	1027	1.8	0	7.8	139	0	20.5	90.3	Flow and Pressure = <<<
G30	1027	0	0.2	20.5	0	0	0	79.2	
G31	1027	0	2.8	18.8	0	0	0	78.3	
G32	1027	36	6.8	0.4	0	0	>	56.7	
GEW1	1027								
GEW4	1027								
GEW24	1027								
GEW28	1027								
SHOP (/20)	1027	0.05	0	21	-	-	-	-	

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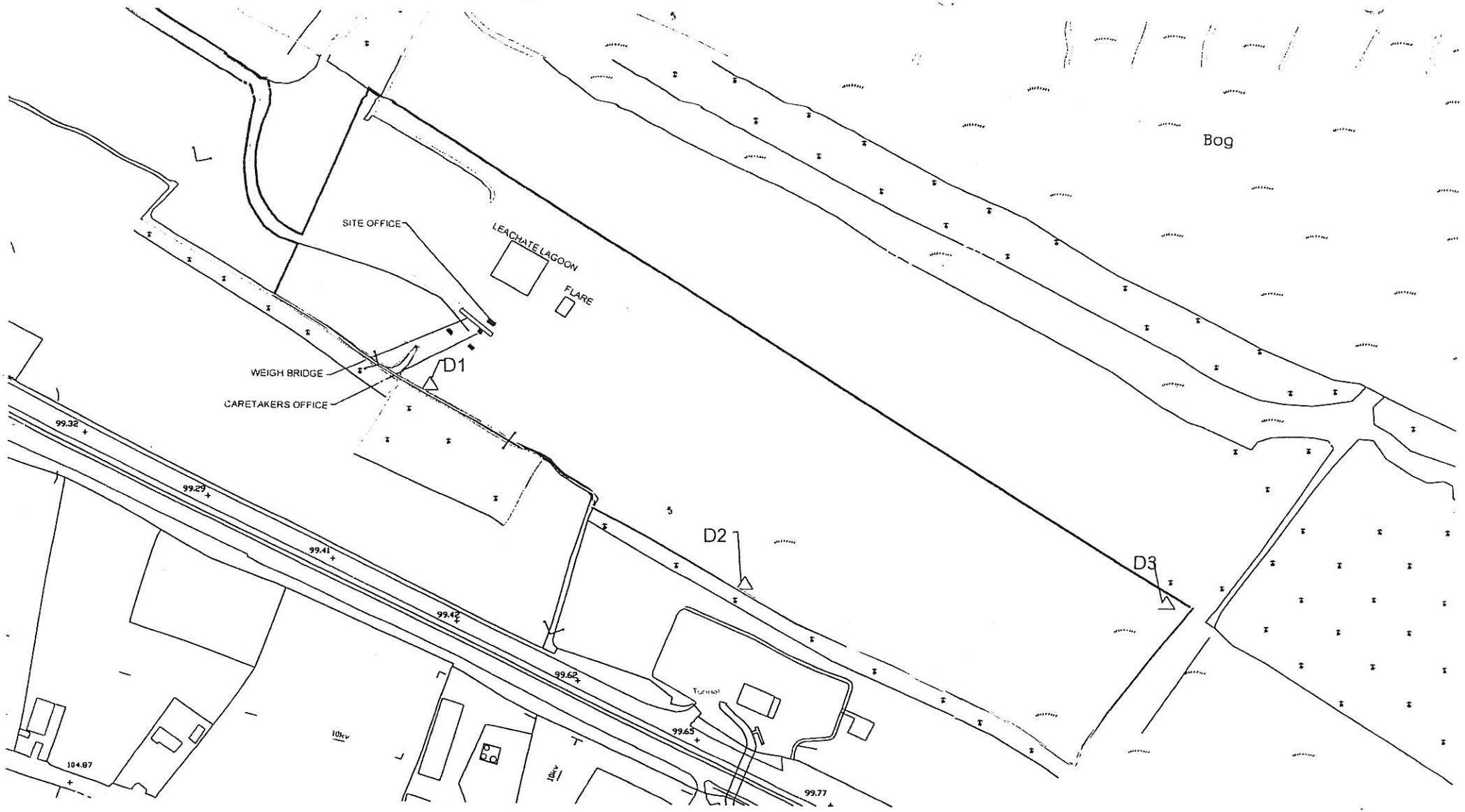
APPENDIX 6

Dust



REVISION	DESCRIPTION	DATE

DRAWING TITLE

DUST MONITORING

WESTMEATH COUNTY COUNCIL

PROJECT

MARLINSTOWN LANDFILL

SURVEYED: DOD
DRAWN: DOD
CHECKED: P.J.CAREY

SCALE : NTS
DATE : 21-12-05

DRAWING NO.

MRL DUST 2

Marlinstown Landfill Dust Results 2010

April

SAMPLING POINT	DUST DEPOSITION RATE mg/m^2-day
D-1	8.3
D-2	14.6
D-3	30.4

June

SAMPLING POINT	DUST DEPOSITION RATE mg/m^2-day
D-1	18.3
D-2	6.2
D-3	19.1

APPENDIX 7

EMS Documentation

Standard Operating Procedure Number SOP/W0071-02/001	Page 1 of 2
Title: Management Structure Marlinstown Landfill	Rev 05 (04-02-07 J.W.) Written by: CMcDonough Approved by: M. Rooney

1.0 Management Structure of Facility.

The day-to-day management of the facility and supervision of waste activities are the responsibility of the Landfill Manager and the site operatives.

The names of the persons who provide management and supervision and their positions are set out below

Landfill Manager:	Mr. Michael Rooney, Executive Engineer.
Deputy Manager:	Mr JohnWaldron, Sen.Executive Technician.
Deputy Manager / Caretaker.	No Longer Required Site Closed
Assistant Caretaker:	No Longer Required Site Closed
General Operative:	No Longer Required Site Closed

2.0 Responsibilities

Westmeath County Council, as the licensee, is responsible for ensuring the requisite resources are provided to operate the facility in accordance with the conditions of Waste Licence Registration No. W0071-02.

The Landfill Manager or nominated Deputy is responsible for ensuring that the day to day operation of the facility is carried out in accordance with waste licence conditions and any procedures or operational work practice sheets prepared on foot of licence conditions.

The Landfill Manager or nominated Deputy is responsible for ensuring that the environmental monitoring programme is carried out and report submitted to the EPA in accordance with licence conditions.

The Landfill Manager or nominated Deputy is responsible for arranging that the specified engineering works, the leachate and landfill gas management programmes and the restoration programmes are properly implemented.

The Landfill Manager is responsible for arranging appropriate training programmes for all facility personnel and for maintaining training records.

3.0 Experience, Competence and Qualifications

- Mr. M.Rooney B.Sc.Eng.(Trinity College Dublin), Dip.Struct.Eng.(DIT Bolton St.), M.I.E.I. is a Civil Engineer of 11 years experience and has completed the FAS Waste Management Training Programme.

- Mr. John Waldron, Senior Executive Technician with 29 years Environmental experience, has completed the FAS Waste Management Training Programme.

4.0 Contingency Arrangements.

In the event of the absence of the above named persons from the facility the following arrangements will be implemented.

Where absence is due to scheduled holidays or periods of illness extending to a maximum of two weeks the following applies: -

- In the absence of the Landfill Manager the nominated Deputy will be Mr. John Waldron, Senior Executive Technician.

For longer periods of absence the Landfill Manager will be responsible for ensuring that appropriate alternative staff are available.

Standard Operating Procedure Number SOP/W0071-02/004	Page 1of 1
Title: Standard Operating Procedure for Corrective Actions at Marlinstown Landfill Site	Rev 04 (04-02-08 A.M.) Written by: Anne Bonner Approved by:

1.0 Introduction.

It is necessary to ensure that the landfill site and associated activities have minimal impact on the environment and that in the unlikely event of an environmental incident occurring it is essential that appropriate corrective action procedures and notification procedures are implemented.

2.0 Objective

To ensure that in the event of a non-compliance with Waste Licence W0071-02 the appropriate notification and corrective action procedures are implemented.

3.0 Responsibillty.

The Landfill Manager must ensure that the Deputy Manager and Landfill Caretaker carry out the procedure.

4.0 Procedures

4.1 Corrective Action Procedures

4.1.2 In the event of an environmental incident the corrective actions as per Table 4.1 Appendix 1, shall be implemented in accordance with Waste Licence Ref No W0071-02.

5.0 Health and Safety.

All operators at the landfill site must ensure that they wear personnel protective clothing at all times.

6.0 References.

- Environmental Protection Agency, Waste Licence Ref. No. W0071-02.
- Environmental Protection Agency (2002). *European Waste Catalog and Hazardous Waste List.* EPA Publications, Wexford.
- Environmental Protection Agency – *Landfill Manuals – Landfill Operational Practices.* EPA Publications, Wexford.

Table 4.1

Scope	Activities	S.O.P.'s Ref No.	Type of Action	Details
Site Operations	• Leachate and landfill gas management • Complaints • Record maintenance • Surface water management • Incidents • Landfill gas flare • Leachate collection treatment and removal	SOP/W0071-02/007 SOP/W0071-02/008 SOP/W0071-02/009	Minor Environmental Incident	Action shall be implemented by landfill site personnel and records of actions implemented retained at the site. If an environmental incident occurs the Landfill manager shall initiate clean up and implement the notification procedures as per condition 11.2.
Surface	• All emissions to waters as per condition 6.5 of licence No. W0071-02		Environmental Incident	If incident the Landfill manager initiates corrective action clean-up and notification procedures as per licence condition 11.
Groundwater monitoring	• All emissions to waters as per condition 6.4 of licence No. W0071-02	SOP/W0071-02/007	Exceedance of trigger level	If trigger levels determined as per 6.4.2 are exceeded the Landfill Manager initiates corrective actions and the notification procedures as per licence condition 11.
Landfill Gas monitoring	As per condition 6.3	SOP/W0071-02/007 SOP/W0071-02/008	Exceedance of trigger level	If trigger levels are exceeded the Landfill manager initiates corrective actions and the notification procedures as per licence condition 11

4.5 Notifying the Environmental Protection Agency

- All emergencies or incidents recorded at Marlinstown Landfill site shall be reported to the Environmental Protection Agency in the following manner:

- **During Business Hours**

Details regarding the incident shall be faxed and conveyed by telephone as soon as practicable or not later then 10.00 am the following working day to the Environmental Protection Agency Licence inspector responsible for the Marlinstown Waste Licence.

- **Outside Business Hours**

Details regarding the incident shall be faxed as soon as practicable or not later then 10.00 am the following working day to the Environmental Protection Agency Licence Inspector and a telephone message shall be left on the 24 hour answering machine.

5.0 Environmental Incident Emergency Procedures

- Table 6.1 outlines the actions taken in the event of an Environmental Incident

6.0 Personal Injury Emergency Procedure

- Table 6.2 Outlines the procedure in the event of a personal injury emergency

7.0 Health and Safety

All operators at the landfill site must ensure that they wear personnel protective clothing at all times.

8.0 References.

- Environmental Protection Agency, Waste Licence Ref. No. 71-1.
- Environmental Protection Agency (2002). *European Waste Catalog and Hazardous Waste List*. EPA Publications, Wexford.
- Environmental Protection Agency – *Landfill Manuals – Landfill Operational Practices*. EPA Publications, Wexford.

Standard Operating Procedure Number SOP/71-1/006	Page 1of 2
Title: Standard Operating Procedure for Emergency Response.	Rev 01 Written by: Anne Bonner Approved by:

1.0 Introduction.

In accordance with the EPA waste Licence the following Emergency response Procedure is developed to ensure that landfill personnel are able to better deal with emergency situations that may arise at Marlinstown landfill site.

2.0 Objective

To develop a systematic approach for landfill personnel in relation to an emergency situation that may arise at the landfill site or as a result of associated activities relating to Marlinstown Landfill.

3.0 Responsibility.

The Landfill Manager must ensure that the Deputy Manager and Landfill Caretaker carry out the procedure.

4.0 Communication of An Emergency

4.1 Notification During Business Hours

- In the event of an emergency response occurring during opening hours 8.30am-4.30pm Monday to Friday and 8.30am-12.30pm on Saturdays, any emergency situation can be reported directly to the landfill caretakers, either by telephone or Fax or directly to the Site Office.

4.2 Notification During Non Business Hours

- In the event of an emergency occurring during non business hours an answering machine shall be in operation at the landfill. The answering machine shall play back the contact names and telephone numbers necessary to activate the relevant emergency response procedure.Appendix A outlines contact telephone numbers.

4.3 Notification of A Major Emergency

- The type of emergency determines the actions taken. If the emergency is a major emergency Westmeath County Councils major emergency plan is activated. This is located in County Buildings of Westmeath County Council.

4.4 Notification of A Minor Emergency

- If the emergency is considered minor it shall be reported to the Landfill personnel and appropiate actions shall be implemented.

Table 6.1 Emergency Response Procedures

Incident	Type	Actions Taken
Surface Water Contamination	Minor	A minor incident may include litter floating on the surface of the water • The Landfill Caretaker shall organise the removal of same and inform the Landfill Manager.
Surface Water Contamination	Major	During the monitoring of the surface waters surrounding the landfill site if it is noted that there is surface water contamination. • The Landfill Manager shall be notified and inturn shall conduct an investigation to locate source of contamination, assess the extent of the contaminant and take appropriate actions to rectify the situation.
Fire	Minor	A minor incident may include a small fire that is easily extinguished by a fire extinguisher • In the event of a small fire the Landfill Caretaker (trained in fire safety) should use the fire extinguisher located at the site to deal with the fire. • The Landfill caretaker should notify the Landfill Manager who inturn shall contact the Fire Brigade and notify the EPA.
Fire	Major	• A major fire shall involve notifying the Landfill Manager of the incident who inturn shall contact the emergency services, EPA, and local residents in the area.

Table 6.1 Emergency Response Procedures

Incident	Type	Action
Spillage of Polluting Matter e.g. Oil./ Chemical	Minor	In event of minor spill which may include leaks from vehicles or small spills of waste oils. • The caretaker shall immediately absorb the material with the absorbent pads, stored at the site. • The spent pads shall then placed in high strength polyethylene bags and treated as hazardous waste to be disposed by a registered contractor
Spillage of Polluting Matter e.g. Oil./ Chemical.	Major	The landfill operatives shall inform Landfill manager of the incident • The primary function of the landfill manager is to assess the extent of the spill and take appropriate measures to ***contain*** the spill. The initial containment may include identifying the source where appropriate, erecting absorbent booms and or digging an interceptor ditch. • The landfill manager shall also employ a registered clean-up contractor, contact the relevant authorities and the EPA and any members of the public which may be affected by the spill • The function of the registered environmental specialist shall be to clean up the contaminant and conduct the appropriate remedial actions.

Table 6.2 Emergency Response Procedures

Incident	Type	Actions Taken
Personal Injury	Minor	In the event of a minor injury such as minor abrasions or cuts . • The Landfill Caretaker shall note the incident in the Incident Report Register, notify Landfill Manager and organise the appropriate treatment. The cleaning solutions, disinfection, barrier creams and materials for the covering of minor cuts or abrasion are located in the First Aid Box located in the Landfill Office. • All landfill staff should arrange to be inoculated for Tetanus and Hepatitis.
	Major	In the event of a major injury such as eye injury or serious injury • The Landfill Caretaker shall notify the appropriate emergency personnel i.e. a doctor and an ambulance. • The Landfill Manager should also be notified of the incident and must • The Landfill Caretaker shall also note the incident in the Incident Report Register

Annex 1 Incident Notification Form

Licence/COA Number Licence/COA Name	
Licensee/COA Address:	
Incident notification form submitted by:	
Licensees/COA holders Environmental Impact Ranking:	1 ☐ 2 ☐ 3. ☐ 4. ☐ 5. ☐
Details of incident:	
Date of incident:	
Approximate start time of incident(Provide range if time is not known)	
Details of when incident first noticed:	
Still ongoing: Yes/No Finish time and date	
New or reoccurring incident[1]	
Uncontrolled release:	Air ☐ Water ☐ Sewer ☐ Ground ☐ No uncontrolled release ☐
Incident Nature (Explosion, Fire, Spillage, Odour, Breach of ELV, Monitoring Equipment offline, Trigger Level Reached, Uncontrolled Release, Other – specify)	
Details of any vulnerable receptors	
Details of ELV Exceedance if available[2] (Provide measurement units for values provided)	Parameter | | | | | | | Value | | | | | | |
Grab or Composite sample	
Location of incident: Discharge point/Other	

Annex 1

Digital Photographs taken:	Yes/No
Odour[3]	Not applicable ☐ Odour detected ☐
Odours detected	
Extent[4]	Intermittent ☐ Persistent ☐
Sensitivity[5]	Remote ☐ Low ☐ Moderate ☐ High ☐ Extra ☐
Intensity[6]	Faint ☐ Moderate ☐ Strong ☐ Very strong ☐
Weather at time of incident:	
Wind Direction:	
Details of who was notified:	EPA by telephone ☐ Local Authority ☐ Fisheries ☐ Other
Corrective actions taken:	
Preventative actions taken or planned:	
Likelihood of reoccurrence	
Details of any other relevant detail or supporting information for submission to the Agency	
This section should be completed by the licensee/COA holder for their records once the corrective and preventative actions are complete[7]	
Follow up actions	
Close out date	
Signed	
Position	

1.0 Introduction.

Environmental monitoring at the Landfill site is essential for ensuring that the landfill site complies with the conditions outlined in Waste Licence W0071-02 and also to establish the possible impacts that the landfill site activities may have on the environment

2.0 Objective

To establish an effective monitoring program that complies with Waste Licence W0071-02
To ensure that in the event of a non-compliance with Waste Licence W0071-02 the appropriate notification and corrective action procedures are implemented.

3.0 Responsibility.

The Landfill Manager must ensure that the Deputy Manager and Landfill Caretaker carry out the procedure.

4.0 Procedures

4.1 Notification of Non – Compliance:

4.1.1 Environmental Consultant

- If a non-compliance of licence limits is noted they shall notify Landfill Manager within a day of the laboratory analysis being completed.
- The Landfill Manager shall initiate the appropriate corrective actions as per the following:
    - SOP/W0071-02/006 Emergency Response Procedure

4.1.2 Westmeath County Council Staff

- The landfill Caretaker and Deputy Manager shall notify Landfill manager of any non - compliance with licence during the course of their site inspections.
- The Landfill Manager shall then initiate the appropriate corrective actions as per the following:
    - SOP/W0071-02/006 Emergency Response Procedure

4.2 Monitoring of Surface Waters and Landfill Gas

4.2.1 Environmental Consultant

- The monitoring schedule for Surface Water, Groundwater, Leachate, Noise, Dust and Landfill Gas is attached in Appendix 1 (Table 7.1) this outlines which monitoring is carried out by the consultants. Detailed maps outlining the monitoring locations are attached in Appendix 3.
- Notification of a non-compliance is as per 4.1of SOP/W0071-02/007
- Reports are sent to the Agency in accordance with Schedule D of the Waste Licence W0071-02

4.2.2 Westmeath County Council Surface Water, Landfill Gas and Gas Flare Monitoring

- The Landfill caretaker or deputy Manager conduct monitoring as outlined in Table 7.1and SOP/W0071-02/008 at the locations identified on maps see Appendix 3. The Gas Monitoring Report Document daily and monthly as per SOP/W0071-02/008, Leachate Monitoring and Surface water Monitoring and Gas Flare Report Sheet are completed see Appendix 2. Detailed maps outlining the monitoring locations are attached in Appendix 3.
- In the event of an non-compliance they shall notify the Landfill Manager who shall initiate the appropriate actions as per the following

  - SOP/71-2/006 Emergency Response Procedures
- Reports are sent to the Agency in accordance with Schedule E of the Waste Licence W0071-02

5.0 Health and Safety.

All operators at the landfill site must ensure that they wear personnel protective clothing at all times.

6.0 References.

- Environmental Protection Agency, Waste Licence Ref. No. W0071-02.
- Environmental Protection Agency (2002). *European Waste Catalog and Hazardous Waste List.* EPA Publications, Wexford.
- Environmental Protection Agency – *Landfill Manuals – Landfill Operational Practices.* EPA Publications, Wexford.

1.0 General

The portable gas monitoring equipment is used to monitor the levels of gases to ensure compliance with Waste Licence W0071-02
The portable gas monitoring equipment records the following parameters:

- methane (CH_4);
- carbon dioxide (CO_2);
- oxygen (O_2);
- lower explosive limit (LEL);
- temperature and
- pressure.

2.0 Objectives

To ensure compliance with Waste Licence W0071-02.
To ensure that in the event of a non-compliance with Waste Licence W0071-02 the appropiate notification and corrective action procedures are implemented.

3.0 Responsibility.

The Landfill Manager must ensure that the Deputy Manager conducts the procedure.

4.0 Equipment

- Portable Sampling Equipment
- Record Sheets
- Protective clothing

5.0 Sampling Frequency

The sampling frequency is as per Table7.1 of SOP/W0071-02/007

6.0 Landfill Gas Measurement

- On arrival at the first location, open the well cover using the key provided.
- Switch on the instrument and wait until the screen prompts for sampling allowing the instrument to settle at atmospheric conditions in the manual for sampling.
- Connect the instrument to the gas port on the well and open the gas tap. Ensure that the tubing is fully sealed on the gas well and properly connected to the instrument. Select either data logging mode or manual and follow instructions in the manual for sampling.
- Note each of the readings for CH_4, CO_2, O_2, LEL and pressure on the field record form or data logger. The maximum CH_4 and CO_2 readings should be recorded. The minimum O_2 reading should be recorded. Also, allow the readings to settle and note the final readings after they have stabilised.
- Switch off the instrument and close gas tap. Remove from the piezometer and lock the cover.
- Move to the next position and repeat.

6.0 Records

The gas monitoring results are recorded in the Gas monitoring record sheets as per Appendix1 of SOP/W0071-02/008

7.0 Notification of Non-compliance

- In the event of a non-compliance the notification procedure as outlined in SOP/W0071-02/007 Section 4.1 and if an emergency SOP/W0071-02/006 shall be implemented.

8.0 Health and Safety.

All operators at the landfill site must ensure that they wear personnel protective clothing at all times.

9.0 References

- Environmental Protection Agency, Waste Licence Ref. No. W0071-02.
- Environmental Protection Agency (2002). *European Waste Catalog and Hazardous Waste List.* EPA Publications, Wexford.
- Environmental Protection Agency – *Landfill Manuals – Landfill Operational Practices.* EPA Publications, Wexford.

Standard Operating Procedure Number: SOP/W0071-02/009	Page: 1of 1
Title: Standard Operating Procedure for the collection, treatment and removal of Leachate at Marlinstown Landfill	Rev: 02 Date: 12-Feb-08 AM Written by : CMcDonough Approved by: PJ Carey

1.0 Introduction.

This procedure outlines the correct procedure to ensure that the leachate is collected, treated and removed off-site in the correct manner.

2.0 Objective.

To ensure that the leachate is handled correctly and no environmental incidents occur.

3.0 Responsibility.

The Landfill Manager must ensure that the Deputy Manager and Landfill Caretaker carries out this procedure.

4.0 Guidelines.

- Leachate is pumped automatically to the Lagoon by the combined leachate/gas extraction system installed.
- The aerator will run continuously to facilitate methane stripping until the leachate level in the lagoon drops below the float switch level 400mm from the base.
- Leachate will be drained from the lagoon with a drainage pipe into a collection tanker.
- The waste must be taken to Mullingar Waste Water Treatment Plant for treatment.
- Records for each load of leachate will be kept at the head office and a copy at the Landfill site.
- Ensure that the contractor employed to empty the leachate lagoon has a valid Waste Collection Permit.
- In the event of a spillage please refer to Standard Operating Procedure for Emergency Response SOP/W0071-02/006

5.0 Health and Safety.

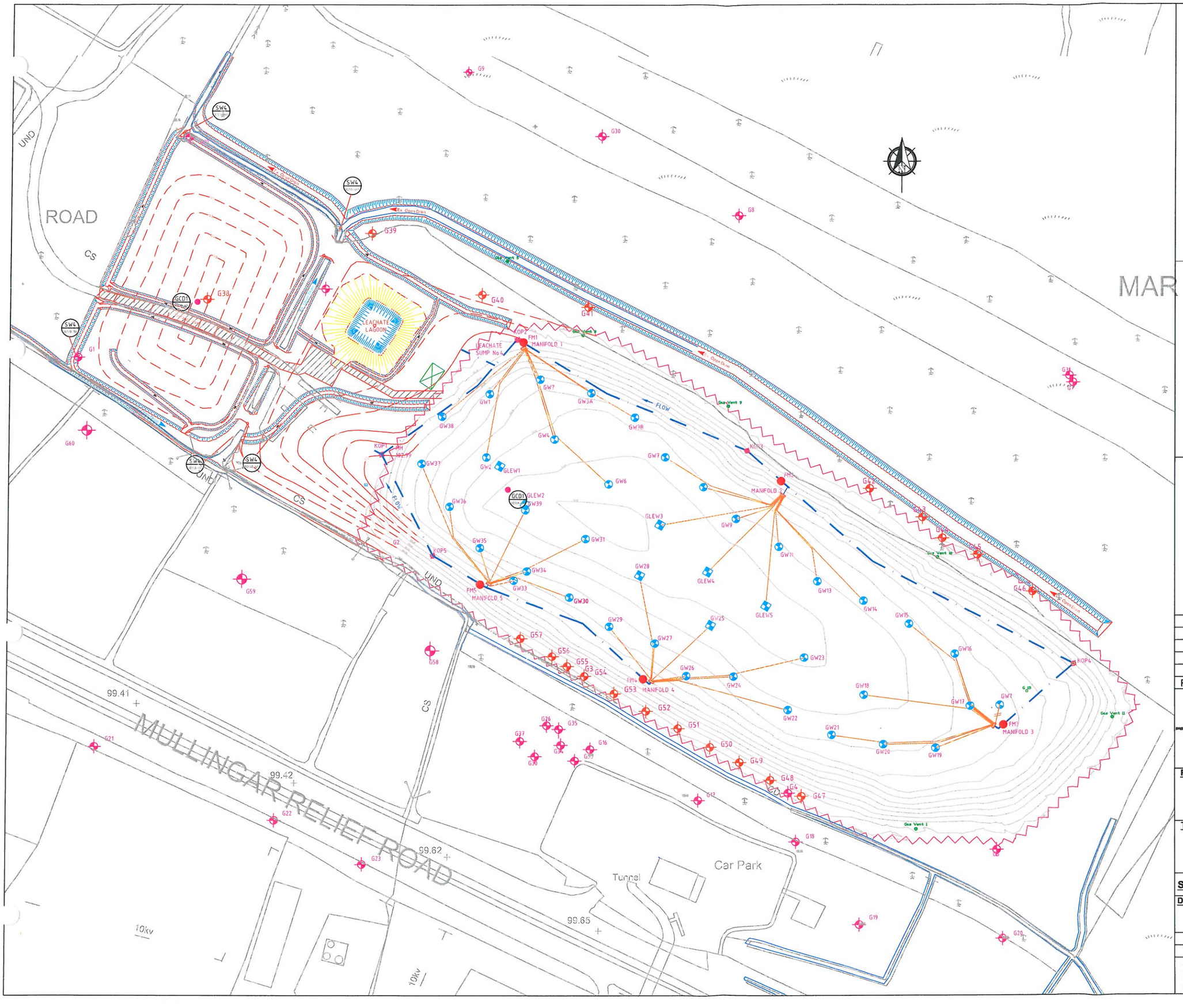
All personnel working at the landfill site must ensure that they wear the correct personal protective clothing at all times.

6.0 References.

- Environmental Protection Agency, Waste Licence Ref. No. W0071-02.
- Standard Operating Procedure Number SOP/W0071-02/006

APPENDIX 8

Topographical Site Survey



LEGEND

- Landfill Gas Trunk Main (180mm ϕ MDPE Pipe)
- Landfill Gas Collection Main (90mm ϕ MDPE Pipe)
- Condensate Knock-Out Pot (KOP)
- Manifold
- Internal Gas Extraction Wells
- Perimeter Gas Extraction Wells
- Well Not Connected to Manifold
- Flow Port at Manifold
- GW? Buried wellhead, number unassigned

Legend

- Gas Well Type 1 (not used)
- Gas Well Type 2
- Combined Gas/Leachate Well
- 90mm ϕ HDPE PE100 SDR 17 Lateral Pipe To Manifold
- 160mm ϕ HDPE PE100 SDR 17 main gas collection line to flare
- Condenaste Discharge line from Knockout Pot
- Manifold
- Gas Vent Stack (with carbon Filter)

Legend

- Combined Gas/Leachate Well
- 90mm ϕ HDPE PE100 SDR 17 Lateral Pipe to Collection system; connections to be made using proprietary saddle connections.
- 110 mm ϕ HDPE PE100 SDR 17 pumped leachate main to lagoon
- Gas Vent Stack (without carbon filter)

REV.	DESCRIPTION.	DATE.	BY.

WESTMEATH COUNTY COUNCIL

PROJECT:
Gas Extraction and Monitoring Well Infrastructure

TITLE:
Marlinstown Landfill Site

Scale:	Datum:	
1/5000	MALIN	4-3-2011

Drawing No.	Stage	Revision
192-11-MTL-01		

Surveyed	Drawn	Checked	Approved
	gc	M M	M R

DESIGN OFFICE,
COUNTY BUILDINGS,
MULLINGAR,
Phone 044 93320% Web: www.westmeathcoco.ie

FILE NAME AND DIRECTORY
Gas Monitoring & Extraction 2011.dwg
F:\PROJECTS\ENVIRONMENT\Landfills\Marlinstown\Dr

N

Car Park

Tunnel

REV.	DESCRIPTION.	DATE.	BY.

WESTMEATH COUNTY COUNCIL

PROJECT:

Marlinstown Landfill
Mullingar, Co. Westmeath

TITLE:

Topo Survey 2010 for AER

Scale:	Datum:	Date:
1/1250	ITM	12/10/10

Drawing No.	Stage	Revision
144_10_03		

Surveyed	Drawn	Checked	Approved
CH & LN	CH	JW	JW

DESIGN OFFICE,
COUNTY BUILDINGS,
MULLINGAR,
Phone 044 9[illegible] Web: www.westmeathcoco.ie

FILE NAME AND DIRECTORY
levels 2010.dwg
P:\ENVIRONMENT\LANDFILL\marlinstown

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.11

REFERENCE YEAR	2010

1. FACILITY IDENTIFICATION

Parent Company Name	Westmeath County Council
Facility Name	Marlinstown Landfill
PRTR Identification Number	W0071
Licence Number	W0071-02

Waste or IPPC Classes of Activity

No.	class_name
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
3.13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.
3.4	Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
3.6	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 Schedule.
3.7	##
4.11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.
4.9	Use of any waste principally as a fuel or other means to generate energy.

Address 1	Marlinstown Bog
Address 2	Mullingar
Address 3	Co Westmeath
Address 4	
Country	Ireland
Coordinates of Location	-7.29169 53.5229
River Basin District	IEEA
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	John Waldron
AER Returns Contact Email Address	jwaldron@westmeathcoco.ie
AER Returns Contact Position	Senior Ex. Technician - Environment Section
AER Returns Contact Telephone Number	044 9332157
AER Returns Contact Mobile Phone Number	087 7853567
AER Returns Contact Fax Number	044 9342330
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
5(a)	Installations for the recovery or disposal of hazardous waste
5(c)	Installations for the disposal of non-hazardous waste
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 Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
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	PER	Calculated using Gas Sim	0.0	38000.0	0.0	38000.0
03	**Carbon dioxide (CO2)**	C	PER	Calculated using Gas Sim	0.0	144000.0	0.0	144000.0
					0.0	0.0	0.0	0.0

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

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
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					Please enter all quantities in this section in KGs			
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: Marlinstown Landfill

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)	254000.0	C	PER	Calculated using GasSim	N/A	
Methane flared	216000.0	E	Estimate	ow/hr by Ch4 conc by Sp. Gra	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)	38000.0	C	Oth	Methane generated minus m	N/A	

Please enter all quantities on this sheet in Tonnes

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	19 07 03	No	3736.0	landfill leachate other than those mentioned in 19 07 02	D8	M	Volume Calculation	Onsite in Ireland	Mullingar Wastewater Treatment Plant,D 0008-01	Clonmore,Mullingar ,Co. Westmeath,.,Ireland		

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

Link to previous years waste data
Link to previous years waste summary data & percentage change