# DUNSINK LANDFILL
# ANNUAL ENVIRONMENTAL REPORT 2011

**REPORTING PERIOD: JANUARY TO DECEMBER 2011**

***WASTE LICENCE REGISTER NO. W0127-01***

**FINGAL COUNTY COUNCIL**
**COUNTY HALL**
**MAIN STREET**
**SWORDS**
**COUNTY DUBLIN**

Comhairle Contae Fhine Gall
Fingal County Council

**TABLE OF CONTENTS**

**TABLE OF CONTENTS**



## TABLES



## FIGURES

**TABLE OF CONTENTS**



APPENDICES

## 1.0 INTRODUCTION

The Environmental Protection Agency (EPA) granted a waste licence (register no. 127-1) to Fingal Council in respect of the above facility on 9th January 2004. From July 2006 the register number was changed to W0127-01. This licence is for the closure and restoration of areas previously landfilled. Under its terms, the Council is required to restore and remediate the facility, to install infrastructure to monitor and manage landfill gas and leachate emissions, and to cap previously filled areas using inert materials. These works are to be completed within three years of the date of grant of the licence. In accordance with the requirements of condition 11.6 of the Waste Licence, an Annual Environmental Report (AER) for the facility must be submitted to the Environmental Protection Agency.

## 1.1 REPORTING PERIOD

The reporting period for the AER is 1st January to 31st December 2011. This is the eighth AER for the facility as required by the waste licence.

## 1.2 FACILITY LOCATION

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

Dunsink Landfill,
Dunsink Lane,
Finglas,
County Dublin.

Access to the landfill is now from the Forest Road end of Dunsink Lane only, Irish National Grid 238886 (Northings) 311766 (Eastings). Figure 1 presents a map of the facility and the surrounding locations.

## 1.3 ENVIRONMENTAL POLICY FOR DUNSINK LANDFILL

- Comply with the terms of waste licence 127-1 and all other relevant legislation and codes of practice.
- Strive for continuous improvement in the running of the facility; in order to minimise the effects of the landfill on the environment.
- Create better awareness and training for all staff involved in the running of the landfill.

Develop a good relationship with local residents around Dunsink for the betterment of the surrounding area.


FIGURE 1: DUNSINK LANDFILL SITE LOCATION AND SITE ACCESS

**Figure 1: Dunsink Landfill Site Location**

## 2.0 SITE DESCRIPTION

Dunsink Landfill is situated in Finglas, County Dublin (National Grid Reference 239500E, 310500N). It is bounded by Dunsink Lane to the south, Rathoath Road to the east, the M50 motorway to the Northwest and Cappagh Hospital to the North. It is approximately 61ha. The most elevated point of the site (as measured in 2010) lies at 100m on the western side of the site. The base of the landfill varies topographically but is estimated to average from 65-70m.

The landfill opened in 1976. Approximately 4,400,000 tonnes of waste is estimated to have been deposited at the facility to June 1996. The landfill subsequently phased to closure, culminating in the closure of the civic amenity in 2003. A landfill gas utilisation plant was installed on site in 1996.

An original application for a waste licence was submitted to the Environmental Protection Agency in September 1999. An amendment to the original application was sought in February 2003. A Proposed Decision was issued in August 2003. Waste Licence 127-1 was issued in January 2004.

## 2.1 LICENCED WASTE ACTIVITIES AT THE FACILITY

On January 9th 2004 Fingal County Council was licensed to carry out the following waste activities at Dunsink Landfill, Finglas, County Dublin subject to twelve conditions.

Licensed Waste Disposal Activities, in accordance with the Third Schedule of the Waste Management Act 1996.

Class 4 Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons:

This activity is limited to:

- The provision and use of a leachate lagoon to temporarily store leachate generated in the landfill, prior to discharge to the public foul sewer; and
- The provision and use of a surface water attenuation pond to control the quality and quantity of the surface water run off from the site.

Licensed Waste Recovery Activities, in accordance with the Fourth Schedule of the Waste Management Act 1996.

Class 2 Recycling or reclamation of organic substances, which are not used as solvents (including composting and other biological transformation processes):
This activity is limited to the composting of green waste, the recycling / reclamation of cardboard, paper and waste oil at the facility.

Class 3 Recycling or reclamation of metals and metal compounds:
This activity is limited to the recycling of ferrous / non-ferrous metals and white goods.

Class 4 Recycling or reclamation of other inorganic materials:
This activity is limited to the recycling or reclamation of subsoil and topsoil (for the restoration of the site) and dry recyclables at the bring centre.

Class 9 Use of any waste principally as a fuel or other means to generate energy:
This activity is limited to the utilisation of landfill gas for the generation of electricity.

Class 11 The use of waste obtained from any activity referred to in a preceding paragraph of this Schedule:
This activity is limited to the use of suitable subsoil and topsoil and composted material for the restoration programme.

Class 13 Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced:
This activity is limited to the storage of recyclable waste prior to recovery off site and the storage of soil on site for the restoration programme.

# 3.0 EMISSIONS AND INTERPRETATION OF MONITORING RESULTS

## 3.1 GROUNDWATER

There are eight groundwater stations (BH3, BH4, BH16, BH18, BH28, BH-29, BH31 and BH32) listed in Schedule D.1 of the waste licence. BH28 listed in Table D.1.1 of the licence was not installed however; BH27 was added to the monitoring infrastructure under agreement with the *Environmental Protection Agency*. Borehole monitoring recorded leachate characteristics from BH29 suggesting that it was a potential migration pathway to groundwater for leachate. It was therefore decommissioned on 14th March 2005, upon agreement with *The Agency*. Two additional groundwater stations (BH33 and BH34) were added to the sampling programme upon agreement with *The Agency*, these were installed on Dunsink Observatory land between the 14th and 16th March 2005. BH18 was destroyed during slope stability work in August 2006 and was replaced as BH18_R on 7th September 2006. BH18_R was decommissioned during the Q1 of 2011 and replaced with BH35 during the same quarter. The grid references for these are shown in Table 1. The sample locations are illustrated in Figure 2.

Condition 6.4.1 requires the licensee to submit to the EPA for its agreement, groundwater monitoring trigger levels in accordance with the requirements of Directive 1999/31/EC for one upgradient and two downgradient monitoring Boreholes. This analysis was conducted and trigger levels were proposed to the EPA in February 2005 (Reference: FCC-127-1-2005-006), Appendix I. These were reviewed at the end of 2006, along with an analysis of control and trigger levels for BH33 & BH34.

**Table 1: Groundwater Monitoring Locations**

| Groundwater Borehole Monitoring Location | Eastings | Northings | Classification |
|---|---|---|---|
| BH3 | 310665 | 239505 | Deep Groundwater |
| BH4 | 310650 | 239490 | Shallow Groundwater |
| BH16 | 311340 | 239085 | Deep Groundwater |
| BH18_R | Decommissioned | | |
| BH27 | 310030 | 238720 | Deep Groundwater |
| BH28 | Not Installed | | |
| BH29 | Decommissioned | | |
| BH31 | 311765 | 238820 | Shallow Groundwater |
| BH32 | 311770 | 238800 | Deep Groundwater |
| BH33 | 310735 | 238724 | Deep Groundwater |
| BH34 | 310719 | 238725 | Shallow Groundwater |
| BH35 | 311158 | 239456 | Deep Groundwater |

Detailed analysis reports are contained in Appendix I. The results obtained have been compared to the Interim Guideline Values of EPA document "Towards Setting Guideline Values for the Protection of Groundwater Ireland", 2003 and proposed trigger levels. The following analysis was completed in 2011 (Table 2).

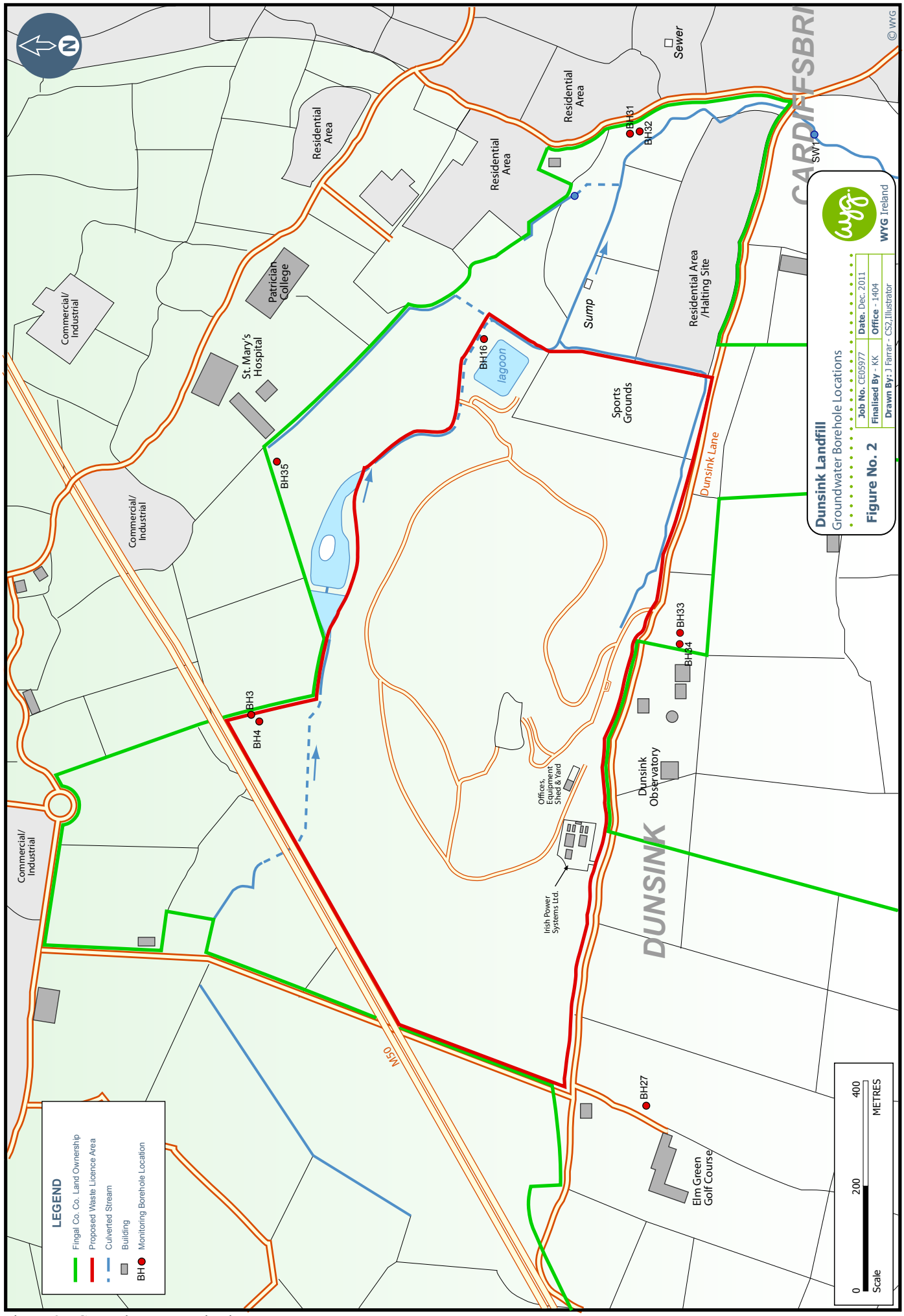



Figure 2 - Groundwater Monitoring Map

**Table 2: Groundwater Sampling Programme 2011**

| Groundwater Borehole Monitoring Location | Q1 Jan-March | Q2 April- June | Q3 July-September | Q4 October - December |
|---|---|---|---|---|
| BH3 | Sampled | Sampled | Sampled | Sampled |
| BH4 | Sampled | Sampled | Sampled | Sampled |
| BH16 | Sampled | Sampled | Sampled | Sampled |
| BH18_R | Decommissioned | | | |
| BH27 | Sampled | Sampled | Sampled | Sampled |
| BH28 | Not Installed | | | |
| BH29 | Decommissioned 14th March 2005 | | | |
| BH31 | Sampled | Sampled | Sampled | Sampled |
| BH32 | Sampled | Sampled | Sampled | Sampled |
| BH33 | Sampled | Sampled | Sampled | Sampled |
| BH34 | Sampled | Sampled | Sampled | Sampled |
| BH35 | Sampled | Sampled | Sampled | Sampled |

### 3.1.1 Methodology

Refer to Schedule D.5 of WL 127-1.

### 3.1.2 Groundwater Monitoring Quality - Findings (See Appendix I)

***Q1 January - March 2011 – Sampling dated 15th March 2011***

Results from groundwater sampling during the 1st quarter of 2011 indicated good groundwater quality at BH3, BH4, BH16, BH27, BH31, BH32, BH33 & BH34.

An elevated level of ammoniacal nitrogen (0.433mg/l) was recorded at BH35 in excess of the threshold value. Control and trigger levels have not yet been established for BH35.

Results at all remaining boreholes were below their respective control and trigger levels during this quarter.

***Q2 April - June 2011- Sampling dated 11th May 2011***

Results from groundwater sampling during the 2nd quarter of 2011 indicated generally good groundwater quality. Slightly elevated levels of pH were recorded at BH3 and BH4 above their respective control values but within the threshold values. Slightly elevated levels of conductivity were recorded at BH3 and BH4 in excess of their respective control and trigger values but less than the threshold value. Elevated levels of ammoniacal nitrogen were recorded at BH33 in excess of the control value and IGV. Elevated ammoniacal nitrogen was also recorded in BH35 above the IGV.

Results at all remaining boreholes were below their respective control and trigger levels during this quarter.

***Q3 July – September 2011- Sampling dated 14th September 2011***

Results from the annual round of groundwater sampling during September 2011, indicated moderate quality groundwater beneath the landfill site and environs.

Elevated levels of pH were recorded in BH3, BH16 and BH27 above their respective control values and an elevated level was recorded in BH32 above the control and trigger values.

Elevated levels of conductivity were recorded in BH3 and BH4 above their respective control and trigger values but less than the Groundwater Regulations threshold value.

Elevated levels of chloride were recorded at BH3 and BH4 in excess of control, trigger levels and threshold values. An elevated level of sodium was also recorded at BH4 above the control and trigger values but less than the threshold value.

Elevated levels of total organic carbon, ammoniacal nitrogen, manganese at BH32 were recorded in excess of the control, trigger and threshold values and elevated iron was recorded in excess of the control and trigger value.

Elevated ammoniacal nitrogen and manganese was recorded at BH31 above the threshold values but less than the control and trigger values.

Elevated levels of manganese were recorded at BH16, BH27 and BH34 in excess of threshold, control and trigger values and in excess of the threshold value in BH35. The level of fluoride in BH35 was also elevated above the threshold value.

***List I/List II Analysis of Groundwaters***

In accordance with the requirements of Waste Licence W0127-01, a number of monitoring boreholes were also analysed for concentrations of List I/List II dangerous substances e.g. volatile and semi volatile organic compounds. Samples for organic analysis were collected from BH3, BH4, BH31, BH32, BH33 and BH34.

All VOCs and SVOCs were recorded below their respective laboratory detection limits during the annual sampling round of 2011.

***Q4 October - December 2011- Sampling dated 23rd November 2011***

Results from groundwater sampling during the 4th quarter of 2011 indicated good groundwater quality. Elevated levels of total organic carbon were recorded in BH4, BH27 and BH34 above their respective control and trigger values.

Results at all remaining boreholes were below their respective control and trigger levels during this quarter.

***Groundwater Levels***

Groundwater levels were recorded from each borehole during each quarter and the results are displayed in Table 3.

**Table 3: Groundwater boreholes water levels in metres below ground level (mbgl)**

| Groundwater Borehole Monitoring Location | Q1 2011 (mbgl) | Q2 2011 (mbgl) | Q3 2011 (mbgl) | Q4 2011 (mbgl) |
|---|---|---|---|---|
| BH3 | 3.55 | 3.25 | 14.5 | 4.15 |
| BH4 Shallow | 3.37 | 3.62 | 3.78 | 3.3 |
| BH16 | 0.37 | 0.75 | 0.7 | - |
| BH27 | 1.12 | 3.42 | 3.42 | 2.14 |
| BH31 Shallow | 3.7 | 3.85 | 4.12 | 3.92 |
| BH32 | 0.92 | 1.20 | 1.07 | 0.66 |
| BH33 | 3.43 | 4.55 | 5.24 | 3.95 |
| BH34 Shallow | 1.48 | 2.32 | 2.98 | 1.05 |
| BH35 | 1.45 | 1.95 | 2.31 | 2.01 |

***Groundwater – Discussion***

A hydrogeological Assessment of the facility was forwarded to the Agency in November 2004 (FCC-127-1-2004-065). It determined an up gradient / down gradient trending of groundwater from West-North-West to East-South-East beneath the landfill and surrounds. This pattern is generally consistent with the regional drainage pattern.

Results from groundwater sampling during 2011 indicated generally good quality groundwater beneath the landfill site and environs though some boreholes recorded elevated levels of ammoniacal nitrogen, total organic carbon, chloride, conductivity, manganese and pH during the year.

***Bedrock Groundwater Quality***

Results during 2011 indicated generally good groundwater quality in bedrock monitoring wells with occasionally elevated parameters to the north, south and east of the site, mainly ammoniacal nitrogen, pH and manganese.

North of the site elevated levels of ammoniacal nitrogen were recorded at BH35 during Q1 and Q2 2011, and elevated fluoride and manganese were recorded in Q3 2011.

Conductivity and pH was also elevated in Q2 and Q3 at BH3 along with elevated chloride in Q3 2011. The south west of the site had elevated TOC recorded in BH27 in Q4 and elevated pH and manganese in Q3. BH33 to the south of the site had elevated ammoniacal nitrogen in Q2 2011. Elevated pH and manganese were recorded in BH16 in Q3. To the east of the site, BH32 recorded elevated pH during Q2 and Q3 along with elevated ammoniacal nitrogen, TOC and manganese during Q3.

***Overburden Groundwater Quality***

Shallow groundwater at BH4 of the site was of moderate quality during 2011 with elevated levels of conductivity and pH recorded in Q2, conductivity, chloride and sodium during Q3 and elevated TOC during Q4.

Groundwater quality east and south of the facility at BH34 was generally good with elevated manganese recorded in Q3 and elevated TOC recorded in Q4 2011.

Elevated ammoniacal nitrogen was recorded in Q3 at BH31, elevated manganese was recorded in Q3 at the same location.

Using ammoniacal nitrogen as a guide to trends in groundwater quality, a pattern of improved groundwater quality is discernable from 2005 onwards.

***Conclusion & Annual Assessment***

The annual assessment of groundwater quality suggests there has been a continued improvement in groundwater quality at Dunsink Landfill in 2011. The landfill however, still appears to be having a slight impact on deep groundwater quality close to the waste body itself as evidenced by results at BH35.

## 3.2 SURFACE WATER

Schedule D.1 of the waste licence requires the monitoring of surface water at six locations (SW1, SW2, SW4, SW7, SW9 & SW10). Biological sampling was required at three locations (KS1, KS2, KS3); samples were collected at an additional three locations in 2011 (KS3a, KS4 and KS6) (See Table 4 and Figure 3).

SW11 was incorporated as an additional sampling location under instruction from *The Agency* following Q1 Monitoring Report 2004. A Biological Sampling Assessment was undertaken on 29th September 2011.

Surface water sampling points were established at the discharge from the wheelwash to the open channel WWSW1 and from the open channel to the Scribblestown Stream WWSW2.

SW1 is located downstream of the facility and sampling at this point monitors the effect of the facility on water quality. SW1 is located some distance downstream of the facility and a breakers yard lies adjacent to the stream and illegal waste tipping occurs between the facility and SW1. A case was put to *The Agency* to move SW1 further upstream to avoid these potential sources of surface water contamination and provide a truer picture of the effect of the facility on surface water quality. During the annual audit of the licence *The Agency* agreed and from 15th August 2005 a new downstream monitoring point, SW17, was used instead of SW1.

SW4 was replaced on 27/2/2006 by SW18 as the upstream sampling point as agreed with *The Agency* (127-1/AK11EM).

In 2010 two additional sampling points were added for the biological monitoring sampling, KS3a and KS6 and in 2011 an additional sampling point, KS4, was included, all of which are presented in Tables 4 & 5 and Figure 3.

**Table 4: Surface Water Monitoring Locations**

| Surface Water Monitoring Location | Eastings | Northings |
|---|---|---|
| SW1 | 311800 | 238460 |
| SW2 | 311380 | 238980 |
| SW4 | 310480 | 239365 |
| SW7 | 311120 | 239220 |
| SW9 | 310885 | 238795 |
| SW10 | 311350 | 239100 |
| SW11* | 311360 | 238915 |
| SW12** | 310424 | 239410 |
| SW13** | 310829 | 239356 |
| SW14** | 311173 | 239277 |
| SW15** | 311417 | 239069 |
| SW16** | 311410 | 238926 |
| SW17*** | 311687 | 238826 |
| SW18**** | 310464 | 239394 |
| KS1***** | 310781 | 239373 |
| KS2***** | 311145 | 239242 |
| KS3***** | 311739 | 238812 |
| KS3a***** | 311600 | 238840 |
| KS4***** | 311415 | 239052 |
| KS6***** | 311590 | 238994 |

| | | |
|---|---|---|
| WWSW1****** | 311616 | 238921 |
| WWSW2****** | 311644 | 238835 |

* Additional sampling location for monitoring programme.
** Enhanced monitoring programme undertaken 30th July 2004.
*** New downstream sampling point agreed during EPA audit August 2005.
**** New upstream sampling point agreed with *The Agency*.
***** Biological Sampling Programme.
****** Sampling points at discharge from wheelwash to open channel and from open channel to Scribblestown Stream. Only sampled when clay is imported onto the Landfill.

See Table 5 for analysis completed in 2011.

### 3.2.1 Methodology

Refer to Schedule D.5 of waste licence 127-1

### 3.2.2 Surface Water Monitoring Quality - Findings (See Appendix II)

Surface water quality was monitored in the drainage network within the landfill and its immediate environs throughout 2011. All the surface water sampling locations stipulated in the waste licence were sampled throughout 2011 (Table 5). The results of the biological sampling programme are discussed later in the report.

The water quality results have been compared to SI 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988 (Appendix II).

**Table 5: Surface Water Monitoring Programme 2011**

| Surface Water Monitoring Location | Q1 | Q2 | Q3 | Q4 | Weekly Visual | Monthly | Annual | Once-Off |
|---|---|---|---|---|---|---|---|---|
| SW2 | Y | Y | Y | Y | Y | N | Y | N |
| SW4 | N | N | N | N | N | N | N | N |
| SW7 | Y | Y | Y | Y | Y | N | Y | N |
| SW9 | Y | Y | N | N | Y | N | N | N |
| SW10 | Y | Y | Y | Y | Y | N | Y | N |
| SW11* | Y | Y | Y | Y | Y | N | Y | N |
| SW12** | N | N | N | N | N | N | N | N |
| SW13** | N | N | N | N | N | N | N | N |
| SW14** | N | N | N | N | N | N | N | N |
| SW15** | N | N | N | N | N | N | N | N |
| SW16** | N | N | N | N | N | N | N | N |
| SW17**** | Y | Y | Y | Y | Y | N | Y | N |
| SW18**** | Y | Y | Y | Y | Y | N | Y | N |
| SW19 | N | Y | N | N | Y | N | N | N |
| WWSW1****** | N | N | N | N | Y | N | N | N |
| WWSW2****** | N | Y | N | Y | Y | N | N | N |
| KS1***** | N | N | Y | N | N | N | N | N |
| KS2***** | N | N | Y | N | N | N | N | N |
| KS3***** | N | N | Y | N | N | N | N | N |
| KS3a***** | N | N | Y | N | N | N | N | N |
| KS4***** | N | N | Y | N | N | N | N | N |
| KS6***** | N | N | Y | N | N | N | N | N |

* Additional sampling location for monitoring programme.
** Enhanced monitoring programme undertaken 30th July 2004.
*** New downstream sampling point agreed during EPA audit August 2005.
**** New upstream sampling point agreed with The Agency.
***** Biological Sampling Programme.
****** Sampling points at discharge from wheelwash to open channel and from open channel to Scribblestown Stream when wheelwash becomes operational. Sampling at the two wheelwash locations ceased in November 2007 and will continue only on a needs be basis.

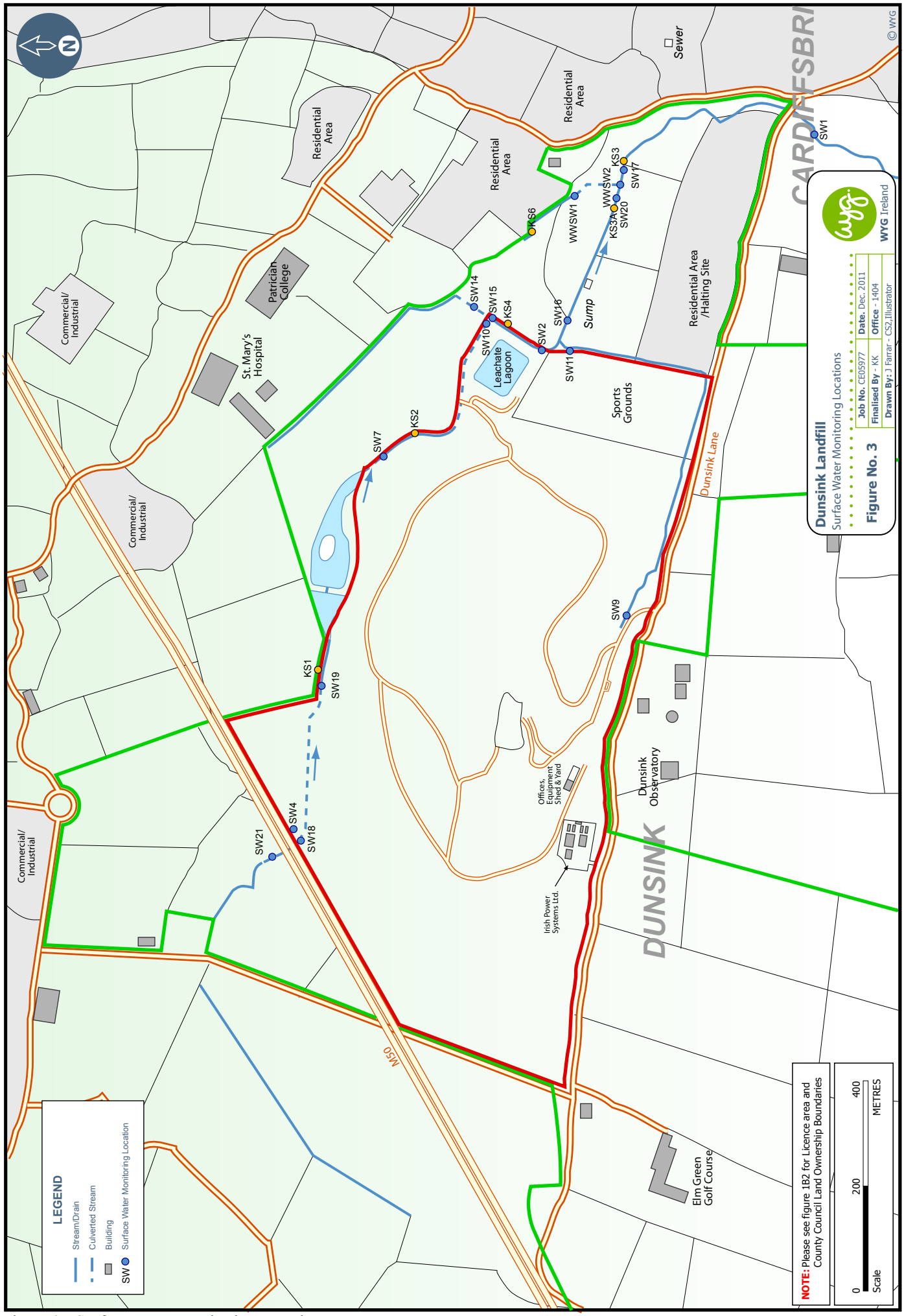



Figure 3 - Surface Water Monitoring Locations

The Environmental Protection Agency's document "Parameters of Water Quality – Interpretation and Standards" details concentrations of total ammonia NH4 in fresh water which contain an unionised ammonia concentration of 0.02mg/l at their given pH and temperature. Unionised ammonia is the component of total ammonia which at "the value of 0.02 mg/l is a long term toxic effect level for fish both salmonid and cyprinid. Lethal levels are about ten times greater".

Using this data, concentrations of ammoniacal nitrogen determined during sampling in 2011 indicated that the concentrations of unionized ammonia at the majority of surface water locations, as required by the licence, would have been below 0.02mg/l throughout the year. The following exceptions were recorded; In Q2, ammoniacal nitrogen concentrations sampled at SW11, SW17 and SW18 exceeded 0.02mg/l. In Q3 and Q4 all of the licence monitoring locations would have been below 0.02mg/l with the exception of SW18.

***Q1 January - March 2011 – Sampling dated 15th March 2011***

Surface water results indicated generally moderate water quality at most locations during Q1 2011 with elevated conductivity recorded in SW2, SW7, SW10, SW11, SW17 and SW18 above the surface water EQS (1,000µS/cm). BOD was elevated above the EQS of 1.5mg/l in each of the seven surface water locations with values ranging from 1.55mg/l to 3.49mg/l. Total suspended solids was elevated above the Salmonid Regulations in SW2 at a concentration of 146mg/l. Dissolved oxygen was outside of the EQS limit in SW10, SW17 and SW18.

***Q2 April - June 2011 Sampling dated 11th May 2011***

Surface water results indicated generally moderate to good water quality at most locations during Q2 2011. Ammoniacal Nitrogen was elevated in SW11 (6.95mg/l), SW17 (7.58mg/l) and SW18 (6.05mg/l). Elevated conductivity was recorded in SW11 on 11th May (1.087mS/cm) and 31st May 2011 (1.057mS/cm). An elevated conductivity was also recorded in WWSW2 (1.09mS/cm). An elevated BOD at SW11 (7mg/l) was recorded. Elevated levels of total suspended solids were recorded at SW2 (32 mg/l), SW7 (43mg/l) and SW9 (310mg/l). Subsequent samples were retrieved from SW18 on 31st May, 15th June and 21st June 2011 and the level of ammoniacal nitrogen in SW18 remained elevated but decreased to 1.27mg/l by 21st June 2011. Ammoniacal Nitrogen at SW11 and SW17 had returned to ambient levels in the samples taken on the 31st May 2011.

***Q3 July – September 2011- Sampling dated 14th September 2011***

Surface water results indicated generally good water quality at most locations during Q3 2011. A slightly elevated conductivity was only recorded at one location SW11 (1.083mS/cm). Ammoniacal nitrogen was elevated in SW18 (5.31mg/l) above the salmonid regulations. An increase in the alkalinity concentration was noted at SW11 (318mg/l).

***Q4 October - December 2011- Sampling dated 23rd November 2011***

Surface water results indicated generally good water quality at most locations during Q4 2011. Sampling point SW9 was dry and therefore a sample could not be retrieved. Elevated parameters were only recorded at one location, SW18. An elevated conductivity was recorded at SW18 above the EQS. An elevated ammoniacal

nitrogen level was recorded above the Salmonid regulations and an elevated BOD was recorded above the EQS but below the Salmonid regulations in SW18.

Due to the regularly elevated levels of ammoniacal nitrogen recorded at SW18, weekly samples were taken at SW18 and SW17 and sent for analysis during Q3 and Q4. Readings stayed elevated at SW18 throughout the second part of the year, but readings at SW17 (downstream of the landfill) showed normal levels of ammoniacal nitrogen as surface water exited the landfill site. Table 6 and Figure 4 below shows ammoniacal nitrogen levels at SW18 and SW17 at various dates in the second part of 2011. Investigations into the source of the ammoniacal nitrogen are ongoing and initial observations suggest the source of the ammoniacal nitrogen is outside of the landfill.

**Table 6: Ammoniacal Nitrogen Concentrations in SW17 and SW18**

| Ammoniacal Nitrogen Levels | | |
|---|---|---|
| **Date** | **SW17** | **SW18** |
| 11/05/2011 | 7.58 | 6.05 |
| 31/05/2011 | 0.32 | 5.37 |
| 15/06/2011 | - | 4.65 |
| 21/06/2011 | - | 1.27 |
| 29/06/2011 | - | 0.298 |
| 05/07/2011 | <0.2 | 0.239 |
| 14/07/2011 | <0.2 | 4.36 |
| 24/08/2011 | 0.49 | 4.67 |
| 21/09/2011 | 0.09 | 6.6 |
| 29/09/2011 | 0.05 | 7.42 |
| 04/10/2011 | 0.15 | 2.55 |
| 12/10/1011 | 0.07 | 4.17 |
| 18/10/2011 | 0.09 | 1.72 |
| 26/10/2011 | 0.23 | 0.53 |
| 03/11/2011 | 0.09 | 1.37 |
| 09/11/2011 | 0.09 | 1.51 |
| 16/11/2011 | 0.12 | 1.98 |
| 23/11/2011 | 0.05 | 1.75 |
| 02/12/2011 | 0.08 | 1.67 |
| 07/12/2011 | 0.08 | 1.5 |
| 13/12/2011 | 0.09 | 0.73 |
| 21/12/2011 | 0.16 | 1.17 |

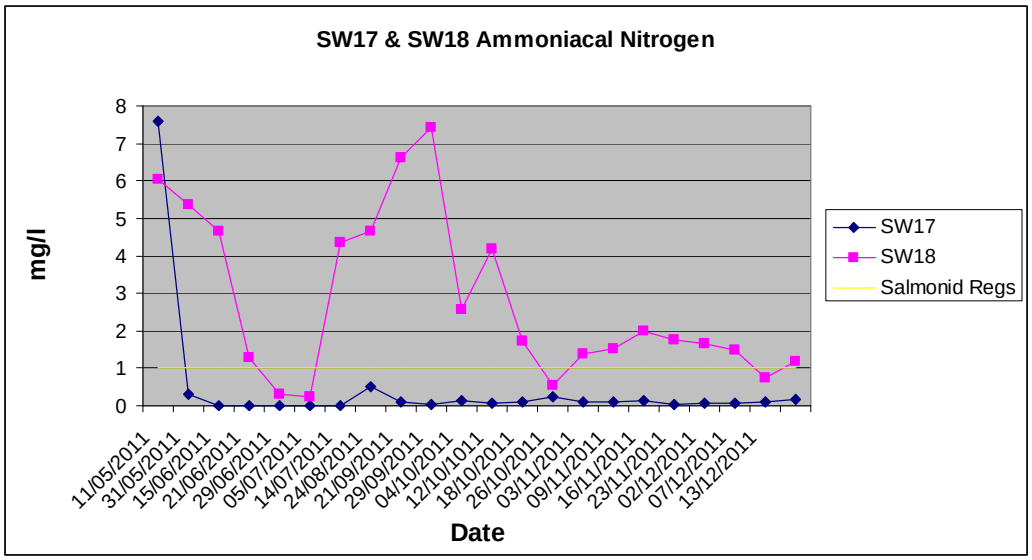



**Figure 2: Ammoniacal Nitrogen Levels at SW Monitoring Locations SW17 & SW18 (2011)**

Quarterly Electrical Conductivity measurements for a number of surface water monitoring points are shown in Figures 4 and 5 below.

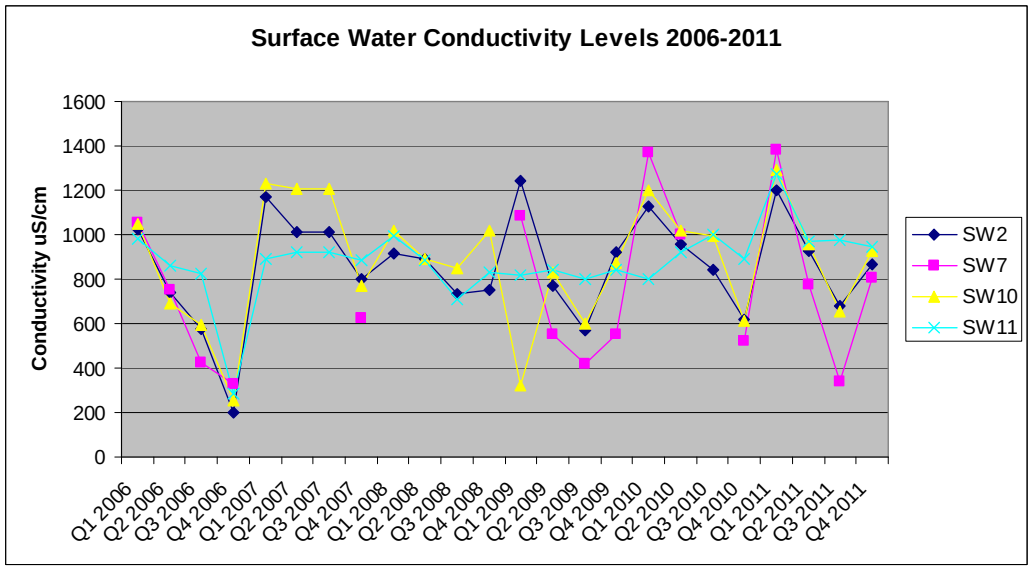



**Figure 3: Conductivity Data Trends '06-'11 at SW Monitoring Locations SW2, SW7, SW10 & SW11**

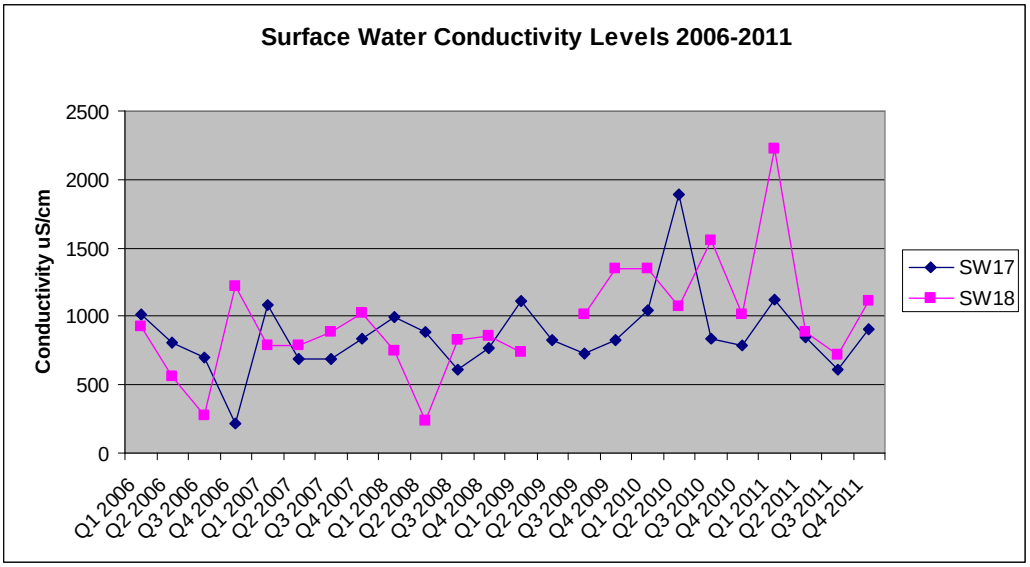



**Figure 4: Conductivity Data Trends '06-'10 at SW Monitoring Locations SW17 & SW18**

***Weekly sampling***

Weekly visual inspections are carried out at the various monitoring points and include sampling of pH, temperature and conductivity. Elevated concentrations in conductivity were measured in January, February and March 2011 generally at locations SW18, SW7, SW10, SW2, SW11 and SW17. This coincided with the severe cold weather and it is likely that the conductivity levels were caused by the treatment of the roads around the landfill (M50) with salt and grit. On each occasion when elevated conductivity was encountered, an incident report was issued to the EPA and ERFB.

Elevated ammoniacal nitrogen was encountered particularly at SW18

***Monthly Wheelwash Sampling***

Monthly sampling ceased in November 2007 as it was agreed with *the Agency* that future sampling of WWSW1 and WWSW2 will occur on a needs be basis.

***Conclusion & Annual Assessment***

The 2011 annual assessment suggests that there was a continuation in the overall trend of improvement in surface water quality at Dunsink Landfill during 2011 though elevated levels of ammoniacal nitrogen upstream of the facility were persistent at SW18 in Q2, 3 and 4. Results from SW17 (from samples collected simultaneously) indicated the issue does not appear to be impacting further downstream. Conductivity levels have also fluctuated, as with the elevated ammoniacal nitrogen, it is considered this is related to contamination by off-site sources.

In general the surface water sampling indicated good water quality over the 4 quarters of the year. New leachate pumping infrastructure (pumps, sump and leachate valve configuration) was commissioned in June 2005. Leachate interceptor drains are

established to the West and South of the Lagoon, to intercept leachate seepages from the landfill. It is believed that these initiatives have been responsible for the general improvement in water quality at the facility.

## 3.3 LEACHATE

Schedule D of the waste licence requires the monitoring of leachate at the station "north-east lagoon", Table 6. A monitoring station which facilitates the obtaining of representative grab and / or continuous samples in accordance with Condition 8.4 is provided at the sump.

**Table 7: Leachate Monitoring Locations 2011**

| Leachate Monitoring Location | Eastings | Northings |
|---|---|---|
| Northeast Lagoon | 311323 | 239031 |
| Sump | 311417 | 238895 |

Table D.5.1 of Schedule D of the waste licence sets down the parameters and frequency for leachate monitoring. Table 7 below outlines the sampling programme for leachate undertaken in 2011.

**Table 8: Leachate Monitoring Programme 2011**

| Leachate Monitoring Location | Q1 | Q2 | Q3 | Q4 | Annual |
|---|---|---|---|---|---|
| North East Lagoon | Sampled | Sampled | Sampled | Sampled | Sampled |
| Sump | Sampled | Sampled | Sampled | Sampled | Sampled |

### 3.3.1 Leachate - Methodology

Refer to Schedule D.5 of waste licence 127-1

### 3.3.2 Leachate Monitoring – Results of Quarterly Sampling (See Appendix II)

***Q1 January - March 2011 – Sampling dated 15th March 2011***

Results from the lagoon recorded pH of 8.44 and conductivity of 1.2mS/cm. Results from the sump recorded pH of 7.16 and conductivity of 1.92mS/cm

***Q2 April - June 2011- Sampling dated 11th May 2011***

Results from leachate sampling at the lagoon on 11th May 2011 recorded pH of 9.23, conductivity of 0.974mS/cm and dissolved Methane levels of <0.001mg/l.

Results from leachate sampling at the leachate sump on 11th May 2011 recorded pH of 7.91, conductivity of 3.431mS/cm and dissolved Methane levels of <0.001mg/l.

Table C.6. of the waste licence dictates that Emission Limits for Dissolved Methane in Leachate Being Discharged to Sewer as 0.14mg/l. The results indicate that emission limit values for dissolved methane are compliant for leachate in the sump and lagoon.

***Q3 July – September 2011- Sampling dated 14th September 2011***

Results from leachate sampling at lagoon on 14th September 2011 recorded pH of 8.67, conductivity of 3.471mS/cm and dissolved methane levels of 0.007mg/l. Results for other parameters tested as part of the annual suite of parameters for leachate indicated levels of ammoniacal nitrogen (35.62mg/l), chloride (438.5mg/l), and potassium (123.9mg/l) amongst others.

Results from leachate sampling at leachate sump on 14th September 2011 recorded pH of 8.13, conductivity of 2.517mS/cm and Dissolved Methane levels of <0.001 mg/l. Elevated levels of ammoniacal nitrogen (149.47mg/l), potassium (170mg/l), sodium (382.5mg/l), manganese (0.731mg/l), and nickel (0.038mg/l) were recorded. These results are typical of leachate from a municipal landfill.

Table C.6. of the waste licence dictates that Emission Limits for Dissolved Methane in Leachate Being Discharged to Sewer as 0.14mg/l. The results indicate that emission limit values for dissolved methane are not exceeded for leachate in the lagoon or for leachate in the sump.

***Q4 October - December 2011- Sampling dated 23rd November and 7th December 2011***

Results from leachate sampling at the lagoon on 23rd November 2011 recorded pH of 8.00, conductivity of 0.723mS/cm and dissolved Methane levels of <0.001 mg/l.

Results from leachate sampling at the leachate sump on 7th December 2011 recorded pH of 7.89, conductivity of 3.59mS/cm and dissolved Methane levels of 2.738mg/l.

Table C.6. of the waste licence dictates that Emission Limits for Dissolved Methane in Leachate Being Discharged to Sewer as 0.14mg/l. The results indicate that emission limit values for dissolved methane is not exceeded for the leachate in the lagoon, however it is exceeded for leachate in the sump.

***Leachate – Discussion.***

The results from quarterly visual inspections and annual monitoring of metals for the leachate lagoon and sump are typical of leachate quality. The lagoon is naturally lower for many parameters due to the diluting effect of rainwater and passive aeration associated with the fall of leachate into the lagoon.

Weekly monitoring of Methane, Carbon dioxide and Oxygen is being carried out at the headspace of the sump and the point of discharge to public sewer in Finglas (See Figure 1). The results are being sent to The Agency through weekly notifications and are also being compiled for Dublin City Council. Dublin City Council may require further mitigation measures following a review of the results of these monitoring rounds.

### 3.3.3 Continuous monitoring of Dissolved Methane in Leachate

Continuous monitoring of dissolved methane at the sump commenced during Q1 2006. Table C.6.of the waste licence dictates that Emission Limits for Dissolved Methane in Leachate Being Discharged to Sewer as 0.14mg/l.

A dissolved methane probe was installed in the leachate sump during the last quarter of 2005. It was not connected to a datalogger until the second quarter of 2006 and when results emerged the probe was deemed to be faulty. A warranty replacement was installed during the last quarter of 2006.

Continuous monitoring of dissolved methane has been in operation from 3rd October 2006 to present.

#### 3.3.3.1 Results from Continuous monitoring of Dissolved Methane in Leachate

Reporting of continuous monitoring of dissolved methane throughout 2011 was as per protocols specified in condition 6.3.3.1. While compiling the data for Q4 2010 the USB stick recording all the data of the probe had been found to be missing. A new stick was installed in January 2011 and data recording re-started from 18th January 2011. Resulting from the annual audit of October 2010 (Audit W0127-01AR10EM), a new methane probe has been purchased and was installed on Wednesday 5th January 2011. The new probe takes readings in the range 0.016 to 1mg/L.

***Q1 January- March 2011***

Reporting is as per protocols specified in condition 6.3.3.1.

a. No 24 hour mean value shall exceed the ELV;
   100% of 24 hour mean values exceeded the ELV.

b. 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

   100% of all 30 minute mean values taken continuously over an annual period exceeded 1.2 times the emission limit value.

c. No 30-minute mean value shall exceed twice the emission limit value.
   100% of 30 minute mean values exceeded 2 times the ELV (0.28mg/L).

***Q2 April - June 2011***

a. No 24 hour mean value shall exceed the ELV;
   100% of 24 hour mean values exceeded the ELV of 0.14mg/L.

b. 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

   99.4% of 30 minute mean values exceeded 1.2 times the ELV (0.168mg/L).

c. No 30-minute mean value shall exceed twice the emission limit value.
   97.5% of 30 minute mean values exceeded 2 times the ELV (0.28mg/L).

***Q3 July- September 2011***

a. No 24 hour mean value shall exceed the ELV;

100% of 24 hour mean values exceeded the ELV of 0.14mg/L

b. 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

   100% of 30 minute mean values exceeded 1.2 times the ELV (0.168mg/L)

c. No 30-minute mean value shall exceed twice the emission limit value.
   96.8% of 30 minute mean values exceeded 2 times the ELV (0.28mg/L).

***Q4 October- December 2011***

a. No 24 hour mean value shall exceed the ELV;
   100% of 24 hour mean values exceeded the ELV of 0.14mg/L

b. 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

   100% of 30 minute mean values exceeded 1.2 times the ELV (0.168mg/L)

c. No 30-minute mean value shall exceed twice the emission limit value.
   96.8% of 30 minute mean values exceeded 2 times the ELV (0.28mg/L).

### 3.3.4 Discussion of Results from Continuous Sampling of Dissolved Methane

The results indicate that the ELV is exceeded almost continuously at high levels. The accuracy of the probe readings was questioned, partly due to the discrepancy between probe readings and the results of the quarterly spot sampling.

Expert advice was sought from ENVIROS, and an on site test was carried out using a technique developed by ENVIROS that allows determination of on the spot levels of dissolved methane in the leachate. The on the spot levels recorded on the 14/11/2011 were at an average of 3.357mg/L. As a result of these elevated readings, a replacement probe was ordered to continuously monitor the dissolved methane, with a range of 0.016 to 5 mg/L. This probe was installed in early January 2012.

An exercise was carried out in conjunction with Dublin City Council to measure methane gas in the headspace of the sewer at various locations of the sewer downstream of the discharge point – during a scenario of pumping high flow of leachate. No methane gas was detected during this exercise.

Fingal County council is preparing a report on this matter.

In the meantime, weekly monitoring of Methane, Carbon dioxide and Oxygen is being carried out at the headspace of the sump and the point of discharge to public sewer in

Finglas (See Figure 6 and Appendix III). The results are being sent to *The Agency* through weekly notifications and are also being compiled for Dublin City Council.

## 3.4 NOISE.

No noise survey was undertaken at Dunsink Landfill in 2011. This was addressed in Licence Audit Report for 2008 from the Agency W1027-01/08/AR08EM, observation No.5, on Environmental Monitoring.

## 3.5 DUST

No dust monitoring surveys were carried out at Dunsink Landfill in 2011. This was addressed in Licence Audit Report for 2008 from the Agency W1027-01/08/AR08EM, observation No.5, on Environmental Monitoring.

## 3.6 $PM_{10}$ MONITORING

The Agency in correspondence referenced 127-1/GEN01EM stated that "The Agency, in accordance with Condition 8.2, does not require monitoring of $PM_{10}$ as listed in Table D.3.1 of the waste licence unless otherwise instructed by the Agency."

## 3.7 BIOLOGICAL ASSESSMENT OF THE SCRIBBLESTOWN STREAM

A biological assessment of the Scribblestown Stream was undertaken at KS1, KS2 & KS3 (Figure 3 / Tables 4 & 5) on 29th September 2011. In 2009, a subsequent biological assessment was conducted in December due to poor biological quality results at the three locations on Scribblestown stream. Therefore kick sampling was conducted at two tributaries to the stream that are present on the landfill. In 2011 three additional locations (KS3a, KS4 & KS6) were included in the standard monitoring round to determine whether any improvement was noted in water quality at Unnamed stream 2 (which flows into the landfill from the Dunsoghly Housing estate adjacent to the landfill).

### 3.7.1 Biological Assessment of Scribblestown Stream – Methodology.

Freshwater ecological assessments were conducted at five sites on the Scribblestown stream in the vicinity of Dunsink landfill site, Dunsink, Co Dublin. One additional sample was taken from the unnamed Stream 2 which flows into Scribblestown stream from the Dunsoghly Housing estate.

These assessments comprised the following investigations:

- Survey of macroinvertebrate fauna using kick sampling, sweep net, stone and vegetation washing methods at each location to produce Q-index values in addition to species diversity indices for each site.
- Aquatic macrophytes survey recording vegetation and describing habitats at each site.
- Recording of standard physico-chemical parameters at each site. These include pH, oxygen (% saturation and mg/l) and conductivity (µS/cm).

### 3.7.2 Macroinvertebrates

One macroinvertebrate sample was taken at each location, KS1, KS2, KS3, KS3a, KS4 and KS6. Samples were normally collected by kick sampling at riffle sites or sweep sampling at slow flowing vegetated areas as appropriate. Kick sampling involves disturbing sediment/ vegetation etc for 2 minutes upstream of a standard sweep net (1mm mesh, 250mm width). However as there was a low flow at the majority of sampling locations Sweep sampling was undertaken instead of kick sampling which involved sweeping through vegetation/ substrate.

Macroinvertebrates were collected and stored in 70% industrial methylated spirits and returned to the laboratory for identification and counting.

### 3.7.3 Discussion

The overall macroinvertebrate community shows Scribblestown stream to be exposed to pollution. No rare macroinvertebrates species or species of conservation concern were recorded.

Conductivity values ranged between 366µS/cm in KS2 to 857µS/cm in KS4. The pH values are of a range between 7.86 in KS4 to 8.41 in KS1 which is within the typical pH range of between 6 and 9. Temperature values varied slightly at all six locations (13.4$^{o}$C in KS4 to 17.9$^{o}$C in KS1) and is likely to be caused by level of direct sunlight on the water body.

**Comparison to Previous Surveys.**

In Sept 2011, the Q-value rating for **KS1** was **Q3** (moderate pollution) representing **no significant change** to the score from 2010 and 2009.

- The sample was dominated by group C & D taxa which demonstrated a relatively pollution (organic) tolerant environment.
- The sampling location showed the presence of filamentous algae
- Shannon – Weiner index 1.17, which is similar to the 2010 sampling round.
- The SSRS score is 0.8 which indicates that the section of the stream is ‘at risk’.

The Q-value rating at **KS2** was **Q3** (moderate pollution) which indicated no significant change in water quality conditions from 2010 and 2009.

- This is based on the dominance of Group C taxa.

- The physico-chemical parameters were all within their relevant standard and at similar levels to previous rounds.
- Shannon – Weiner index 1.86 which is a slight decrease on the 2010 sampling round.
- The SSRS score is 1.6 which indicates that the section of the stream is 'at risk'

The Q-value rating at **KS3** was **Q3** (moderate pollution) which represented no significant change to water quality in comparison to the 2010 results and a sustained improvement compared to the 2009 results (Q2).
The river channel was clogged with vegetation (fools watercress and watercress), indicative of excessive nutrients though the presence of stickleback fish was noted in the stream and Group B taxa dominated the sample.

- DO was slightly lower than in the other upstream locations.
- Shannon – Weiner index 1.5 which is a decrease on the 2010 sampling round.
- The SSRS score is 3.2 which indicates that this stretch of the channel is "at risk" which is consistent with the Q-value rating

The Q-value rating at **KS3a was Q3** indicating **moderately polluted** water. This sample was taken upstream of the weir and upstream of the confluence culvert pipe from Unnamed stream 2. The results indicate that there has been no change at the location since 2010.

- Group C taxa dominated the sample (mainly Potamopgyrgus, Gammarus and Baetis spp).
- The Shannon-Weiner (H') diversity index value was 1.91.
- The SSRS score is 4.8 which indicates that this stretch of the channel is "at risk" which is consistent with the Q-value rating.

The Q-value rating at **KS4 was Q3** indicating **moderately polluted** water. This sample was taken upstream from the confluence of Unnamed Stream 1 and Scribblestown Stream. The channel was completely overgrown with fool's water cress in the water column. The results indicated that there has been no deterioration at this location since it was last sampled in December 2009.

- Group C taxa dominated the sample (mainly polycentropodidae, Gammarus and Baetis spp)
- The Shannon-Weiner (H') diversity index value was 1.7.
- The SSRS score is 3.2 which indicates that this stretch of the channel is "at risk" which is consistent with the Q-value rating.

A **Q3** classification was assigned to **KS6** indicating **moderately polluted** water which indicates an improvement compared to September 2010 when the stream was classified as Q1-2, seriously polluted.

- The Shannon-Weiner (H') diversity index value was 1.94.
- The SSRS score is 4 which indicates that the river is at risk of pollution which is consistent with the Q-value score.

In summary, all of the locations (KS1, KS2, KS3, KS3a, KS4 and KS6) were assigned a Q-value of 3 which corresponds with Class C i.e. moderately polluted.

The results of the biological assessment indicate that no significant change was observed in water quality since the previous monitoring event in 2010, with the exception of an improvement noted in KS6. KS6 has improved from seriously polluted to moderately polluted. There has been a slight improvement in water quality in KS3 improving from Q2-3 in 2010 to Q3 in 2011.

## 3.8 LANDFILL GAS

### 3.8.1 Landfill Gas Monitoring – Methodology.

Refer to Schedule D.2. of waste licence 127-1.

### 3.8.2 Landfill Gas Facility Monitoring

Since the 4$^{th}$ Quarter (Q4) of 2006 measurements of landfill gas were carried out at twenty four locations at the perimeter of the landfill (See Figure 6 and Table 8).

During November 2007 (Q4) in agreement with the *Agency*, weekly gas monitoring decreased to six monitoring locations (G35 to G40) and the leachate sump and sewer, with the monthly monitoring round still consisting of all accessible gas monitoring locations (24 locations). From September 2010 and during 2011 monitoring location G23 was also included in the weekly gas monitoring.

Gas levels were monitored using an LMSxi landfill gas analyser. The boreholes were monitored for Methane ($CH_4$), Carbon dioxide ($CO_2$), Oxygen ($O_2$), temperature and atmospheric pressure.

***Landfill Gas - Proximity of Buildings and Developments to the Site***

There are a number of buildings and developments on site, which are identified in the risk analysis of the site from landfill gas, which have potential to expose receptors to risk from landfill gas (See Figure 6). These include the former Irish Power Systems (IPS) compound (now FCC) at the southern boundary to the site along Dunsink lane. The Equipment yard and shed (which will also house the site offices) is close to the southern boundary of the site, immediately east of the IPS compound.

There are a number of buildings and developments close to the site which have potential to expose receptors to risk from landfill gas. Cappagh Hospital is located to the north of the landfill boundary. Dunsoghly estate lies to the east of Cappagh Hospital and north east of the landfill boundary. A halting site is established along the south-east boundary of the landfill (Figure 6).

South of Dunsink Lane, which marks the southern boundary of the site, there are a number of developments. From west to east these include; Elm Green Golf Course, Dunsink Observatory and a series of unauthorised halting sites (Figure 6).

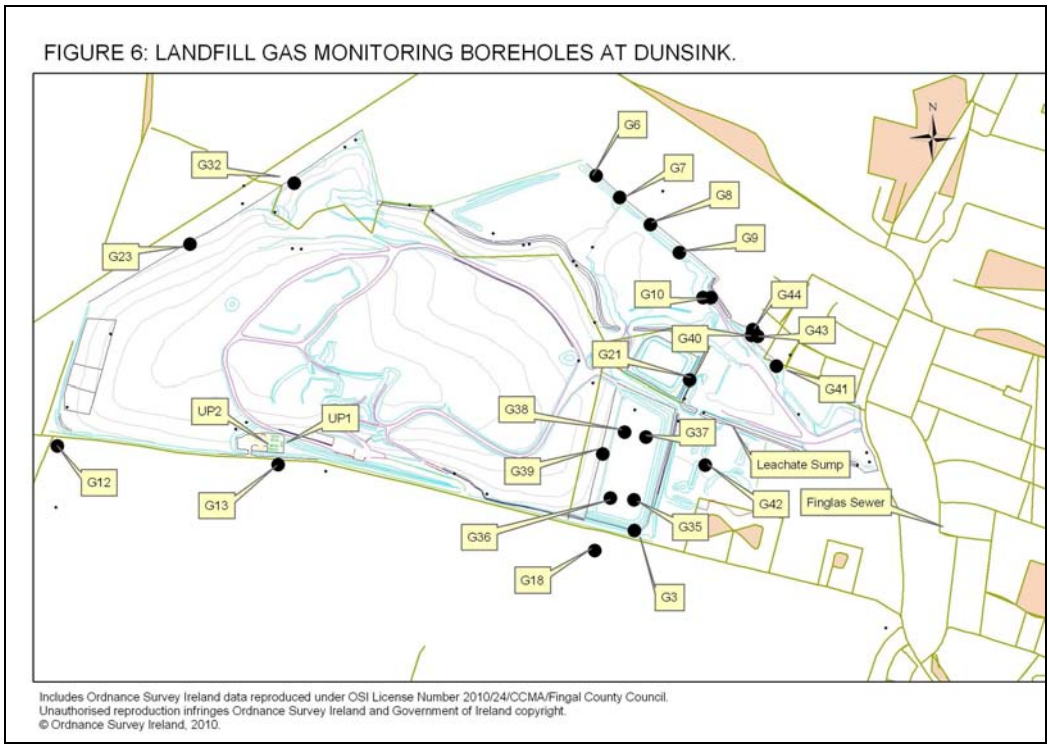



**Figure 5: Landfill Gas Borehole Monitoring Locations**

***Historical Monitoring (1998-2000).***

The landfill gas-monitoring programme during the period 1998-2000 involved thirty-four landfill gas-monitoring boreholes.

Monitoring during this period indicated consistent and elevated levels of Methane at landfill gas monitoring boreholes G30 west of the "sports grounds", G25 and G26 immediately north of the IPS compound. The borehole logs for G25 and G26 indicate that these are within the waste body.

Landfill gas monitoring during this period, indicates a more widespread pattern for carbon dioxide trigger level exceedances. Elevated levels were recorded at G1, G2, G30 ("sports grounds"), G4, G6 & G9 (northern boundary of the site); G11 and G32 (M50); G14 & G15 (Dunsink Observatory); G25, G26 & G27 (IPS compound area) and G33 (within waste body).

**Table 9: Landfill Gas monitoring Locations and Programme 2011**

| Landfill Gas Monitoring Locations. | Monitoring Frequency | Eastings | Northings |
|---|---|---|---|
| G3** | Monthly | 311270 | 238670 |
| G6** | Monthly | 311180 | 239425 |
| G7** | Monthly | 311230 | 239375 |
| G8** | Monthly | 311300 | 239320 |
| G9** | Monthly | 311360 | 239260 |
| G10** | Monthly | 311410 | 239170 |
| G12 | Monthly | 310040 | 238850 |
| G13 | Monthly | 310560 | 238795 |
| G18 | Monthly | 311150 | 238630 |
| G21 | Monthly | 311380 | 238990 |

| | | | |
|---|---|---|---|
| G23 | Weekly | 310325 | 239265 |
| G32 | Monthly | 310540 | 239420 |
| G35 | Weekly | 311265 | 238740 |
| G36 | Weekly | 311210 | 238740 |
| G37 | Weekly | 311290 | 238875 |
| G38 | Weekly | 311245 | 238880 |
| G39 | Weekly | 311195 | 238835 |
| G40 | Weekly | 311520 | 239090 |
| G41** | Monthly | 311580 | 239020 |
| G42** | Monthly | 311410 | 238805 |
| G43** | Monthly | 311524 | 239088 |
| G44** | Monthly | 311516 | 239100 |
| IPS inlet | Weekly | 310515 | 238849 |
| Leachate Sump | Weekly | 311417 | 238895 |
| Finglas Manhole* | Weekly | 311909 | 238733 |

** (Changed to monthly monitoring during November 2007)

***Locations of Trigger Level Exceedances***

During Quarter 1 2011, elevated levels of carbon dioxide were recorded at a number of the sportsfield boreholes including G37, G38 and G39. Elevated levels of carbon dioxide were also regularly recorded at G40, G43 and G44. Elevated levels of carbon dioxide were recorded at G3, G9, G10, G21, and G23 occasionally.

Elevated levels of methane were recorded at G37 on 7th January 2011 (4.2%v/v) and the 2nd February (1.2%v/v) and at the Leachate Sump on 16th of February (1.6%v/v). No other significant concentrations of methane were recorded during the 1st Quarter of 2011.

During Quarter 2 2011, elevated levels of carbon dioxide continued to be recorded at a number of the sportsfield boreholes including G36, G37, G38, G39 and G40. Elevated levels of carbon dioxide were also regularly recorded at G40, G43 and G44. Elevated levels of carbon dioxide were recorded at G3, G9, G10, and G23 occasionally.

Elevated levels of methane were recorded at G23 on 31st May 2011 (1.3%v/v) and the 8th of June 2011 (3.5%v/v). No other significant concentrations of methane were recorded during the 2nd Quarter of 2011.

During Quarter 3 2011, elevated levels of carbon dioxide were recorded at a number of the sportsfield boreholes including G3, G36, G37 and G38. Elevated levels of carbon dioxide were also regularly recorded at G23, G10, G40, G43 and G44. Elevated levels of carbon dioxide were recorded at G9 occasionally.There were no elevated concentrations of methane recorded at any of the boreholes locations during the 3rd Quarter of 2011.

During Quarter 4 2011, elevated levels of carbon dioxide continued to be recorded at a number of the sportsfield boreholes including G36, G37, G38, G39 and at G40. Elevated levels of carbon dioxide were also occasionally recorded at G9, G10, G23, G43 and G44.

An elevated level of methane was recorded at G37 on 7th December 2011 (1.0% v/v) and 13th December 2011 (3.9%v/v). No other significant concentrations of methane were recorded during the 4th Quarter of 2011.

***Landfill Gas Monitoring – Discussion.***

A review of the landfill gas sampling network and programme was undertaken during Q3 (July-September) 2004 in response to potential landfill gas migration issues. The review included an analysis of potential receptors and results of a spike-monitoring programme. The review culminated in the alteration of the landfill gas monitoring infrastructure and monitoring programme from that stated in Schedule D and G of the waste licence during 2005. This involved the recruitment of old landfill gas monitoring wells and the addition of three new monitoring wells (G40-G42) into the monitoring infrastructure during 2005 and five new monitoring locations during 2006 (IPS compound, G43, G44, Leachate Sump and Finglas Sewer) (See Figure 6).

The locations for elevated levels of landfill gas emissions of methane at this time included the "sports grounds" area, and the northern boundary to the site, the boundary towards Dunsoghly estate and the offices of the IPS compound area.

A venting trench was proposed and agreed by the Agency for the remediation of landfill gas migration on the "sports-ground". These works went to public tender and the venting trench was commissioned during Q2 2005. A landfill gas spike monitoring report conducted in September 2004 suggested that the Scribblestown Stream may well be acting as an effective natural barrier/vent to landfill gas migration towards Cappagh Hospital and the Northern Boundary of the site and implies that these areas are not at risk. With the extension of the gas extraction network at Dunsink, considerable reductions in levels of methane and carbon dioxide were noted in the sports fields boreholes throughout 2006 & 2007. However, elevated methane and carbon dioxide levels above the trigger values were recorded once in Quarter 3 of 2008 and then consistently through Quarter 4. Borehole G37 in the "sportsfield" recorded the most elevations while Boreholes G35 and G36 recorded no exceedances in this reporting period. Borehole G38 recorded elevated levels of Carbon Dioxide on a number of occasions in the second half of 2008. A proposal to carry out a series of excavations in the areas of G37 and G38 to detect any local methane sources and follow-up monitoring was accepted by the Agency (FCC-127-1-2009-004). The offices of the IPS compound area are continuously monitored for elevated levels of methane and carbon dioxide.

Two additional boreholes were placed between G40 and Dunsoghly Estate (G43 and G44). Since installation no methane was recorded at either of these boreholes. Nevertheless, G40 itself continued to register methane above trigger level throughout 2007, although methane levels decreased in 2008 and no methane was recorded at G40 during 2009.

Landfill gas monitoring at Dunsink Landfill during 2011 indicated a further improvement on results of previous years however the "sports field" area remains an issue (though improvements were noted in methane exceedances).

***Landfill Gas Monitoring – Conclusion***

Landfill gas monitoring undertaken at Dunsink landfill in 2011 indicated continued improvement in methane and carbon dioxide concentrations. The sports field area – namely G37 shows the presence of elevated $CH_4$ however the frequency of $CH_4$ exceedances has dropped considerably over the year. Elevated $CO_2$ readings are generally found in the sports field area. The Dunsoghly area and the sports field continue to be monitored closely. DCC continue to be notified of the results and mitigation measures will be proposed in the event that there is any further deterioration in results during 2012.

### 3.8.3 Landfill Gas Utilisation Plant Monitoring Equipment and Sampling points

Weekly monitoring at the inlet and continuous monitoring at the outlet commenced during Q1 2006. It was agreed by the Agency that reporting of incidents under this system could be done through the quarterly and annual environmental reports.

***Inlet to Landfill Gas Utilisation Plant***

A gas sampling system to include chilling and filtration for the protection of the portable infrared analyser was installed. This facilitates weekly monitoring of methane, carbon dioxide and oxygen using an LMSXi landfill gas analyser, which is used for borehole monitoring. It also provides a sampling location for annual monitoring of Total Sulphur, Total Chlorine and Total Fluorine. The results from the weekly sampling at the inlet are reported in the weekly landfill gas monitoring round sheets. See Appendix III.

***Outlet from Landfill Gas Utilisation Plan.***

Carbon monoxide and nitrogen oxides are monitored continuously. Continuous monitors on the outlets of the two gas engines were installed. The analysers are proven to be effective on other landfill gas utilisation plants. An appropriate data management system has been installed. This provides for data logging and data storage.

Additionally, a gas sampling system to allow for annual monitoring of total VOCs as carbon, total non-methane VOCs and Particulates, Hydrochloric acid and Hydrogen fluoride, and, quarterly monitoring of nitrogen oxides has been installed.

***Emission limit values for Landfill Gas Plant***

The emission point reference numbers are proposed to be:

- UP1 Utilisation Plant Input 1
- UP2 Utilisation Plant Output Engine 1
- UP3 Utilisation Plant Output Engine 2

The analysers are able to measure and report at a sufficient resolution to register the emission limit for Carbon monoxide (CO) (1400mg/m3).

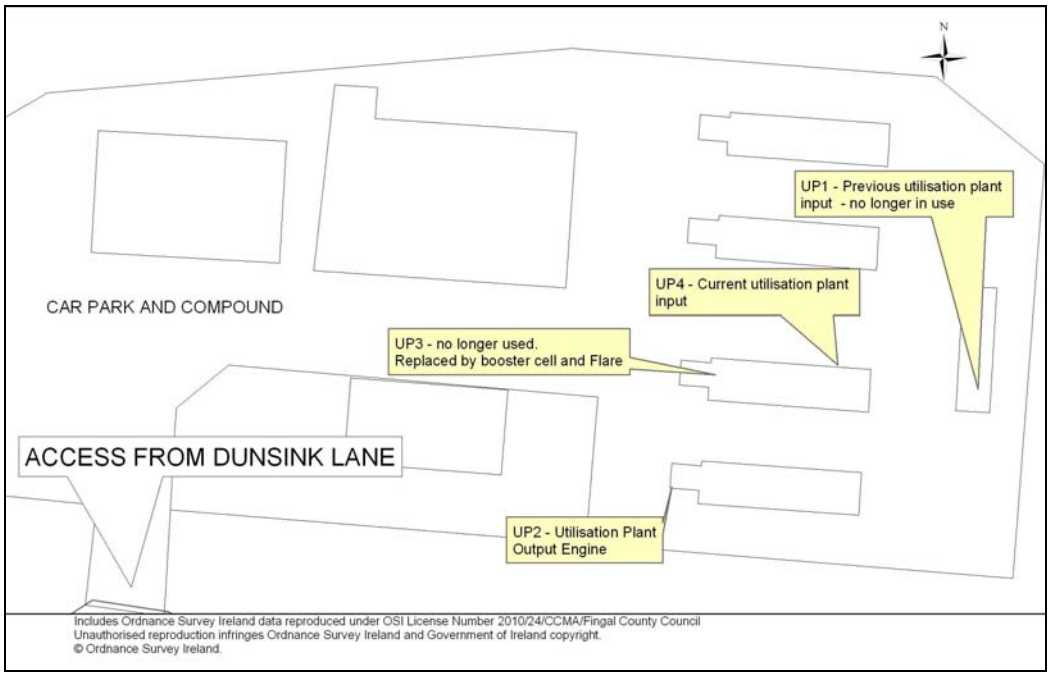



**Figure 6: Dunsink Landfill Gas Utilisation Plant**

### 3.8.4 Results from Continuous sampling of parameters at outlets Landfill Gas Combustion Plant.

Continuous monitoring of outlet parameters at the Landfill Gas Combustion Plant was undertaken throughout 2011. The source of these emissions is the engines identified as UP2, Engine #2 was removed and UP3 is no longer used (see Figure 7 above).

Limit values as per Schedule C.5 of the governing waste licence 127-1 are outlined in the table below;

**Table 10: Emission Limit Values for continuously monitoring parameters at outlets for utilisation plant**

| Parameter | Utilisation Plant Emission Limit Value |
|---|---|
| Nitrogen oxides ($No_x$) | 500mg/$m^3$ |
| CO | 1400mg/$m^3$ |

Note 1: Dry gas referenced to 5% oxygen by volume for utilisation plants.

As per condition 1.6 b) of the waste licence 127-1, and Schedule C.5, specifying the Emission Limits Values (ELV) for Landfill Gas Plant (see Table 9 above) the following incidents occurred during 2011 at the IPS compound in Dunsink.

Condition 6.3.2 has been complied with in full as of 27-09-2006; “The concentration limits …..shall be based on gas volumes under standard conditions of:-

In the case of landfill gas combustion plant:
Temperature 273K, pressure 101.3kPa, dry gas; 5% oxygen”.

Throughout 2011 reporting of continuous landfill gas monitoring was as per protocols specified in condition 6.3.3.1.

***1st Quarter 2011***

When the data was downloaded for Q4 of 2010, a fault became apparent with the recording equipment and no data was available after the 14th October 2010. Automatic Flare Solutions (AFS) was contacted to repair the equipment and a new controller was ordered and has been installed back in the engine on 14th March 2011. When this was installed back the AFS engineer advised of another fault – the pump bringing the gas to the monitoring station was broken and a replacement has been ordered. No data was available until the repair was completed.

No results from continuous monitoring of the outlet from the landfill gas combustion plant were available during Q1 2011 due to faulty equipment being repaired.

The following incidents occurred during Quarter 1, 2011 at the former IPS compound in Dunsink.

This quarter reporting is as per protocols specified in condition 6.3.3.1.

(a) No 24 hour mean value shall exceed the ELV;
No data available

(b) 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.
No data available

(c) No 30-minute mean value shall exceed twice the emission limit value.
No data available

***2nd Quarter 2011***

As explained in the previous quarter, a fault with the data logger resulted in no data being available for Q1 2011. The repairs were completed on 27th April 2011 and emission levels have been available since then.

This quarter reporting is as per protocols specified in condition 6.3.3.1.

(a) No 24 hour mean value shall exceed the ELV;
For the 65 days of data available, no 24 hours means exceeded 500mg/$m^3$ for Nitrogen Oxides and one 24 hours mean exceeded 1400mg/$m^3$ for Carbon Monoxide. The result exceeding the 24hours means was on the 27th April 2011 when the sampling restarted at 12.44 pm – and therefore is a 12 hours mean value rather than a 24 hours mean value.

(b) 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

For the 65 days of data available, 9 no. 30 minute mean values or 0.3% of samples taken continuously for Carbon Monoxide exceeded 1.2 times the 1400mg/$m^3$ ELV at

the engine. No 30 minute mean values taken continuously over this period for Nitrogen Oxides exceeded 1.2 times the 500mg/m3 ELV at the engine.

(c) No 30-minute mean value shall exceed twice the emission limit value.

For the 65 days of data available, no 30 minute mean values taken continuously for Carbon Monoxide exceeded two times the 1400mg/$m^3$ ELV at the engine. No 30 minute mean values taken continuously over this period for Nitrogen Oxides exceeded two times the 500mg/$m^3$ ELV at the engine.

Data was only available from the 27th April 2011 following repairs carried on the data logger and pump of the gas analyser. For the 65 days of data available the results from continuous monitoring of the outlet from the landfill gas combustion plant present a general picture of compliance with the Emission Limit Values.

***3rd Quarter 2011***

Continuous monitoring of outlet parameters at the Landfill Gas Combustion Plant was undertaken during this quarter from 01/07/2011.

The following incidents occurred during Quarter 3, 2011 at the former IPS compound in Dunsink.

This quarter reporting is as per protocols specified in condition 6.3.3.1.

(a) No 24 hour mean value shall exceed the ELV;

No 24 hour means exceeded 500 mg/$m^3$ for Nitrogen Oxides and no 24 hour means exceeded 1400 mg/$m^3$ for Carbon monoxide at engine number 1.

(b) 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

No 30 minute mean values or 0% of samples taken continuously over this quarter for Carbon monoxide exceeded 1.2 times the 1400mg/$m^3$ ELV at engine number 1. No 30 minute mean values or 0% taken continuously over this quarter for Nitrogen Oxides exceeded 1.2 times the 500mg/$m^3$ ELV at engines number 1.

(c) No 30-minute mean value shall exceed twice the emission limit value.
No 30 minute mean values taken continuously over this quarter for Carbon monoxide exceeded twice the 1400mg/$m^3$ ELV at engine number 1. No 30 minute mean values taken continuously over this quarter for Nitrogen Oxides exceeded twice the 500mg/$m^3$ ELV at engine number 1.

***4th Quarter 2011***

Continuous monitoring of outlet parameters at the Landfill Gas Combustion Plant was undertaken during this quarter from 01/10/2011.

This quarter reporting is as per protocols specified in condition 6.3.3.1.

(a) No 24 hour mean value shall exceed the ELV;

No 24 hour means exceeded 500 mg/$m^3$ for Nitrogen Oxides and no 24 hour means exceeded 1400 mg/$m^3$ for Carbon monoxide at engine number 1.

(b) 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value.

No 30 minute mean values or 0% of samples taken continuously over this quarter for Carbon monoxide exceeded 1.2 times the 1400mg/$m^3$ ELV at engine number 1. 9 no. 30 minute mean values or 0.2% taken continuously over this quarter for Nitrogen Oxides exceeded 1.2 times the 500mg/$m^3$ ELV at engine number 1.

(c) No 30-minute mean value shall exceed twice the emission limit value.

No 30 minute mean values taken continuously over this quarter for Carbon monoxide exceeded twice the 1400mg/$m^3$ ELV at engine number 1. No 30 minute mean values taken continuously over this quarter for Nitrogen Oxides exceeded twice the 500mg/$m^3$ ELV at engine number 1.

### 3.8.5 Summary of Continuous Sampling of Emissions at Landfill Gas Combustion Plant

The results from continuous sampling of parameters from outlets at landfill gas combustion plant throughout 2011 presented a general picture of compliance with emission limit values.

## 3.9 METEOROLOGICAL MONITORING

Condition 8.6 and Schedule D.6 require daily monitoring of precipitation volume, temperature (min/max), wind force and direction, evapotranspiration, humidity and atmospheric pressure. This data is obtained from Met. Éireann's Dublin Airport Weather Station and the data are illustrated by month in the following tables / figures. The data is presented in the form of monthly averages which masks much of its complexity. The data is available in full tabular format at the facility offices.

### 3.9.1 Total Precipitation Volume by Month

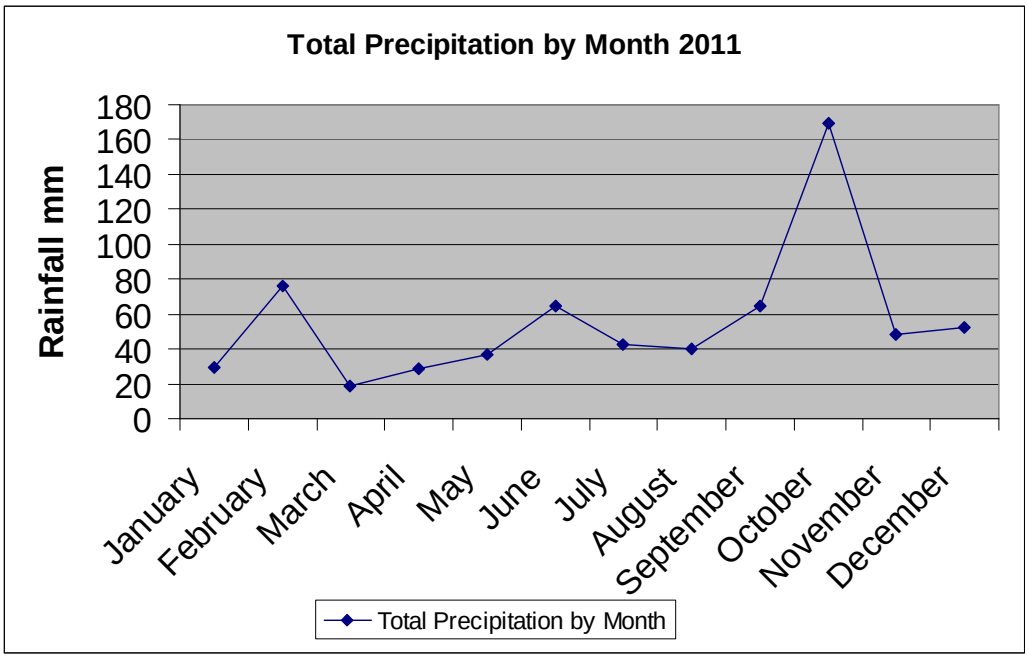



**Figure 7: Total Precipitation mm by Month 2011**

### 3.9.2 Average Daily Temperatures (minimum /maximum) By Month 2011

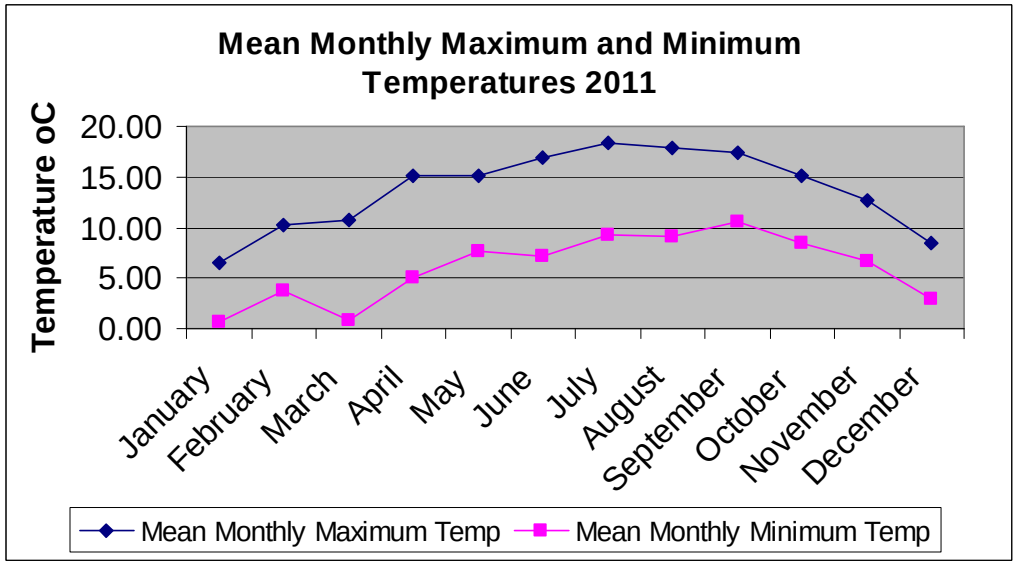



**Figure 8: Average Daily Temperatures (Minimum/Maximum) by Month 2011**

### 3.9.3 Average Daily Wind speed by Month 2011

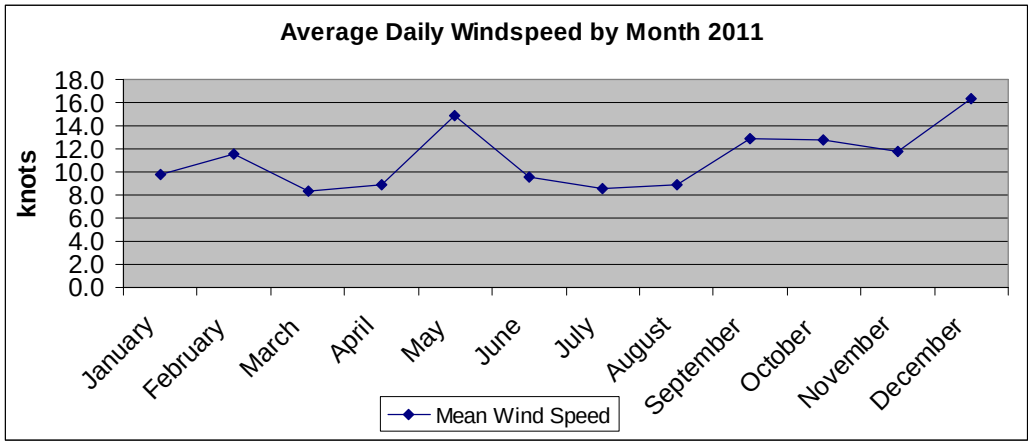



**Figure 9: Average Daily Windspeed by Month 2011**

### 3.9.4 Average Daily Wind Speed and Direction by Month 2011

**Table 11: Average Daily Wind Speed by Month 2011**

| Month | Speed (knots) |
|---|---|
| Jan | 9.8 |
| Feb | 11.6 |
| Mar | 8.4 |
| Apr | 8.9 |
| May | 14.9 |
| Jun | 9.5 |
| Jul | 8.6 |
| Aug | 8.6 |
| Sept | 12.9 |
| Oct | 12.8 |
| Nov | 11.8 |
| Dec | 16.3 |

Figure 11 shows a Rose Diagram of average daily wind direction measured at Dublin Airport. The figure shows the winds during 2011 are predominantly West to South Westerly in direction.

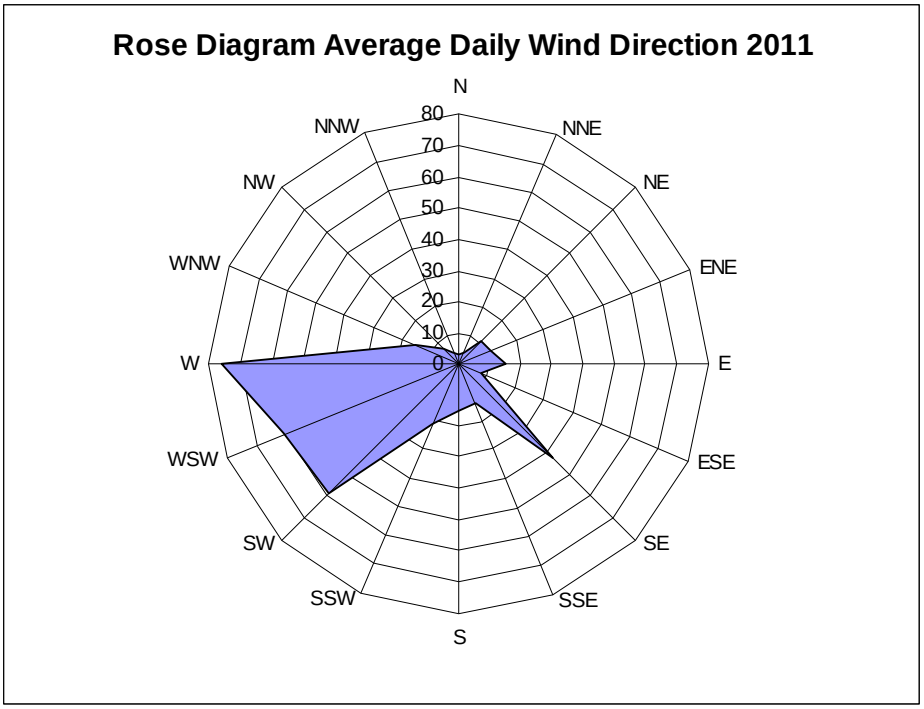



**Figure 10 - Rose Diagram of Average Daily Wind Direction at Dublin Airport**

### 3.9.5 Total Evaporation and Potential Evapotranspiration by Month 2011

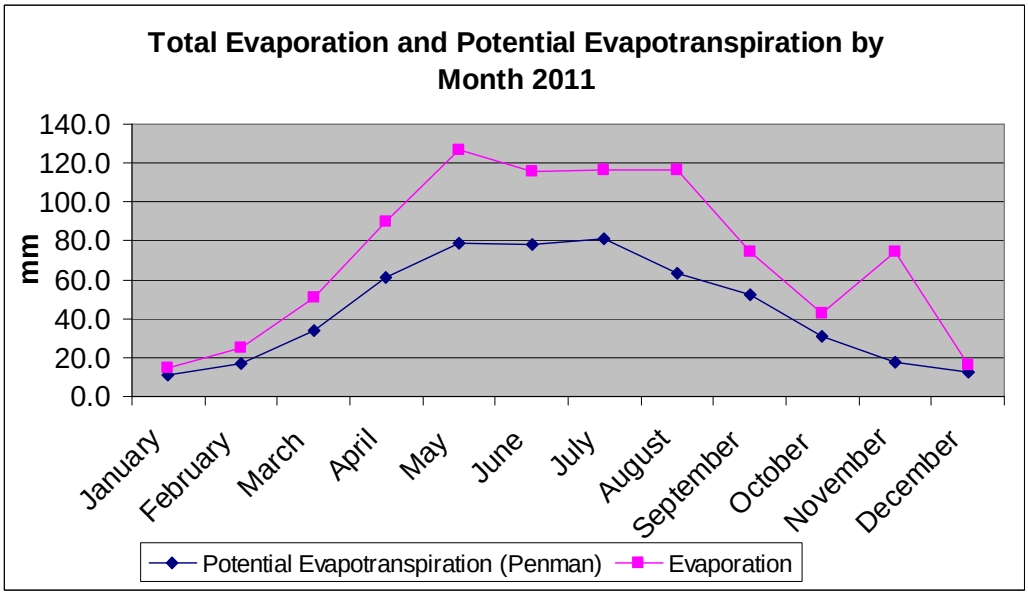



**Figure 11 - Average Daily Evaporation and Potential Evapotranspiration by Month 2011**

### 3.9.6 Average Daily Relative Humidity By Month 2011

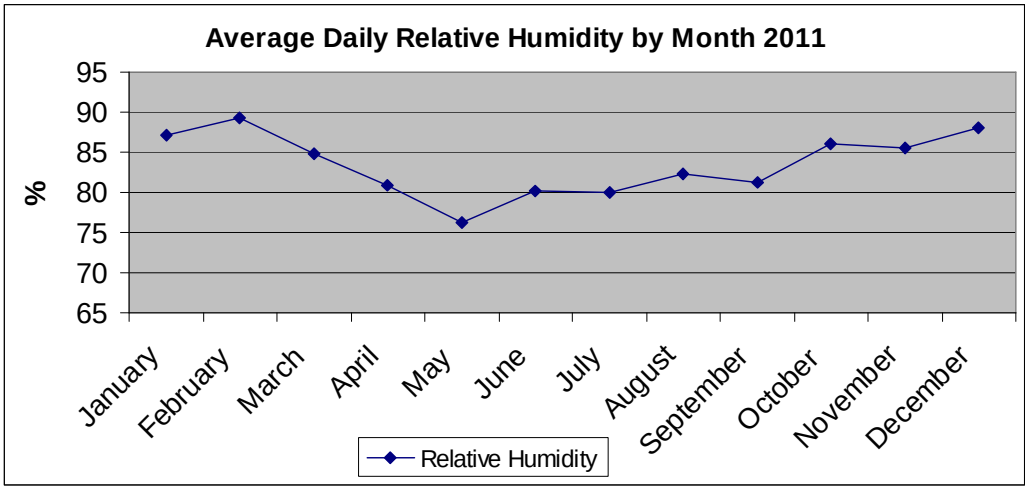



**Figure 12 - Average Daily Relative Humidity by Month 2011**

### 3.9.7 Average Daily Atmospheric Pressure By Month 2011

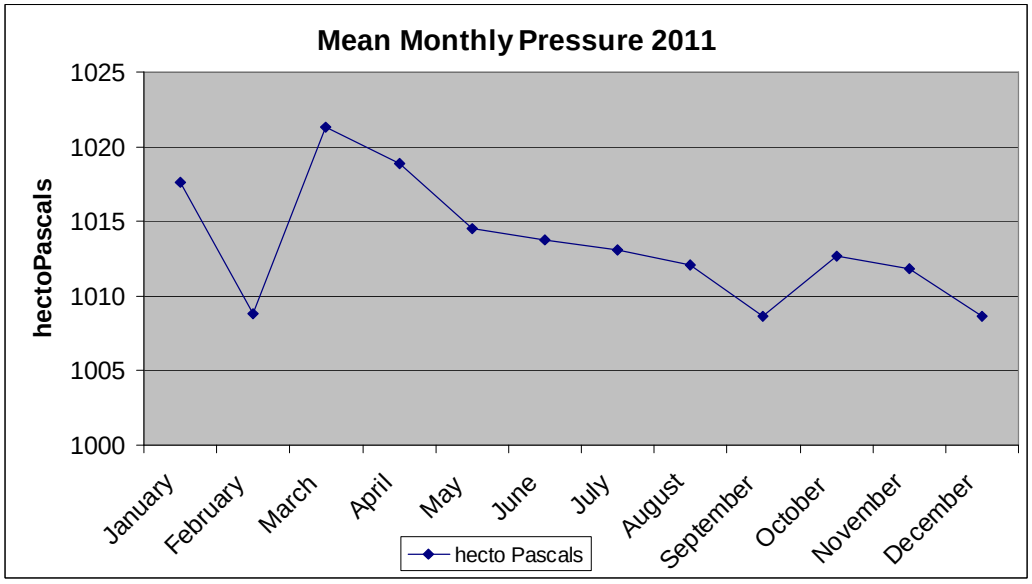



**Figure 13 - Average Daily Atmospheric Pressure by Month 2011**

## 4.0 RESOURCE & ENERGY CONSUMPTION

Resources consumed at Dunsink Landfill include diesel fuel, electricity and hydraulic oil. There were three main consumer entities operating on site:

- Fingal County Council (FCC)
- Contractors
- Bioverda Power Systems (BPS)

## 4.1 FINGAL COUNTY COUNCIL

The compound offices were connected to the national electricity grid in March 2005. The compound offices are no longer occupied, and FCC at Dunsink consumes electricity at the pump house. FCC did not consume hydraulic oil. The main component of FCC's resource and energy consumption was electricity. (Table 11).

## 4.2 CONTRACTORS

Contractors on site consumed diesel fuel in the operation of their plant, which comprises; mainly one JCB (Table 11)

## 4.3 BIOVERDA POWER SYSTEMS

BPS on site consumed more electricity and lubricant oil when compared to 2010. They consumed less diesel and landfill gas than in previous years (Table 11). This reflects the downturn in landfill gas utilisation.

**Table 12: Summary of Resources used on site for the reporting period**

| Resource | FCC | Contractors | BPS | Total 2011 | Total 2010 | Total 2009 |
|---|---|---|---|---|---|---|
| Electricity MWh | 69* | Nil | 87 | 156* | 132* | 399 |
| Diesel Vehicles | 3,000* | 8,100* | Nil | 11,100* | 11,100* | 11,100* |
| Diesel Pump | Nil | Nil | Nil | Nil | Nil | Nil |
| Hydraulic Oil | Nil | 60* | Nil | 60* | 60* | 60* |
| Lubricating Oil | Nil | 200* | 2,800 | 3,000* | 2,180* | 5,875* L |

*Estimates

## 5.0 VOLUME OF LEACHATE PRODUCED AND DISCHARGED OFF-SITE

A flow metre measuring volumes of leachate produced from the facility or volumes of leachate discharged off-site was installed with the new pump house in June 2005. However, during 2004 efforts were made to get estimates for leachate production in Dunsink to determine the appropriate capacity of current and proposed leachate infrastructure. It was considered important in view of the daily discharge limit of 1,400$m^3$ imposed by the Sanitary Authority (Dublin City Council) to determine responses should this limit be breached.

## 5.1 METHODS FOR ESTIMATING LEACHATE PRODUCTION

An annual water balance calculation was performed to estimate leachate production in Dunsink. This figure is compared with figures measured as discharged offsite (See Table 12).

### 5.1.1 Water Balance Calculations

In calculating the water balance for Dunsink the formula used was taken from Environmental Protection Agency (EPA) guidelines (EPA 2000)[1]. Rainfall data from Dublin airport Meteorological station are used in this calculation. Data from 2011 is used in the average and scenario calculations.

Lo = [ER(A) + LW + IRCA + ER(l)] – [aW]
Whereby;
**ER** = effective rainfall (m).
**A** = Area of cell ($m^2$).
**LW** = Liquid waste (also includes excess water from sludges) $M^3$.
**IRCA** = Infiltration through restored and capped areas ($m^3$).
**l** = Surface area of lagoons ($m^2$).
**a** =absorptive capacity of waste $M^3$/t.
**W** = weight of waste deposited.

**ER** = Total Rainfall (R) minus Actual Evapotranspiration (AE).
For Dunsink landfill, following the guidance given in the EPA guidelines the ER is taken as R.
Total rainfall (R) for Dunsink in 2011 was 671.8mm or **0.6718m**.

**A=** The landfill area is 154 acres or 62.3 hectares or **623000$m^2$**. No area is active, there has been no dumping of municipal waste for over seven years.

ER(A)=0

[1] Environmental Protection Agency (2000). Landfill Manuals; Landfill Site Design. EPA, Ireland. ISBN 1 84095 026 9

LW = Liquid waste is not deposited in Dunsink. $0m^3$.

IRCA = In areas that have been temporarily capped / restored an infiltration rate of 25-30% of the annual rainfall should be used. In areas which have been restored an infiltration rate of 2-10% should be applied. Given that the landfill is now restored 10% will be used as the infiltration rate through restored and capped areas.
10% of ER = 0.06718. 623,000m2 X 0.06718m

IRCA= $41,853.14m^3$
l = In Dunsink the area of the lagoon is $6,000m^2$, ER=0.6718
ER(l) =$4,030.8m^3$

**aW** = The total volume of waste has been calculated roughly, as 3.3 million $m^3$ on the basis of volume of three phases of landfill. It has also been roughly estimated that approximately 5,000,000 tonnes of waste have been deposited in Dunsink based on figures available from 1994 for annual inputs to the site. On this basis the roughly estimated waste density is $1.5t/m^3$. This is very high and may be due to compaction by its overburden of subsoil or fill. The absorptive capacity of waste falls to negligible or none per tonne of waste before leachate is generated at densities greater than $1.2t/m^3$, **aW=0 $m^3$/tonne**

Lo = [ER(A) + LW + IRCA + ER(l)] – [aW]

Lo = [0 + 0 + 41,853.14+ 4,030.8] – [0]

**Lo = 45,883.94$m^3$ pa**
**Lo = 125.71$m^3$ /d**
**Lo = 5.24$m^3$ /hr**

### 5.1.2 Scenario Building

This rough estimate should be viewed in the context of varying annual rainfall over a year period. Water balance calculations should be carried out for a number of scenarios such as average monthly leachate volumes to be generated (See Table 12).

**Table 13: Estimates of Leachate Production: Average Monthly rainfall recorded at Dublin Airport 2011 (Source: Met Éireann)**

| 2011 | Rain (mm) | Rainfall % Total | Estimated Monthly Leachate Production $M^3$ |
|---|---|---|---|
| January | 29.1 | 4.33 | 1987.5 |
| February | 76.2 | 11.34 | 5204.5 |
| March | 19.2 | 2.86 | 1311.4 |
| April | 28.6 | 4.26 | 1953.4 |
| May | 37 | 5.51 | 2527.1 |
| June | 64.3 | 9.57 | 4391.7 |
| July | 42.6 | 6.34 | 2909.6 |
| August | 39.7 | 5.91 | 2711.5 |
| September | 65 | 9.68 | 4439.5 |
| October | 169.7 | 25.26 | 11590.5 |
| November | 48.4 | 7.20 | 3305.7 |
| December | 52 | 7.74 | 3551.6 |
| Total 2011 | 671.8 | 100.0 | 45883.9 |

The EPA guidelines (EPA, 2000) suggest a peak flow factor of 3 to 5 times the predicted average flow rate should be used when sizing plant / pipe work. Therefore using 2011 rain data and allowing for the now completed restoration of Dunsink, an adequate pump station should be able to handle about ($5.24m^3$ * 3) to ($5.24m^3$ * 5) or 15.72 $m^3$/hr to 26.2 $m^3$/hr during wet weather flow. During 2011, the volume of leachate discharged to public sewer was 147,693$m^3$ which equates to 16.86$m^3$/hr.

### 5.1.3 Results

Water balance calculations from EPA guidelines for Dunsink during peak wet conditions suggest that leachate production / discharge could be in the range of 378-630$m^3$ /day.

### 5.1.4 Discussion

The results presented above are estimates only. The results from this exercise (EPA model), indicate that Dublin City Council's discharge limit of 1,400$m^3$/day would not be breached and the leachate lagoon would not ordinarily be needed to deal with any excess leachate generated. The lagoon has a capacity of 26,700$m^3$. The pump house design facilitates pumping a maximum of 20 litres/s or 72$m^3$ / hr or 1,728$m^3$ / day and the modelled leachate production is well below this.

The new pumping arrangements installed during June 2005 provide data for the volume of leachate generated at the facility (Table 13).

**Table 14: Estimates of Leachate Production and Volumes Measures as Discharged from site**

| 2011 | Rain mm | % | Estimated Monthly Leachate Production $M^3$ | Volume Discharged as Measured By Flow Metre |
|---|---|---|---|---|
| January | 29.1 | 4.33 | 1987.5 | 20,938 |
| February | 76.2 | 11.34 | 5204.5 | 26,022 |
| March | 19.2 | 2.86 | 1311.4 | 14,748 |
| April | 28.6 | 4.26 | 1953.4 | 8,425 |
| May | 37 | 5.51 | 2527.1 | 5,869 |
| June | 64.3 | 9.57 | 4391.7 | 6,162 |
| July | 42.6 | 6.34 | 2909.6 | 6,363 |
| August | 39.7 | 5.91 | 2711.5 | 7,695 |
| September | 65 | 9.68 | 4439.5 | 7,575 |
| October | 169.7 | 25.26 | 11590.5 | 10,468 |
| November | 48.4 | 7.20 | 3305.7 | 14,482 |
| December | 52 | 7.74 | 3551.6 | 18,945 |
| Total | 671.8 | 100.0 | 45,883.9 | 147,692 |
| | | | | |

The estimated monthly leachate production is significantly and substantially less than the actual volumes measured as discharged from site. There maybe a groundwater influence in leachate generation at the site which accounts for this anomaly. The EPA water balance calculation is based on rainfall contribution to leachate generation.

Since 2006 a significant rise in leachate pumped off-site has occurred and it is considered that this is partially explained by the emplacement of two major leachate interception drains at the north and south of the facility. These leachate interception

drains are obviously harnessing significant amounts of leachate and contributing to the leachate load at Dunsink.

### 5.1.5 Conclusion

Given all the results presented above (the varied estimates for leachate production and the actual volumes discharged offsite), it is suggested that the pump house design, in conjunction with the option to use the lagoon periodically provides sufficient capacity for dealing with the estimated leachate generated in the landfill. The completion of the restoration of the site during 2008 and 2009 has led to a reduced estimate of the amount of leachate generated by the facility through the water balance calculations. However the progress in landfill restoration has ultimately resulted in greater leachate collection and consequent increased volumes of leachate being discharged offsite. Nevertheless, the data provided by the leachate flow metre continues to vindicate the capacity designed into the leachate infrastructure.

## 5.2 ANNUAL WATER BALANCE CALCULATIONS AND INTERPRETATIONS

### 5.2.1 Introduction

The actual water balance calculations are outlined in detail in Section 5.1.

### 5.2.2 Discussion and Interpretation

It must be stated that the results are estimates only and based on many assumptions, which may or may not be correct. Furthermore data from key variables, such as depth of waste, proximity of groundwater table and effect of springs within waste body, are unavailable.

(i) Previous estimates of the wet weather flow and dry weather flows for leachate were prepared by FCC in 2003 on the basis of direct measurements. These estimates calculated Wet Weather Flow leachate volumes in the range of 1242-1656$m^3$/day and 414$m^3$/day during dry weather flow.

(ii) Water balance calculations are presented in Section 5.1.1 from EPA guidelines for Dunsink during peak wet conditions. They suggest that peak leachate production / discharge could be 630$m^3$/day during wet weather and 378$m^3$/day during Dry Weather Flow.

(iii) During 2011, the volume of leachate discharged to public sewer was 147,693$m^3$ which equates to 16.86$m^3$/hr. (See Table 13). This suggests that average leachate production/discharge over the year is 404$m^3$/day.

These figures must be seen in the context of the bedrock geology and aquifer status of the site. The regional view of the vicinity of the Dunsink Landfill is of a low yielding aquifer.

### 5.2.3 Conclusion

The results from water balance calculations and from the pump house flow-metre are very different in terms of leachate modelled as generated on site and leachate volumes pumped off-site. However both sets of results validate the choice of leachate pump house design, which was based on empirical measurements of leachate flowing through the existing infrastructure. The pump house design facilitates pumping a maximum of 20 litres/s or 72$m^3$ / hr or 1728$m^3$ / day. Dublin City Council allows a maximum discharge of 1400 $m^3$ / day.

The worst case scenario for Dunsink from wet weather flows derived from previous estimates at 1,656$m^3$/day exceeds this limit. In instances when the pump-house cannot pump away volumes as they are generated from the facility the system is self regulating. During Wet Weather Flow peak flows in excess of the limit are rare and short in duration. When they do occur the automatic valve opens and closes to regulate the level of leachate in the sump and facilitate controlled discharge of leachate to public sewer or the lagoon. The lagoon has additional capacity of 26,700$m^3$ and if empty would have capacity for 16+ days pumping to lagoon during wet weather flow. This contingency provides for scenarios whereby pumping to the public sewer would not be feasible for any reason.

The results suggest that the pump house design, in conjunction with the option to use the lagoon periodically may provide sufficient capacity for dealing with the estimated leachate generated in the landfill.

## 5.3 ESTIMATED ANNUAL AND CUMULATIVE QUANTITY OF INDIRECT EMISSIONS TO GROUNDWATER

### 5.3.1 Emissions to Groundwater - Introduction

At present there are no estimates for annual and cumulative quantities of indirect emissions of leachate to groundwater.

Inferences are made from estimates in Sections 5.1.1 (estimates of leachate going through leachate management infrastructure during Wet Weather Flow) and 5.1.2 (estimates of leachate generated at the facility based on water balance calculations). At the outset, it must be stated that this is an exercise fraught with difficulties in that these estimates are based upon many assumptions, which may or may not be correct. Furthermore; data from key variables such as depth of waste, proximity of groundwater table and effect of springs within the facility; are unavailable.

Nevertheless the volumes of leachate discharged from the facility consistently and substantially exceed those estimated from water balance calculations.

#### **5.3.1.1** Dry weather flow

The leachate infrastructure and discharge consents from Dublin City Council are more than adequate to deal with the volumes of leachate generated in Dunsink during dry

weather flow. This suggests that there may be no indirect emissions to groundwater during Dry Weather Flow conditions.

#### **5.3.1.2** Wet weather flow

The leachate infrastructure system seems to be "flashy" i.e. the amount of leachate going through the system rapidly increases following rainfall events. For all but the highest peaks in wet weather flow the leachate infrastructure and discharge consents from Dublin City Council are more than adequate to deal with the volumes of leachate generated in Dunsink and there is little risk of contamination of groundwater.

In instances when the pump-house cannot pump away volumes as they are generated from the facility the system is self regulating. Peak discharges during Wet Weather Flow are rare and short in duration, the automatic valve opens and closes to regulate the level of leachate in the sump and facilitate controlled discharge of leachate to public sewer or the lagoon.

### 5.3.2 Bedrock Geology of the site and Aquifer Status

The western half of the landfill is underlain by Waulsortian Limestones. The GSI classify the County Meath Waulsortian Limestones as L1, bedrock which is moderately productive only in local zones and this can be assumed to be the case for Dunsink.

The central part of the landfill is underlain by the Tober Colleen formation. The thinly bedded mudstones of the Tober Colleen formation which underlie the Calp Limestone have been classified by the GSI as Pu, bedrock which is generally unproductive due to the low permeability of the bedrock.

The eastern part of the site is underlain by basinal limestones consisting of limestone turbidites with bioclastic and calcareous mudstones. The GSI classify the County Meath Waulsortian Limestones as L1, bedrock which is moderately productive only in local zones and this can be assumed to be the case for Dunsink.

There is a minor faulting in the vicinity of the site and there is a minor fault running in a north-west south-east direction through the site.

A number of boreholes have been drilled into the bedrock on the site and a visual inspection of the drill chips from the monitoring boreholes indicated the site to be generally underlain by the soft black basinal (Calp) limestones and mudstones. These were recorded at all boreholes that were drilled to bedrock. The hardness and shade of the rock varied between boreholes between different depths within the same borehole. The Calp Limestone of County Dublin has been classified in the GSI Groundwater Protection Scheme as a L1 aquifer, bedrock which is generally moderately productive.

The monitoring well drilling programme confirmed the regional view of the vicinity of the Dunsink Landfill as generally low yielding aquifer.

### 5.3.3 Conclusion

On the basis that

(1) The underlying geology and overburden have produced a localised classification of the aquifer as generally low yielding.
(2) Measured volumes of leachate discharged from the facility are consistently and substantially higher than those calculated through water balance calculations.
(3) The groundwater monitoring programme indicates that groundwater around the facility is generally good;

It is considered that indirect discharges to groundwater are not significant in volumes or effect.

# 6.0 WORKS PROPOSED AND UNDERTAKEN & TIMESCALE FOR THOSE PROPOSED DURING THE COMING YEAR

## 6.1 WORKS UNDERTAKEN DURING 2011.

The phased handover of the landfill and surrounding areas to the Parks Department was completed by December 2009. The Environment Department continued with all monitoring obligations as set out in the landfill license.

In 2011, Fingal County Council Operations Department have been working closely with the Irish Horse Welfare Trust and local horse owners in Dunsink in an effort to address and regulate the situation with regard to the wandering horses in Dunsink.

The Council, the Irish Horse Welfare Trust and the owners have now formed a club, which regulates the numbers of animals on the site, all of the horses are now microchipped and passported, and traceable to their owners.

Temporary stables have been installed to provide shelter for the horses for the winter season.

## 7.0 SITE SURVEY INDICATING EXISTING LEVELS OF THE FACILITY

Fingal County Council sought approval from the Environmental Protection Agency on the 13/08/2009, (letter Ref FCC-127-1-2009-010) not to undertake a topographic survey in 2009. This was due to the fact that there was no importation of soil into the restored landfill and no subsidence was anticipated. Approval was given by the EPA on the 20/08/2009 by telephone from Mr Eamonn Merriman. Figure 15 below shows the topographic status of the landfill as established by the most recent topographic survey completed in 2007.

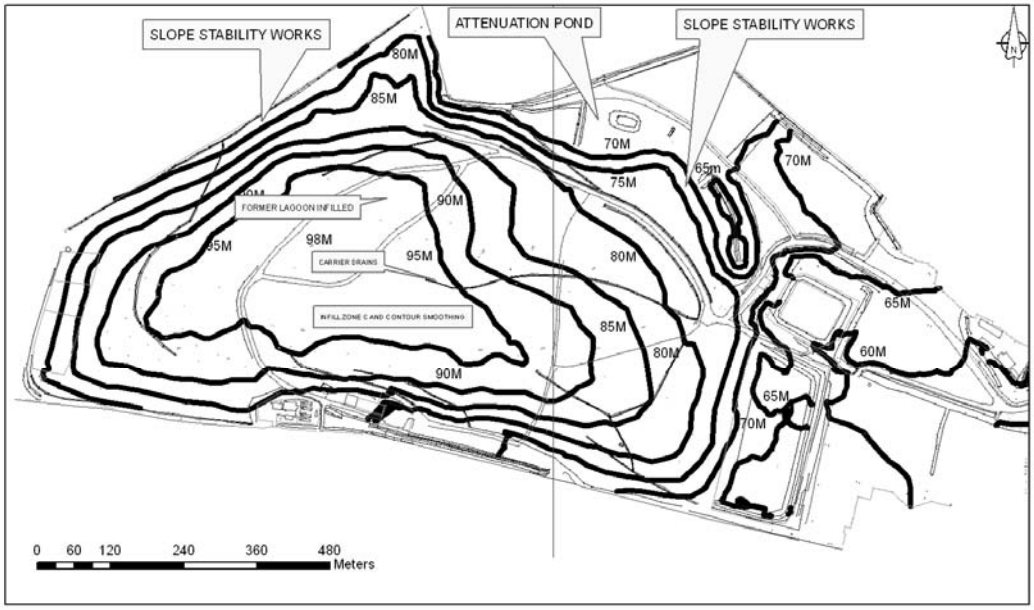





**Figure 14: Simplified Topographical Map of Dunsink 2007**

## 8.0 ESTIMATED ANNUAL & CUMULATIVE QUANTITY OF LANDFILL GAS EMITTED

In early 1996 a gas collection network was first configured throughout the whole landfilled portion of Dunsink. In 1999 the collection network was replaced by a larger more extensive arrangement.

It is comprised of a high-density polyethylene (HDPE) ring main around the site with a number of branch lines, which contains manifolds that connect to individual gas extraction wells.

There are approximately eighty-five gas extraction wells currently connected to manifolds throughout the site. Some of the wellheads are buried so it is not physically possible to confirm their condition or truly assess their performance. An additional thirteen gas wells were installed in Zone A and six additional gas wells were installed in Zone C during 2006.

There are ten branch lines off the main collection ring. These branches are 250mm in diameter and have multi-outlet manifolds configured to collect the gas from the wells in their vicinity. Each branch can be isolated where it connects to the main line. The manifold arrangement allows the line from the individual wells to be sampled and controlled. This has the effect of balancing the "good gas" with the bad to maintain the optimum quality to the utilisation plant.

The mainline ring is a 355mm HDPE pipe that completely encircles the landfill and finishes back at the utilisation plant compound. It has two dewatering chambers, one next to the old main landfill entrance and the other adjacent to the IPS compound, where the collected condensate is returned to the waste body via a disused extraction well. This ring main can be isolated in a number of locations to permit maintenance operations and still maintain operation of the utilisation plant.

The extraction pump which feeds the remaining generator (one was removed from site during 2006) is capable of collecting three thousand cubic metres of gas per hour at a maximum suction pressure of –150mbar. It is currently delivering approximately three hundred and fourty cubic metres per hour at a quality of 49%$CH_4$. In the unlikely event the engine is out of service for an extended duration, the integral flare can be run to maintain negative pressure on the landfill.

## 8.1 LANDFILL GAS CONSUMED BY UTILISATION PLANT 2011

Figures for landfill gas emitted from the facility are derived from data submitted by Bioverda Power Systems for the utilisation plant in Dunsink. The migration issues of previous years are largely resolved and the utilisation plant controls the vast majority of the landfill gas emitted. The figures for 2011 are presented in Table 14.

## 8.2 LANDFILL GAS CONSUMED BY UTILISATION PLANT AND GENERATED BY FACILITY 1996-PRESENT

The amount of landfill gas utilised by the plant has continued to trend downwards as would be expected but utilisation is dropping less sharply in recent years than the period 2003-2005.

It was reported last year that the rate of landfill gas generation at the facility is continuing to drop but the generation shows that the amount of gas being consumed at the facility is less than the GasSim model in 2009. In 2009 and 2010 the gas engine would occasionally 'run out of gas' at viable concentrations indicating that the gas field production is decreasing at an increasing rate. That trend continued in 2011 with the engine regularly 'running out of gas' and having to be restarted after giving the field an opportunity to recover, typically 48-60 hours.

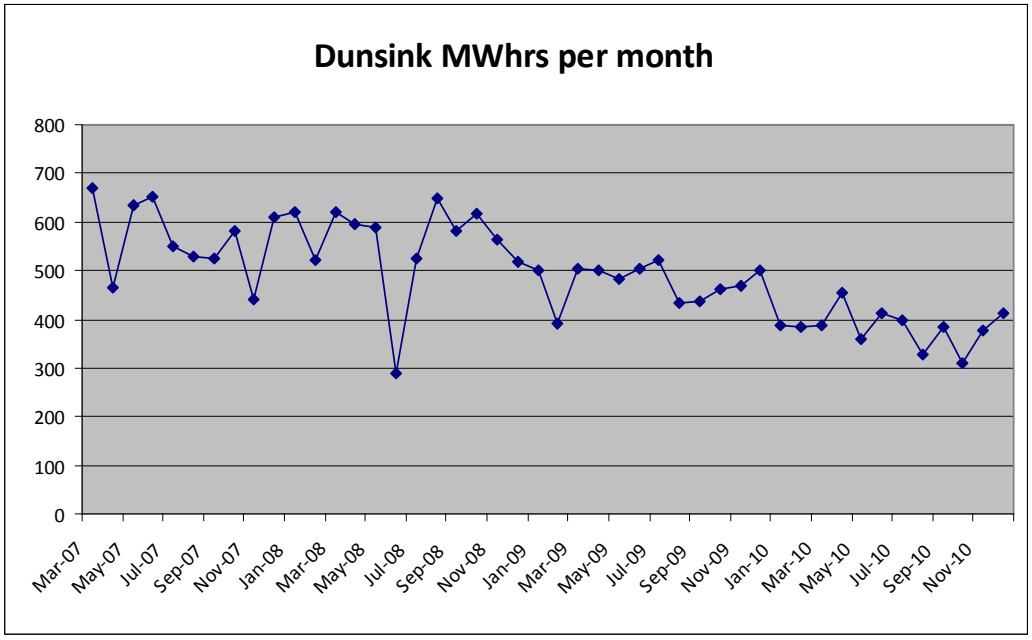



**Figure 15 - MWhr exported per month at Dunsink.**

Bioverda are reporting that supply of gas has dropped sharply. It is considered that landfill gas migration is not an overwhelming issue at Dunsink and it is suggested that these figures reflect a downward pattern over time of landfill gas emitted from the facility.

The landfill gas network was extended during 2006. Given the definite pattern and direction in landfill gas generation and utilisation there appeared to be enough data to provide for the specification of an enclosed flare. The enclosed flare should cater for the needs of Landfill Gas Management in Dunsink for the next twenty years. The enclosed flare was delivered to site in December 2007 and was installed and commissioned during the first quarter of 2008 and is now operated by Fingal County Council

**Table 15 - Landfill Gas Consumed by BPS utilisation plant in Dunsink during 2011**

| | Units | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diesel | Litres | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Electricity Consumed | Kwhrs | 8973 | 7220 | 6743 | 6160 | 7849 | 6125 | 7737 | 7383 | 7536 | 7726 | 5133 | 8992 | 87577 |
| Oil (Lubrication) | Litres | 0 | 350 | 0 | 350 | 300 | 250 | 250 | 0 | 300 | 350 | 350 | 300 | 2800 |
| Landfill Gas | 1000' Cubic metres | 226 | 207 | 256 | 225 | 216 | 243 | 228 | 254 | 210 | 221 | 279 | 213 | 2778 |
| Average Monthly Ch4 | % by Volume | 48 | 50 | 50 | 50 | 49 | 48 | 48 | 49 | 50 | 50 | 49 | 49 | 49 |
| Electrical units exported (power output) | MWhrs | 323 | 296 | 365 | 321 | 308 | 347 | 326 | 363 | 300 | 316 | 398 | 304 | 3967 |

Data compiled and verified by: Simon Kelly, Greenstar GDA and BPS Engineering Manager

## 9.0 REPORT ON PROGRESS TOWARDS ACHIEVEMENT OF ENVIRONMENTAL OBJECTIVES AND TARGETS CONTAINED IN PREVIOUS YEAR'S REPORT.

This is the eighth AER under this Licence. In 2011 the majority of objectives for the facility nearing completion were fully completed and the Enclosed Flare was commissioned and handed over to Fingal County Council.

- The Phased Handover of the landfill and surrounding areas to the Parks Department which began in 2008 was completed as of December 2009
- Capping works, final landscaping and slope stability maintenance were completed in 2009.
- Environmental Infrastructure Inspection, Maintenance and Monitoring were ongoing in 2011

## 10.0 SCHEDULE OF ENVIRONMENTAL OBJECTIVES AND TARGETS 2011

The schedule of environmental objectives is complete and has now been withdrawn from the AER.

## 11.0 PROCEDURES DEVELOPED RELATING TO THE FACILITY OPERATION

No new Standard operating procedures (SOP`s) were introduced in 2011.

## 12.0 TANK, PIPELINE AND BUND TESTING AND INSPECTION REPORT

The leachate lagoon and bund tests were last conducted in October 2007. Conditions 3.10.5 and 5.10.2 of the licence require that the test be carried out every three years by an independent and appropriately qualified chartered engineer.

### 12.1 LAGOON

An integrity test is currently being conducted on the Lagoon in Dunsink. The previous integrity test was completed during October 2007. A new integrity test was carried out in late January 2012 – the results of which are not available at time of printing this report. The results of the integrity test will be submitted to the Agency shortly.

### 12.2 OIL BUND IPS COMPOUND- DUNSINK

An integrity test was conducted during October 2007 on the oil bund on the IPS compound. The bund integrity was found to be good, it was watertight and found fit for its intended use. Oil is no longer stored in the compound – it is therefore proposed not to carry out further integrity test on the disused bund.

# 13.0 REPORTED INCIDENTS AND COMPLAINTS SUMMARIES

## 13.1 REPORTED ENVIRONMENTAL INCIDENTS

There were 98 reported incidents last year reported under condition 1.6 c) "Any trigger level specified in this licence which is attained or exceeded"; and d) "Any indication that environmental pollution has, or may have, taken place." Forty of these were notified to the Eastern Regional Fisheries Board during 2011.

**Table 16: Summary of reported incidents during 2011**

| | **EPA Notified** | | | | | **ERFB* Notified** |
|---|---|---|---|---|---|---|
| | Surface Water | Groundwater | Landfill Gas | Dissolved Methane | Noise | Surface Water & Groundwater |
| **Month** | **2011** | **2011** | **2011** | **2011** | **2011** | **2011** |
| **January** | 4 | | 4 | | | 4 |
| **February** | 4 | | 4 | | | 4 |
| **March** | 5 | 1 | 5 | | | 5 |
| **April** | 4 | | 4 | | | 4 |
| **May** | 6 | 1 | 5 | 1 | | 6 |
| **June** | 2 | | 4 | | | 2 |
| **July** | 1 | | 4 | | | 1 |
| **August** | 1 | | 5 | | | 1 |
| **September** | 2 | 2 | 4 | | | 2 |
| **October** | 2 | | 4 | | | 2 |
| **November** | 5 | | 4 | | | 5 |
| **December** | 4 | 1 | 4 | 1 | | 4 |
| **Total** | **40** | **5** | **51** | **2** | **0** | **40** |

* Eastern Regional Fisheries Board.

A summary of the environmental incidents distributed by month and thematic area is provided in Table 15.

Table 15 indicates an increase in the number of incidents in 2011 compared to 2010. The number of landfill gas incidents is similar to last year. They primarily relate to regular breaches of trigger levels for carbon dioxide at the Sports field and on the monthly rounds at Dunsoghly and Cappagh boundaries.

Surface water incidents have increased since 2010, and the incidents primarily related to elevated levels of conductivity and ammoniacal nitrogen which are unlikely to relate to the landfill. These were discussed in section 3.2.2.

There were two exceedances of the ELV for Dissolved Methane in 2011 which was at the Leachate Sump in Q2 and Q4.

The EPA was notified of all incidents. The ERFB were notified on all incidents pertaining to surface water and Dublin City Council continues to be informed in relation to Dissolved Methane.

## 13.2 REPORTED ENVIRONMENTAL COMPLAINTS

Condition 10.4 of Licence 127-1 requires that the licensee shall maintain a written record of all complaints relating to the operation of the facility. No complaints were received by FCC during 2011.

It is considered that with the closure and completed restoration and improvements to landfill infrastructure since the end of 2009, the landfill is now less of an issue for its surroundings. This is a continuation of the trend in recent years. There were no complaints in 2009 while in 2008 there were just two complaints, compared with five for 2004, one for 2005 and two for 2006.

## 14.0 REVIEW OF NUISANCE CONTROLS

Condition 7 of Waste Licence 127-1 requires that vermin, birds, flies, mud, dust, litter, noise and odours do not give rise to nuisance at the facility or in the immediate area of the facility.

To this end a Nuisance Monitoring Programme was instigated. This involves weekly inspection of the nuisances stated in Condition 7.1, but also includes those associated with security, surface water and leachate. The nuisance inspection is conducted in conjunction with the weekly Surface Water Visual Inspection. The facility and some adjoining areas are separated into seven zones. A checklist was designed and is filled in weekly since inspections were formalised in August 2004. The nuisance-monitoring programme feeds into the Environmental Management System, in that if nuisances are detected which are not considered incidents under Condition 1.6 of the licence – Corrective Action Procedures are invoked. If nuisances are detected which are considered incidents under Condition 1.6 of the licence, procedures listed under condition 9.1 are adhered to. The records for weekly inspections are available in the facility office. A template of the nuisance inspection form is attached in Appendix IV.

# 15.0 FINANCIAL PROVISION, MANAGEMENT, STAFFING STRUCTURE & PROGRAMME FOR PUBLIC INFORMATION

## 15.1 FINANCIAL PROVISION

With regard to the uptake of Environmental Liability Risk Assessment (ELRA), Residuals Management Plans (RMP), Closure Remediation and Aftercare Plans (CRAMP) and Financial Provision (FP), please find the following information in relation to Dunsink Landfill.

Risk Category as derived using the system set out in the Guidance Document. This specific exercise has not been carried out to date. However on looking at the guidance document it appears similar to the "Methodology for Determining Enforcement Category of Licences". This exercise gave Dunsink an A2 enforcement category which would probably equate to a **Risk Category 3** classification.
The facility's RMP/CRAMP was the culmination of a series of proposals beginning in June 2005 and was agreed by *the Agency* during 2005. The series of proposals are referenced and detailed below and *the Agency* would have received copies in triplicate.

**Table 17 - Dunsink RMP/CRAMP**

| FCC-127-1-2005- | LETTER DATED | POST TO EPA 127-1 REGARDING |
|---|---|---|
| FCC-127-1-2005-015 | 09/06/2005 | Restoration and aftercare plan |
| FCC-127-1-2005-022 | 28/07/2005 | Restoration and aftercare plan & SEW Leachate Management & Drainage |
| FCC-127-1-2005-025 | 13/09/2005 | Restoration and Aftercare Plans and achievement of final profile |
| FCC-127-1-2005-026 | 19/09/2005 | Slope Stability Survey |
| FCC-127-1-2005-027 | 23/09/2005 | Restoration & Aftercare plans Drilling Wells |

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

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

## 15.2 MANAGEMENT AND STAFFING STRUCTURE

The following comprise the current management structure for Dunsink Landfill in 2011.

***Licence Compliance***

| | |
|---|---|
| **Senior Engineer:** | John Daly. |
| **Waste Infrastructure and Enforcement:** | John Daly. B.E. (Civil Engineering), M.Sc (Environmental Engineering), MIEI |
| **Assistant Scientist:**, | Mr. A. Kerveillant. Management of waste licence conditions & License Compliance. M.S.c Environment |

***Landfill Management***

| | |
|---|---|
| **Senior Engineer:** | Mr. Gary O'Brien. Manager of Castleknock / Mulhuddart Operational Area, |
| **Senior Executive Parks Superintendant:** | Ruairi O'Dulaing. Responsibility For Parks Development and transition |
| **District Supervisor:** | Ted Lynch Coolmine Depot District Supervisor. Responsibility for overseeing Landfill management operations |
| **Assistant Foreman:** | Paul Rattigan, Management of Landfill, |

## 15.3 PROGRAMME FOR PUBLIC INFORMATION.

Public information can be viewed at the **Council's Headquarters** between 9.30 a.m. and 12.45 p.m. and 2.00 p.m. and 4.00 p.m. Monday to Friday (excluding public holidays), unless otherwise arranged by prior appointment.

- Facilities for viewing information from a computer or files are provided at Dunsink Facility office by prior arrangement with the Landfill Manager

- The website (www.fingalcoco.ie) was last updated in November 2010. It informs that the remediation and restoration phase is now complete, and also has the licence available for download.

- Site visits to **Dunsink Landfill** can be arranged by applying in writing to the Landfill Manager requesting a date and time for the proposed visit and indicating the number of visitors and the purpose of such a visit and whether any presentation is required. The use of cameras and video equipment during the visit must be agreed in advance with Fingal County Council. Such requests will be accommodated where possible. Operational and security matters will take precedence and visits may be cancelled at short notice.

- The work undertaken by Fingal County Council, the Irish Horse Welfare Trust and the local horse owners has been publicised through the media during the year, including a report on the RTE "Ear to the Ground" show.

## 16.0 STAFF TRAINING REPORT

As activities at the landfill have gradually decreased since the closure and restoration phases during 2008 and 2009, training requirements have also decreased. Manual Handling training of the site operatives took place in 2009. No training took place in 2011.

## GLOSSARY

| | |
|---|---|
| **Aftercare** | Any measures that are necessary to be taken in relation to the facility for the purposes of preventing environmental pollution following the cessation of the activity in question at a facility. |
| **Annually** | At approximately twelve monthly intervals. |
| **Aquifer** | A formation (e.g. body of rock, gravel or sand stratum) that is capable of storing significant quantities of water and through which groundwater moves. |
| **Baseline monitoring** | Monitoring in and around the location of a proposed facility so as to establish background environmental conditions prior to any development of the proposed facility. |
| **Borehole** | A shaft installed outside a waste area for the monitoring of and/or extraction of landfill gas/groundwater. Established by placing a casing and well screen into the boring. If installed within the waste area, it is called a well. |
| **Bunding / Berm** | A dike or mound usually of clay or other inert material used to define limits of cells or phases or roadways; or to screen the operation of a landfill from adjacent properties; reducing noise, visibility, dust and litter impacts. |
| **Capping** | The covering of a landfill, usually with low permeability material (landfill cap). |
| **Condensate** | The liquid which forms within the gas pipe work due to the condensation of water vapour from landfill gas. |
| **Detection limit.** | The concentration of the determinant for which there is a 95% probability of detection when a single analytical result is obtained, detection being defined as obtaining a result which is significantly greater (p=0.05) than zero. Also referred to as Limit of Detection. |
| **Direct discharge** | The introduction into groundwater of List I or II substances without percolation through the ground or subsoil. |
| **Downgradient** | The direction towards which groundwater or surface water flows. |
| **Emission** | Meaning assigned by the EPA Act of 1992. |
| **Flare unit** | A device used for the combustion of landfill gas thereby converting its methane content to carbon dioxide. |
| **Gas wells** | Wells installed during filling or retrofitted later within the waste area for the monitoring of and/or removal of landfill gas either actively through an extraction system or passively by venting. |
| **Groundwater** | Groundwater is that part of the subsurface water which is in the saturated zone. |
| **Hydrogeology** | The study of the interrelationships of the geology of soils and rocks with groundwater. |

| | |
|---|---|
| **Indirect discharge** | The introduction into groundwater of List I or II substances after percolation through the ground or subsoil. |
| **Inert landfill** | A landfill that accepts only inert waste that fulfils the criteria set out in the Agency's draft manual "Waste Acceptance". |
| **Lagoon** | A land area used to contain liquid, e.g.leachate collected from landfill. |
| **Landfill** | Waste disposal facility used for the deposit of waste on to or in to land. |
| **Landfill gas (LFG)** | All gases generated from the landfilled waste. |
| **Leachate** | Any liquid percolating through the deposited waste and emitted from or contained within a landfill as defined in Section 5(1) of the Waste Management Act. |
| **Leachate Well** | Well installed within the waste area for the monitoring and/or extraction of leachate as opposed to borehole, which is the term, used when located outside the waste deposition area. |
| **List I/II substances** | Substances referred to in the EU Directives on Dangerous Substances (76/464/EEC) and Groundwater (80/68/EC). |
| **Lower explosive limit (LEL)** | The lowest percentage concentration by volume of a mixture of flammable gas with air which will propagate a flame at 25$^{o}$C and atmospheric pressure. |
| **Macroinvertebrate** | Larger invertebrate animals visible to the eye. Usually defined as those that are retained by a net or sieve of mesh size 0.6mm. |
| **Minimum reporting value** | This is the lowest concentration of a substance that can be determined with a known degree of confidence. It is a matrix dependent and not necessarily equivalent to the Limit of Detection of the analytical system but is generally a multiple of that value which reflects the robustness and reproducibility of the test method as applied to the specific matrix. Also referred to as the limit of quantitation or practical reporting limit. |
| **Noise Sensitive Location** | (NSL) Any dwelling-house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels. |
| **Quarterly** | At approximately three monthly intervals. |
| **Receiving water** | A body of water, flowing or otherwise, such as a stream, river, lake, estuary or sea, into which water or wastewater is discharged. |
| **Restoration** | Works carried out on a landfill site to allow planned afteruse. |
| **Substrata** | River bed or bottom on or in which invertebrates live. |
| **Taxa** | Named taxonomic groups. Usually family or species level in biotic indices. |

| | |
|---|---|
| **Trigger level** | A parameter value specified in the licence, the achievement or exceedance of which requires certain actions to be taken by the licensee. |
| **Upper explosive limit (LEL)** | The highest percentage concentration by volume of a mixture of flammable gas with air which will propagate a flame at 25$^{o}$C and atmospheric pressure. |
| **Void space** | Space available to deposit waste. |
| **Water balance** | A calculation to estimate a volume of liquid generated. In the case of landfills, water balance normally refers to leachate generation volumes. |

# APPENDIX I

**Q1 - Dunsink Groundwater March 2011**

| Parameter | Unit | Threshold Value | BH3 | BH3 Control Values | BH3 Trigger Values | BH4 | BH4 Control Values | BH4 Trigger Values | BH16 | BH16 Control Values | BH16 Trigger Values | BH27 | BH27 Control Values | BH27 Trigger Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| pH | pH Units | **6.5 - 9.5** [1] | 7.3 | 8 | 8.38 | 7.22 | 8.2 | 8.59 | 7.58 | 8.24 | 8.64 | 7.17 | 8.18 | 8.57 |
| Conductivity | mS/cm | **1.875** | 1.21 | 1.231 | 1.289 | 1.25 | 1.352 | 1.414 | 0.670 | 0.8379 | 0.8778 | 1.010 | 1.282 | 1.343 |
| Temperature | °C | **-** | 11.2 | - | - | 9.4 | - | - | 9.7 | - | - | 10.8 | - | - |
| Ammoniacal Nitrogen | mg/l | **0.175** | <0.2 | 0.42 | 0.44 | <0.2 | 0.31 | 0.33 | <0.2 | 0.21 | 0.22 | <0.2 | 1.89 | 1.98 |
| Total Organic Carbon | mg/l | **N-A-C**[1] | <3.0 | 6.3 | 6.6 | 3.04 | 6.3 | 6.6 | 3.12 | 6.3 | 6.3 | 3.42 | 5.25 | 5.5 |

| Parameter | Unit | Threshold Value | BH31 | BH31 Control Values | BH31 Trigger Values | BH32 | BH32 Control Values | BH32 Trigger Values | BH33 | BH33 Control Values | BH33 Trigger Values | BH34 | BH34 Control Values | BH34 Trigger Values | BH35 | BH35 Control Values | BH35 Trigger Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| pH | pH Units | **6.5 - 9.5**[1] | 7.65 | 8.39 | 8.79 | 7.44 | 8.18 | 8.6 | 7.68 | 8.58 | 8.99 | 7.1 | 8.61 | 9.02 | 7.75 | Control & Trigger values not yet determined | |
| Conductivity | mS/cm | **1.875** | 0.650 | 0.791 | 0.828 | 0.690 | 1.227 | 1.286 | 0.640 | 0.852 | 0.892 | 0.860 | 0.998 | 1.045 | 0.760 | | |
| Temperature | °C | **-** | 11.0 | - | - | 11.1 | - | - | 10.1 | - | - | 7.1 | - | - | 11.6 | | |
| Ammoniacal Nitrogen | mg/l | **0.175** | <0.2 | 1.575 | 1.65 | <0.2 | 0.735 | 0.77 | <0.2 | 0.21 | 0.22 | <0.2 | 0.21 | 0.22 | **0.433** | | |
| Total Organic Carbon | mg/l | **N-A-C**[1] | <3.0 | 8.4 | 8.8 | <3 | 5.25 | 6 | <3 | 5.25 | 5.5 | 4.83 | 6.3 | 6.6 | <3 | | |

Threshold value = Groundwater regulations SI 9 of 2010

[1] = Where no threshold value exists results are compared to EPA I.G.V. from Table 3.1 of EPA document "Towards Setting Guideline Values for the protection of Groundwater in Ireland"

**Shading & Bold = Value has exceeded threshold value**

Shading = Value has exceeded the Control Value

Shading = Value has exceeded Trigger Value

Sampled on 15th March 2011

Analysis conducted by Alcontrol Laboratories Ltd.

**Q2 - Dunsink Groundwater May 2011**

| Parameter | Unit | Threshold Value | BH3 | BH3 Control Values | BH3 Trigger Values | BH4 | BH4 Control Values | BH4 Trigger Values | BH16 | BH16 Control Values | BH16 Trigger Values | BH27 | BH27 Control Values | BH27 Trigger Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| pH | pH Units | **6.5 - 9.5** [1] | 8.01 | 8 | 8.38 | 8.28 | 8.2 | 8.59 | 7.87 | 8.24 | 8.64 | 7.9 | 8.18 | 8.57 |
| Conductivity | mS/cm | **1.875** | 1.41 | 1.231 | 1.289 | 1.499 | 1.352 | 1.414 | 0.572 | 0.8379 | 0.8778 | 0.769 | 1.282 | 1.343 |
| Temperature | °C | **-** | 11.5 | - | - | 13.1 | - | - | 11.3 | - | - | 12 | - | - |
| Ammoniacal Nitrogen | mg/l | **0.175** | 0.12 | 0.42 | 0.44 | 0.07 | 0.31 | 0.33 | 0.09 | 0.21 | 0.22 | 0.09 | 1.89 | 1.98 |
| Total Organic Carbon | mg/l | **N-A-C**[1] | 3 | 6.3 | 6.6 | 4 | 6.3 | 6.6 | 3 | 6.3 | 6.3 | 2 | 5.25 | 5.5 |

| Parameter | Unit | Threshold Value | BH31 | BH31 Control Values | BH31 Trigger Values | BH32 | BH32 Control Values | BH32 Trigger Values | BH33 | BH33 Control Values | BH33 Trigger Values | BH34 | BH34 Control Values | BH34 Trigger Values | BH35 | BH35 Control Values | BH35 Trigger Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| pH | pH Units | **6.5 - 9.5**[1] | 8.05 | 8.39 | 8.79 | 8.28 | 8.18 | 8.6 | 7.9 | 8.58 | 8.99 | 7.69 | 8.61 | 9.02 | 7.97 | Control & Trigger values not yet determined | |
| Conductivity | mS/cm | **1.875** | 0.581 | 0.791 | 0.828 | 0.566 | 1.227 | 1.286 | 0.495 | 0.852 | 0.892 | 0.555 | 0.998 | 1.045 | 0.612 | | |
| Temperature | °C | **-** | 11.3 | - | - | 11.3 | - | - | 11.2 | - | - | 10 | - | - | 12.6 | | |
| Ammoniacal Nitrogen | mg/l | **0.175** | 0.11 | 1.575 | 1.65 | 0.12 | 0.735 | 0.77 | **0.22** | 0.21 | 0.22 | 0.17 | 0.21 | 0.22 | **0.22** | | |
| Total Organic Carbon | mg/l | **N-A-C**[1] | 4 | 8.4 | 8.8 | 3 | 5.25 | 6 | 3 | 5.25 | 5.5 | 5 | 6.3 | 6.6 | 2 | | |

Threshold value = Groundwater regulations SI 9 of 2010

[1] = Where no threshold value exists results are compared to EPA I.G.V. from Table 3.1 of EPA document "Towards Setting Guideline Values for the protection of Groundwater in Ireland"

**Shading & Bold = Value has exceeded threshold value**

Shading = Value has exceeded the Control Value

Shading = Value has exceeded Trigger Value

Sampled on 11th May 2011

Analysis conducted by Alcontrol Laboratories Ltd.

**Dunsink Q3 2011 GW**

## Groundwater Results

| PARAMETER | UNIT | Threshold Value | BH3 | BH3 Control Values | BH3 Trigger Values | BH4 | BH4 Control Values | BH4 Trigger Values | BH16 | BH16 Control Values | BH16 Trigger Values | BH27 | BH27 Control Value | BH27 Trigger Values | BH31 | BH31 Control Values | BH31 Trigger Values | BH32 | BH32 Control Values | BH32 Trigger Values | BH33 | BH33 Control Values | BH33 Trigger Values | BH34 | BH34 Control Values | BH34 Trigger Values | BH35 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **pH Value** | **units** | **6.5 - 9.5** | 8.03 | 8 | 8.38 | 8.06 | 8.2 | 8.59 | 8.38 | 8.24 | 8.64 | 8.43 | 8.18 | 8.57 | 7.95 | 8.39 | 8.79 | 8.61 | 8.18 | 8.6 | 8.29 | 8.58 | 8.99 | 8.54 | 8.61 | 9.02 | 8.54 |
| **Conductivity** | **mS/cm** | **1.875** | 1.454 | 1.231 | 1.289 | 1.421 | 1.352 | 1.414 | 0.595 | 0.838 | 0.878 | 0.816 | 1.282 | 1.343 | 0.571 | 0.791 | 0.828 | 0.586 | 1.227 | 1.286 | 0.522 | 0.852 | 0.892 | - | 0.998 | 1.045 | 0.645 |
| **Ammonical Nitrogen as NH4-N** | **N mg/l** | **0.175** | <0.03 | 0.42 | 0.44 | 0.14 | 0.315 | 0.33 | 0.05 | 0.21 | 0.22 | <0.03 | 1.89 | 1.98 | 0.26 | 1.575 | 1.65 | 1.46 | 0.735 | 0.77 | <0.03 | 0.21 | 0.22 | - | 0.21 | 0.22 | <0.03 |
| **Dissolved Oxygen (O2)** | **O2 mg/l** | **N-A-C** | 6 | - | - | 7 | - | - | 6 | - | - | 6 | - | - | 7 | - | - | 7 | - | - | 6 | - | - | 5 | - | - | 8 |
| **Chloride (Cl)** | **Cl mg/l** | **187.5** | 221 | 76.65 | 80.3 | 200 | 91.35 | 95.7 | 22 | 40.95 | 42.9 | 48.2 | 75.6 | 79.2 | 25.6 | 32.55 | 34.1 | 25.2 | 26.25 | 27.5 | 16.5 | 28.35 | 29.7 | 18 | 32.55 | 34.1 | 25.2 |
| **Potassium (K)** | **K mg/l** | **5 [1]** | 3.7 | 5.25 | 5.5 | 4.1 | 7.77 | 8.14 | 1.5 | 3.78 | 3.96 | 1.9 | 3.36 | 3.52 | 1.7 | 4.41 | 4.62 | 2.8 | 6.72 | 7.04 | 2 | 5.25 | 5.5 | 2.5 | 3.99 | 4.2 | 1.8 |
| **Sodium (Na)** | **Na mg/l** | **150** | 15.5 | 51.24 | 53.68 | 111.7 | 37.8 | 39.6 | 15 | 21 | 22 | 26.1 | 47.25 | 49.5 | 15.9 | 25.2 | 26.4 | 16.4 | 21.31 | 22.33 | 15.5 | 82.95 | 86.9 | 25.7 | 64.58 | 67.7 | 23.1 |
| **Fluoride (F)** | **F mg/l** | **1 [1]** | <0.3 | 0.315 | 0.33 | <0.3 | 0.315 | 0.33 | 0.5 | 0.74 | 0.77 | 0.5 | 0.74 | 0.77 | <0.3 | 0.945 | 0.99 | <0.3 | 0.315 | 0.33 | 0.7 | 0.945 | 0.99 | <0.3 | 0.32 | 0.3 | 1.2 |
| **Total Organic Carbon** | **C mg/l** | **N-A-C** | <2 | 6.3 | 6.6 | <2 | 6.3 | 6.6 | <2 | 6.3 | 6.6 | 5 | 5.25 | 5.5 | 5 | 8.4 | 8.8 | 7 | 5.25 | 6 | 4 | 5.25 | 5.5 | - | 6.3 | 6.6 | 3 |
| **Total Oxidised Nitrogen (water)** | **N mg/l** | **N-A-C** | <0.2 | - | - | 1.3 | - | - | 1.6 | - | - | <0.2 | - | - | <0.2 | - | - | <0.2 | - | - | <0.2 | - | - | <0.2 | - | - | <0.2 |
| **Calcium (Ca)** | **Ca mg/l** | **200 [1]** | 179.3 | - | - | 168.8 | - | - | 81 | - | - | 110.4 | - | - | 99.1 | - | - | 90.5 | - | - | 79.6 | - | - | 120.6 | - | - | 84.5 |
| **Cadmium (Cd)** | **Cd mg/l** | **0.003** | <0.0005 | - | - | <0.0005 | - | - | <0.0005 | - | - | <0.0005 | - | - | <0.0005 | - | - | <0.0005 | - | - | <0.0005 | - | - | <0.0005 | - | - | <0.0005 |
| **Chromium (Cr)** | **Cr mg/l** | **0.037** | <0.0015 | - | - | <0.0015 | - | - | <0.0015 | - | - | <0.0015 | - | - | <0.0015 | - | - | <0.0015 | - | - | <0.0015 | - | - | <0.0015 | - | - | <0.0015 |
| **Copper (Cu)** | **Cu mg/l** | **1.5** | <0.007 | - | - | <0.007 | - | - | <0.007 | - | - | <0.007 | - | - | <0.007 | - | - | <0.007 | - | - | <0.007 | - | - | <0.007 | - | - | <0.007 |
| **Total Cyanide (Cn)*** | **Cn mg/l** | **0.037** | <0.01 | - | - | <0.01 | - | - | <0.01 | - | - | <0.01 | - | - | <0.01 | - | - | <0.01 | - | - | <0.01 | - | - | 0.01 | - | - | <0.01 |
| **Iron (Fe)** | **Fe mg/l** | **0.2 [1]** | <0.02# | 0.018 | 0.019 | <0.02# | 0.019 | 0.02 | <0.02# | 0.03 | 0.028 | <0.02# | 0.03 | 0.032 | <0.02# | 0.0441 | 0.0462 | <0.02# | 0.01365 | 0.0143 | <0.02# | 0.0147 | 0.0154 | <0.02# | 0.0304 | 0.0319 | <0.02# |
| **Lead (Pb)** | **Pb mg/l** | **0.018** | <0.005 | - | - | <0.005 | - | - | <0.005 | - | - | <0.005 | - | - | <0.005 | - | - | <0.005 | - | - | <0.005 | - | - | <0.005 | - | - | <0.005 |
| **Magnesium (Mg)** | **Mg mg/l** | **50 [1]** | 22.5 | 22.73 | 23.82 | 12.2 | 19.08 | 19.99 | 23.9 | 29.23 | 30.62 | 32.9 | 51.07 | 53.5 | 12.9 | 18.76 | 19.66 | 17.7 | 25.074 | 26.268 | 21.5 | 21.95 | 23.001 | 14.7 | 23.247 | 24.354 | 27 |
| **Manganese (Mn)** | **Mn mg/l** | **0.05 [1]** | 0.087 | 0.151 | 0.158 | 0.006 | 0.0294 | 0.0308 | 0.182 | 0.169 | 0.177 | 0.087 | 0.077 | 0.08 | 0.636 | 0.9135 | 0.957 | 0.071 | 0.0672 | 0.0704 | <0.002 | 0.0483 | 0.0506 | 1.016 | 0.391 | 0.4103 | 0.107 |
| **Nickel (Ni)** | **Ni mg/l** | **0.015** | 0.005 | 0.0116 | 0.0121 | <0.002 | 0.042 | 0.044 | <0.002 | 0.0021 | 0.0022 | 0.003 | 0.063 | 0.066 | <0.002 | 0.0105 | 0.011 | <0.002 | 0.0105 | 0.011 | <0.002 | 0.021 | 0.022 | 0.003 | 0.00525 | 0.0055 | 0.002 |
| **Mercury (Hg)** | **Hg mg/l** | **0.00075** | <0.001* | - | - | <0.001* | - | - | <0.001* | - | - | <0.001* | - | - | <0.001* | - | - | <0.001* | - | - | <0.001* | - | - | <0.001* | - | - | <0.001* |
| **Residue on Evaporation** | **mg/l** | **-** | 1147 | - | - | 981 | - | - | 417 | - | - | 646 | - | - | 481 | - | - | 446 | - | - | 395 | - | - | - | - | - | 491 |
| **Sulphate (soluble) (SO4)** | **SO4 mg/l** | **187.5** | 162.19 | - | - | 90.13 | - | - | 32.51 | - | - | 61.73 | - | - | 43.95 | - | - | 42.81 | - | - | 25.69 | - | - | 33.74 | - | - | 63.41 |
| **Zinc (Zn)** | **Zn mg/l** | **0.1 [1]** | 0.004 | - | - | 0.014 | - | - | <0.003 | - | - | 0.005 | - | - | <0.003 | - | - | 0.003 | - | - | <0.003 | - | - | 0.003 | - | - | 0.004 |
| **Boron (B)** | **B mg/l** | **0.75** | 0.085 | - | - | 0.04 | - | - | 0.074 | - | - | 0.086 | - | - | 0.042 | - | - | 0.054 | - | - | 0.036 | - | - | 0.039 | - | - | 0.085 |
| **Alkalinity (as CaCO3)** | **CaCO3 mg/l** | **N-A-C** | 240 | - | - | 272 | - | - | 242 | - | - | 382 | - | - | 240 | - | - | 236 | - | - | 246 | - | - | 352 | - | - | 272 |
| **Ortho Phosphate** | **P04 mg/l** | **-** | <0.06 | - | - | <0.06 | - | - | <0.06 | - | - | <0.06 | - | - | <0.06 | - | - | <0.06 | - | - | <0.06 | - | - | <0.06 | - | - | <0.06 |

Threshold value = Groundwater regulations SI 9 of 2010

[1] = Where no threshold value exists results are compared to EPA I.G.V. from Table 3.1 of EPA document "Towards Setting Guideline Values for the protection of Groundwater in Ireland"

Shading = Value has exceeded threshold value

Shading = Value has exceeded the trigger/control value

* Laboratory level of Detection is above IGV recommended level

# Laboratory level of Detection is in excess of trigger/control value

Sampling was undertaken on the 14th September 2011.

N-A-C= No abnormal change

Analysis conducted by Jones Laboratories, UK

CE05977

**Volatile Organic Compounds**
**Dunsink**

**White Young Green Ireland**

**Job Number: CE05977**
**3rd Quarter 2011**

Units - µg/l

| Compound | Unit | LOD | BH3 | BH4 | BH31 | BH32 | BH33 | BH34 |
|---|---|---|---|---|---|---|---|---|
| Toluene-d8** | % | <0 | 92 | 96 | 96 | 98 | 91 | 94 |
| 4-Bromofluorobenzene** | % | <0 | 108 | 111 | 108 | 112 | 106 | 106 |
| Dichlorodifluoromethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Chloromethane | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Vinyl chloride | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Bromomethane | µg/l | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloroethane | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Trichlorofluoromethane | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,1-Dichloroethene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Dichloromethane | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Methyl tertiary butyl ether (MTBE) | µg/l | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| trans-1,2-Dichloroethene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,1-Dichloroethane | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| cis-1,2-Dichloroethene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 2,2-Dichloropropane | µg/l | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Bromochloromethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Chloroform | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,1,1-Trichloroethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,1-Dichloropropene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Carbontetrachloride | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,2-Dichloroethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Benzene | µg/l | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Trichloroethene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,2-Dichloropropane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Dibromomethane | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Bromodichloromethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| cis-1,3-Dichloropropene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Toluene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| trans-1,3-Dichloropropene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,1,2-Trichloroethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,3-Dichloropropane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Tetrachloroethene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Dibromochloromethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,2-Dibromoethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Chlorobenzene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,1,1,2-Tetrachloroethane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Ethylbenzene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| m,p-Xylene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| o-Xylene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Styrene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Bromoform | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Isopropylbenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,1,2,2-Tetrachloroethane | µg/l | <4 | <4 | <4 | <4 | <4 | <4 | <4 |
| 1,2,3-Trichloropropane | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Bromobenzene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Propylbenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 2-Chlorotoluene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,3,5-Trimethylbenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 4-Chlorotoluene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| tert-Butylbenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,2,4-Trimethylbenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| sec-Butylbenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 4-iso-Propyltoluene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,3-Dichlorobenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,4-Dichlorobenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| n-Butylbenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,2-Dichlorobenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| 1,2-Dibromo-3-chloropropane | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,2,4-Trichlorobenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Hexachlorobutadiene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| Naphthalene | µg/l | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| 1,2,3-Trichlorobenzene | µg/l | <3 | <3 | <3 | <3 | <3 | <3 | <3 |

**Semivolatiles**
**Dunsink**

**White Young Green Ireland**

**Job Number: CE05977**
**3rd Quarter 2011**

Units - µg/l

| Compound | Unit | LOD | BH3 | BH4 | BH31 | BH32 | BH33 | BH34 |
|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trichlorobenzene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-Dichlorobenzene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,3-Dichlorobenzene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,4-Dichlorobenzene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2,4,5-Trichlorophenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2,4,6-Trichlorophenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dichlorophenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dimethylphenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dinitrotoluene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2,6-Dinitrotoluene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Chloronaphthalene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Chlorophenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Methylnaphthalene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Methylphenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Nitroaniline (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Nitrophenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 3-Nitroaniline (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-Bromophenylphenylether (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-Chloro-3-methylphenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-Chloroaniline (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-Chlorophenylphenylether (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-Methylphenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-Nitrophenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-Nitroaniline (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Azobenzene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Acenaphthylene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Acenaphthene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Anthracene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| bis(2-Chloroethyl)ether (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| bis(2-Chloroethoxy)methane (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| bis(2-Ethylhexyl) phthalate (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Benzo(a)anthracene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Butylbenzyl phthalate (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Benzo(b)fluoranthene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Benzo(k)fluoranthene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Benzo(a)pyrene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Benzo(g,h,i)perylene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Carbazole (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Chrysene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Dibenzofuran (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| n-Dibutyl phthalate (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Diethyl phthalate (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Dibenzo(a,h)anthracene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Dimethyl phthalate (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| n-Dioctyl phthalate (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Fluoranthene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Fluorene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Hexachlorobenzene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Hexachlorobutadiene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Pentachlorophenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Phenol (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| n-Nitroso-n-dipropylamine (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Hexachloroethane (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Nitrobenzene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Naphthalene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Isophorone (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Hexachlorocyclopentadiene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Phenanthrene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Indeno(1,2,3-cd)pyrene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Pyrene (aq) | µg/l | <10 | <10 | <10 | <10 | <10 | <10 | <10 |

**Q4 - Dunsink Groundwater November 2011**

| Parameter | Unit | Threshold Value | BH3 | BH3 Control Values | BH3 Trigger Values | BH4 | BH4 Control Values | BH4 Trigger Values | BH16 | BH16 Control Values | BH16 Trigger Values | BH27 | BH27 Control Values | BH27 Trigger Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| pH | pH Units | **6.5 - 9.5** [1] | 7.96 | 8 | 8.38 | 8.05 | 8.2 | 8.59 | 8.07 | 8.24 | 8.64 | 7.93 | 8.18 | 8.57 |
| Conductivity | mS/cm | **1.875** | 1.159 | 1.231 | 1.289 | 0.748 | 1.352 | 1.414 | 0.433 | 0.8379 | 0.8778 | 0.705 | 1.282 | 1.343 |
| Temperature | °C | **-** | 11.5 | - | - | 11.1 | - | - | 12.5 | - | - | 11.5 | - | - |
| Ammoniacal Nitrogen | mg/l | **0.175** | 0.02 | 0.42 | 0.44 | 0.03 | 0.31 | 0.33 | 0.06 | 0.21 | 0.22 | 0.04 | 1.89 | 1.98 |
| Total Organic Carbon | mg/l | **N-A-C**[1] | 4 | 6.3 | 6.6 | 8 | 6.3 | 6.6 | 6 | 6.3 | 6.3 | 14 | 5.25 | 5.5 |

| Parameter | Unit | Threshold Value | BH31 | BH31 Control Values | BH31 Trigger Values | BH32 | BH32 Control Values | BH32 Trigger Values | BH33 | BH33 Control Values | BH33 Trigger Values | BH34 | BH34 Control Values | BH34 Trigger Values | BH35 | BH35 Control Values | BH35 Trigger Values |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| pH | pH Units | **6.5 - 9.5**[1] | 8.02 | 8.39 | 8.79 | 7.38 | 8.18 | 8.6 | 7.79 | 8.58 | 8.99 | 7.73 | 8.61 | 9.02 | 7.95 | Control & Trigger values not yet determined | |
| Conductivity | mS/cm | **1.875** | 0.483 | 0.791 | 0.828 | 0.496 | 1.227 | 1.286 | 0.455 | 0.852 | 0.892 | 0.543 | 0.998 | 1.045 | 0.556 | | |
| Temperature | °C | **-** | 11.7 | - | - | 11.7 | - | - | 10.9 | - | - | 11.2 | - | - | 11.3 | | |
| Ammoniacal Nitrogen | mg/l | **0.175** | 0.56 | 1.575 | 1.65 | 0.08 | 0.735 | 0.77 | 0.05 | 0.21 | 0.22 | 0.12 | 0.21 | 0.22 | 0.15 | | |
| Total Organic Carbon | mg/l | **N-A-C**[1] | 5 | 8.4 | 8.8 | 6 | 5.25 | 6 | 4 | 5.25 | 5.5 | 19 | 6.3 | 6.6 | 4 | | |

Threshold value = Groundwater regulations SI 9 of 2010

[1] = Where no threshold value exists results are compared to EPA I.G.V. from Table 3.1 of EPA document "Towards Setting Guideline Values for the protection of Groundwater in Ireland"

**Shading & Bold = Value has exceeded threshold value**

Shading = Value has exceeded the Control Value

Shading = Value has exceeded Trigger Value

Sampled on 23rd November 2011

Analysis conducted by Jones Environmental Laboratory

# APPENDIX II

**Q1 - Dunsink Surface Water March 2011**

| Parameter | Unit | SI 272 of 2009 | Salmonid Regs | SW2 | SW7 | SW9 | SW10 | SW11 | SW17 | SW18 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| pH | pH Units | 6-9 (note 1) | ≥6≤9 | 8.04 | 8.28 | 7.83 | 7.64 | 7.25 | 7.77 | 7.97 |
| Conductivity | mS/cm | 1 (note 2) | - | **1.200** | **1.380** | 0.790 | **1.290** | **1.270** | **1.120** | **2.22** |
| Temperature | °C | - | <10°C* | 9.3 | 9.2 | 14.3 | 8.6 | 8.0 | 10.1 | 9 |
| Dissolved Oxygen | % | 80-120% saturation | 50%>9 | 95.6 | 96.1 | 114.6 | **69.9** | 88.5 | **77.4** | **70.9** |
| Ammoniacal Nitrogen# | mg/l | - | <1 | 0.279 | <0.2 | <0.2 | <0.2 | <0.2 | 1.01 | 0.599 |
| BOD | mg/l | <=1.5 mean (note 3) | 5 | **2.55** | **2.41** | **1.87** | **1.55** | **2.17** | **2.39** | **3.49** |
| Total Suspended Solids | mg/l | - | 25 | 146 | 6 | 12 | 4.5 | 9.5 | 2.5 | 22 |

SI 272 of 2009 = European Communities Environmental Objectives (Surface Water) Regulations 2009
**Bold = Value has exceeded Surface Water Regulations**
Salmonid Regs= European Communities (Quality of Salmonid Waters) Regulation , SI 293 of 1988.
Shading = Value has exceeded Salmonid Regulations
# Standard for Ionised Ammonia = <1, Ionised Ammonia= total ammonium x 1.28-Results stated should be converted before being compared to the standard.
*=Second Schedule of Salmonid Regulations states " temperature must not exceed 10 degrees celsius during the period from 1 November to 30 April where species which need cold water for reproduction are present
Note 1 : Hard water - >100mg/l CACO3
Note 2 : In the absence of a standard for conductivity under SI 272 of 2009 or the Salmonid Regulations SI 293 of 1988, a threshold value from SI 294 of 1989 (Quality of SW Intended for Abstraction of Drinking Water) has been used
Note 3 : For waters achieving good status

Sampled on 15th March 2011
Analysis conducted by Alcontrol Laboratories Ltd.

**Q1 - Dunsink Leachate Results March 2011**

| Parameter | Units | Leachate Sump | Lagoon |
|---|---|---|---|
| | | 15/03/2011 | 15/03/2011 |
| pH | pH units | 7.16 | 8.44 |
| Conductivity | mS/cm | 1.92 | 1.2 |
| Temperature | °C | 10.7 | 8.3 |
| Ammoniacal Nitrogen# | mg/l | 0.911 | 15.6 |
| BOD | mg/l | <1 | 2.57 |
| Total Suspended Solids | mg/l | <2 | 3.0 |
| Dissolved Oxygen | mg/l | - | 69.7 |
| Dissolved methane CH4 | mg/l | - | - |

Sampled on 15th March 2011

Analysis conducted by Alcontrol Laboratories Ltd.

**Q2 - Dunsink Surface Water May 2011**

| Parameter | Unit | SI 272 of 2009 | Salmonid Regs | SW2 | SW7 | SW9 | SW10 | SW11 | SW11(2) | SW17 | SW17(2) | SW18 | SW18(2) | SW18(3) | SW18(4) | SW19(2) | WWSW2(2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| pH | pH Units | 6-9 (note 1) | ≥6≤9 | 8.16 | 8.11 | 8.13 | 8.19 | 7.99 | 8.02 | 8.51 | 8.09 | 8.24 | 8.16 | 7.85 | 8.35 | 8.04 | 8.48 |
| Conductivity | mS/cm | 1 (note 2) | - | 0.810 | 0.742 | 0.691 | 0.869 | **1.087** | **1.057** | 0.804 | 0.836 | 0.76 | 0.776 | 0.643 | 0.45 | 0.873 | **1.09** |
| Temperature | °C | - | <10°C* | 13.5 | 18 | 17.2 | 12.8 | 13.7 | 11.2 | 16.8 | 12.5 | 11.9 | 11.5 | 13.4 | 13.6 | 11 | 11 |
| Dissolved Oxygen | % | 80-120% saturation | 50%>9 | 9.0 | 10.0 | 9.0 | 9.0 | 3.0 | - | 8.0 | - | 8.0 | - | - | - | - | - |
| Ammoniacal Nitrogen# | mg/l | - | <1 | 0.09 | 0.27 | 0.18 | 0.5 | 6.95 | 0.03 | 7.58 | 0.32 | 6.05 | 5.37 | 4.65 | 1.27 | 0.1 | 0.628 |
| BOD | mg/l | <=1.5 mean (note 3) | 5 | <1 | <1 | <1 | <1 | **7** | 4 | 1 | - | 1 | - | - | - | - | - |
| Total Suspended Solids | mg/l | - | 25 | 32 | 43 | 310 | 15 | <10 | - | 21 | - | 25 | - | - | - | - | - |

SI 272 of 2009 = European Communities Environmental Objectives (Surface Water) Regulations 2009
**Bold = Value has exceeded Surface Water Regulations**
Salmonid Regs= European Communities (Quality of Salmonid Waters) Regulation , SI 293 of 1988.
Shading = Value has exceeded Salmonid Regulations
# Standard for Ionised Ammonia = <1, Ionised Ammonia= total ammonium x 1.28-Results stated should be converted before being compared to the standard.
*=Second Schedule of Salmonid Regulations states " temperature must not exceed 10 degrees celsius during the period from 1 November to 30 April where species which need cold water for reproduction are present
Note 1 : Hard water - >100mg/l CACO3
Note 2 : In the absence of a standard for conductivity under SI 272 of 2009 or the Salmonid Regulations SI 293 of 1988, a threshold value from SI 294 of 1989 (Quality of SW Intended for Abstraction of Drinking Water) has been used
Note 3 : For waters achieving good status

Sampled on 11th May 2011

(2) Sampled on 31st May 2011

(3) Sampled on 15th June 2011

(4) Sampled on 21st June 2011
Analysis conducted by Jones Environmental Forensics

**Dunsink Q3 2011 SW**

**Surface Water Results**

| PARAMETER | UNIT | SI 272 of 2009 | Salmonid | SW2 | SW7 | SW9 | SW10 | SW11 | SW17 | SW18 |
|---|---|---|---|---|---|---|---|---|---|---|
| pH Value | units | 6-9 (note 1) | 6-9 | 8.18 | 7.51 | - | 8.13 | 7.91 | 8.51 | 8.53 |
| Conductivity | mS/cm | 1 | - | 0.619 | 0.3 | - | 0.591 | **1.083** | 0.571 | 0.669 |
| Ammonical Nitrogen as NH4-N | N mg/l | - | 1 | 0.04 | 0.05 | - | 0.07 | 0.05 | 0.06 | 5.31 |
| Dissolved Oxygen (O2) | O2 mg/l | 80-120% saturation | 50% >9 | 8 | 5 | - | 8 | 7 | 8 | 6 |
| Chloride (Cl) | Cl mg/l | - | - | 37.4 | 34.4 | - | 35.7 | 72.1 | 31.6 | 34 |
| Potassium (K) | K mg/l | - | - | 2.7 | 2.7 | - | 2.9 | 1.2 | 1.9 | 4.3 |
| Sodium (Na) | Na mg/l | - | - | 27.2 | 26.5 | - | 27.4 | 39 | 22.7 | 25.1 |
| COD | 02 mg/l | - | - | 14 | 17 | - | 13 | 17 | 9 | 8 |
| BOD | 02 mg/l | <=1.5 mean (note 2) | 5 | <1 | 1 | - | <1 | 1 | 1 | 3 |
| Total Oxidised Nitrogen (water) | N mg/l | - | - | <0.2 | <0.2 | - | 0.3 | <0.2 | 1.3 | 1.9 |
| Total Suspended Solids | mg/l | - | 25 | <10 | <10 | - | <10 | <10 | <10 | <10 |
| Calcium (Ca) | Ca mg/l | - | - | 59 | 23.1 | - | 60 | 162.4 | 85.8 | 78.6 |
| Cadmium (Cd) | Cd mg/l | 0.15 | - | <0.0005 | <0.0005 | - | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chromium (Cr) | Cr mg/l | 0.0047 | - | <0.0015 | 0.0021 | - | 0.0027 | <0.0015 | <0.0015 | <0.0015 |
| Copper (Cu) | Cu mg/l | 0.03 (Note 3) | - | <0.007 | <0.007 | - | <0.007 | <0.007 | <0.007 | <0.007 |
| Iron (Fe) | Fe mg/l | - | - | 0.03 | 0.053 | - | 0.03 | <0.02 | <0.02 | 0.025 |
| Lead (Pb) | Pb mg/l | 0.0072 | - | <0.005 | <0.005 | - | <0.005 | <0.005 | <0.005 | <0.005 |
| Magnesium (Mg) | Mg mg/l | - | - | 5.9 | 4.6 | - | 5.9 | 14.4 | 6.2 | 6.3 |
| Manganese (Mn) | Mn mg/l | - | - | <0.002 | 0.005 | - | <0.002 | 0.175 | <0.002 | 0.003 |
| Nickel (Ni) | Ni mg/l | 0.02 | - | 0.004 | 0.004 | - | 0.004 | 0.008 | 0.002 | 0.004 |
| Mercury (Hg) | Hg mg/l | 0.00005 | - | <0.001 | <0.001 | - | <0.001 | <0.001 | <0.001 | <0.001 |
| Sulphate (soluble) (SO4) | SO4 mg/l | - | - | 52.28 | 21.6 | - | 43.59 | 96.06 | 71.22 | 50.59 |
| Zinc (Zn) | Zn mg/l | 0.1 | - | 0.004 | 0.004 | - | 0.003 | 0.005 | 0.005 | 0.021 |
| Alkalinity (as CaCO3) | CaCO3 mg/l | N-A-C | - | 140 | 60 | - | 148 | **318** | 180 | 198 |
| Boron (B) | B mg/l | - | - | 0.04 | 0.031 | - | 0.04 | 0.07 | 0.04 | 0.03 |
| ortho - phosphate | PO4 mg/l | - | - | <0.06 | <0.06 | - | <0.06 | <0.06 | <0.06 | 0.27 |

**Legend:**
SI 272 of 2009 = European Communities Environmental Objectives (Surface Water) Regulations 2009
**Bold = Value has exceeded Surface water Regulations**
Salmonid Regs= European Communities (Quality of Salmonid Waters) Regulation, 1988
Shading = Value has exceeded Salmonid Water Quality Standard
Sampling was undertaken on 14th September 2011
Note 1 : Hard water - >100mg/l CACO3
Note 2 : For waters achieving good status
Note 3 : The standard of 0.005mg/l applies where hardness <100mg/l CACO3; 0.03mg/l applies where hardness >100mg/l CACO3
N-A-C= No abnormal change

CE05977

White Young Green Environmental

Analysis conducted by Jones Laboratories, UK

**Dunsink Q3 2011 Leachate**

| Leachate Monitoring | | | |
|---|---|---|---|
| **PARAMETER** | **UNIT** | **LAG** | **LSP** |
| pH Value | units | 8.67 | 8.13 |
| Conductivity | mS/cm | 3.471 | 2.517 |
| Ammonical Nitrogen as NH4-N | N mg/l | 35.62 | 149.47 |
| Dissolved Methane | CH4 mg/l | 0.007 | <0.001 |
| Chloride (Cl) | Cl mg/l | 438.5 | 2.747 |
| Potassium (K) | K mg/l | 123.9 | 170 |
| Sodium (Na) | Na mg/l | 276.5 | 382.5 |
| COD | 02 mg/l | 169 | 164 |
| BOD | 02 mg/l | 16 | 13 |
| Total Oxidised Nitrogen (water) | N mg/l | 1.5 | <0.2 |
| Calcium (Ca) | Ca mg/l | 31.1 | 118.6 |
| Cadmium (Cd) | Cd mg/l | <0.0005 | <0.0005 |
| Chromium (Cr) | Cr mg/l | 0.0017 | 0.0035 |
| Copper (Cu) | Cu mg/l | <0.007 | <0.007 |
| Fluoride (F) | F mg/l | <0.3 | <0.3 |
| Iron (Fe) | Fe mg/l | 0.152 | 0.525 |
| Lead (Pb) | Pb mg/l | <0.005 | <0.005 |
| Magnesium (Mg) | Mg mg/l | 45.5 | 46.6 |
| Manganese (Mn) | Mn mg/l | 0.006 | 0.731 |
| Nickel (Ni) | Ni mg/l | 0.027 | 0.038 |
| Mercury (Hg) | Hg mg/l | <0.001 | <0.001 |
| Sulphate (soluble) (SO4) | SO4 mg/l | 25.99 | 62.28 |
| Zinc (Zn) | Zn mg/l | <0.003 | <0.003 |
| Boron (B) | B mg/l | 1.159 | 1.271 |
| ortho-phosphate | PO4 mg/l | <0.06 | <0.06 |

Analysis conducted by Jones Laboratories, UK
CE05977

**Q4 - Dunsink Surface Water November 2011**

| Parameter | Unit | SI 272 of 2009 | Salmonid Regs | SW2 | SW7 | SW9 | SW10 | SW11 | SW17 | SW18 | WWSW2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| pH | pH Units | 6-9 (note 1) | ≥6≤9 | 8.21 | 8.66 | | 7.86 | 8.44 | 8.24 | 7.85 | 8.26 |
| Conductivity | mS/cm | 1 (note 2) | - | 0.869 | 0.807 | | 0.930 | 0.945 | 0.905 | **1.115** | 0.831 |
| Temperature | °C | - | <10°C* | 10.6 | 9.4 | Dry | 10.5 | 9.5 | 10.7 | 12.4 | 11.5 |
| Dissolved Oxygen | % | 80-120% saturation | 50%>9 | 89.1 | 92.5 | | 69.1 | 85.8 | 89.1 | 68.5 | 88.6 |
| Ammoniacal Nitrogen# | mg/l | - | <1 | 0.04 | 0.05 | | 0.05 | 0.05 | 0.05 | 1.75 | 0.1 |
| BOD | mg/l | <=1.5 mean (note 3) | 5 | <1 | 1 | | <1 | <1 | <1 | **2** | <1 |
| Total Suspended Solids | mg/l | - | 25 | <10 | <10 | | <10 | 16 | <10 | <10 | <10 |

SI 272 of 2009 = European Communities Environmental Objectives (Surface Water) Regulations 2009
**Bold = Value has exceeded Surface Water Regulations**
Salmonid Regs= European Communities (Quality of Salmonid Waters) Regulation , SI 293 of 1988.
Shading = Value has exceeded Salmonid Regulations
# Standard for Ionised Ammonia = <1, Ionised Ammonia= total ammonium x 1.28-Results stated should be converted before being compared to the standard.
*=Second Schedule of Salmonid Regulations states " temperature must not exceed 10 degrees celsius during the period from 1 November to 30 April where species which need cold water for reproduction are present
Note 1 : Hard water - >100mg/l CACO3
Note 2 : In the absence of a standard for conductivity under SI 272 of 2009 or the Salmonid Regulations SI 293 of 1988, a threshold value from SI 294 of 1989 (Quality of SW Intended for Abstraction of Drinking Water) has been used
Note 3 : For waters achieving good status

Sampled on 23rd November 2011

Analysis conducted by Jones Environmental Laboratory

**Q4 - Dunsink Leachate Results November/December 2011**

| Parameter | Units | Leachate Sump | Lagoon |
|---|---|---|---|
| | | 07/12/2011 | 23/11/2011 |
| pH | pH units | 7.89 | 8.00 |
| Conductivity | mS/cm | 3,590 | 723 |
| Temperature | °C | - | - |
| Ammoniacal Nitrogen# | mg/l | 116.17 | 5.64 |
| Dissolved Methane | mg/l | 2.738 | <0.001 |

Sampled on 23rd November and 7th December 2011

Analysis conducted by Jones Environmental Laboratory

# APPENDIX III

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 07/01/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | RF/FK | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cold Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G35 | | 0.1 | 0.1 | 20.8 | | 985 | | 0.2 |
| G36 | | 0.1 | 0.1 | 20.9 | | 984 | | 0.2 |
| G37 | | **4.2** | **4.3** | 0.2 | | 984 | | 8.3 |
| G38 | | 0.1 | 0.9 | 19.7 | | 984 | | 0.2 |
| G39 | | 0.1 | **5.6** | 10.5 | | 984 | | 0.2 |
| G40 | | 0.1 | **7.4** | 7.2 | | 985 | | 0.2 |
| G23 | | 0.1 | 0.1 | 20.3 | | 989 | | 0.1 |
| Leachate Sump | | 0.3 | **2.3** | 20.3 | | 985 | | 0.6 |
| Sewer | | 0.1 | **2.0** | 20.3 | | 984 | | 0.2 |
| IPS INLET* | | **40.5** | **34.5** | 1.7 | | | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 13/01/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | RF/FK | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cold Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G35 | | 0.0 | 0.1 | 50.6 | 0.0 | 995 | | 0.0 |
| G36 | | 0.0 | 0.2 | 20.5 | 0.0 | 995 | | 0.0 |
| G37 | | 0.0 | 1.0 | 18.3 | 0.0 | 995 | | 0.1 |
| G38 | | 0.0 | 0.1 | 20.5 | 0.0 | 995 | | 0.0 |
| G39 | | 0.1 | **5.9** | 10.3 | 0.0 | 995 | | 0.1 |
| G40 | | 0.0 | **7.3** | 6.0 | 0.0 | 995 | | 0.1 |
| G23 | | 0.0 | 0.0 | 19.0 | 0.0 | 995 | | 0.0 |
| Leachate Sump | | 0.1 | 0.3 | 20.5 | 0.0 | 996 | | 0.2 |
| Sewer | | 0.1 | 0.7 | 20.5 | 0.0 | 996 | | 0.1 |
| IPS INLET* | | **39.6** | **24.4** | 1.9 | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | Site Address : | | | |
|---|---|---|---|---|
| Dunsink Landfill | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : Operational | Date : | 20/01/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | Weather : | Barometric Pressure : |
|---|---|---|
| RF/FK | Cold Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G35 | | 0.0 | 0.1 | 20.6 | 0.0 | 1036 | 5.0 | 0.0 |
| G36 | | 0.0 | 0.6 | 50.5 | 0.0 | 1034 | 3.5 | 0.0 |
| G37 | | 0.0 | **2.2** | 14.7 | 0.0 | 1034 | 4.5 | 0.0 |
| G38 | | 0.0 | **4.2** | 15.3 | 0.0 | 1033 | 4.0 | 0.0 |
| G39 | | 0.0 | **5.1** | 12.2 | 0.0 | 1034 | 3.5 | 0.0 |
| G40 | | 0.0 | **6.6** | 9.2 | 0.0 | 1034 | 4.0 | 0.0 |
| G23 | | 0.0 | 0.0 | 18.4 | 0.0 | 1034 | 5.0 | 0.0 |
| Leachate Sump | | 0.0 | **3.6** | 19.6 | 0.0 | 1035 | 4.4 | 2.2 |
| Sewer | | 0.0 | 0.9 | 20.4 | 0.0 | 1036 | 5.5 | 0.0 |
| IPS INLET* | | **39.5** | **29.5** | 1.7 | - | | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 26/01/11 | Time: | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSx Multigas Landfill Analyser | 0-100% $CH_4$, $CO_2$. | Sep-11 |

| Monitoring Personnel : | RF/SD | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy/Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | 0.0 | 20.4 | 0.0 | 1012 | 4.5 | 0.0 |
| G6 | | 0.0 | 1.2 | 20.1 | 0.0 | 1010 | 5.0 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.6 | 0.0 | 1010 | 5.0 | 0.0 |
| G8 | | 0.0 | 0.0 | 20.5 | 0.0 | 1009 | 5.0 | 0.0 |
| G9 | | 0.0 | 1.0 | 19.2 | 0.0 | 1010 | 4.5 | 0.0 |
| G10 | | 0.0 | 1.5 | 18.3 | 0.0 | 1011 | 5.0 | 0.0 |
| G12 | | 0.0 | 0.1 | 20.2 | 0.0 | 1011 | 5.5 | 0.0 |
| G13 | | 0.0 | 0.6 | 19.7 | 0.0 | 1011 | 5.0 | 0.0 |
| G18 | | 0.0 | 0.0 | 19.5 | 0.0 | 1011 | 5.0 | 0.0 |
| G21 | | 0.0 | 0.3 | 20.2 | 0.0 | 1012 | 4.5 | 0.0 |
| G23 | | 0.0 | 0.0 | 20.1 | 0.0 | 1010 | 4.5 | 0.0 |
| G35 | | 0.0 | 0.4 | 20.0 | 0.0 | 1012 | 4.5 | 0.0 |
| G36 | | 0.0 | **3.2** | 19.0 | 0.0 | 1012 | 4.5 | 0.0 |
| G37 | | 0.5 | **5.7** | 0.6 | 0.0 | 1012 | 4.5 | 12.2 |
| G38 | | 0.0 | **5.1** | 12.5 | 0.0 | 1012 | 4.5 | 0.0 |
| G39 | | 0.0 | **5.3** | 11.2 | 0.0 | 1012 | 4.5 | 0.0 |
| G40 | | 0.0 | **6.8** | 8.6 | 0.0 | 1011 | 4.5 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.4 | 0.0 | 1011 | 5.0 | 0.0 |
| G42 | | 0.0 | 0.0 | 20.4 | 0.0 | 1012 | 5.0 | 0.0 |
| G43 | | 0.0 | **2.1** | 16.8 | 0.0 | 1010 | 4.5 | 0.0 |
| G44 | | 0.0 | **5.6** | 12.8 | 0.0 | 1010 | 5.5 | 0.0 |
| Leachate Sump | | 0.0 | 0.9 | 20.2 | 0.0 | 1012 | 5.5 | 0.0 |
| Sewer | | 0.0 | 0.6 | 20.1 | 0.0 | 1013 | 8.5 | 0.0 |
| IPS INLET* | | | | | | | | |

* Note monitoring completed manually with a portable gas analyser while the continuous gas analyser is being repaired

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 02/02/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | RF/FK | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cold Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G35 | | 0.0 | 0.2 | 20.6 | 0.0 | 1006 | 14.0 | 0.0 |
| G36 | | 0.0 | **4.4** | 16.2 | 0.0 | 1006 | 11.5 | 0.0 |
| G37 | | **1.2** | **3.9** | 4.7 | 0.0 | 1004 | 10.0 | 28.3 |
| G38 | | 0.0 | **3.4** | 15.7 | 0.0 | 1004 | 11.0 | 0.0 |
| G39 | | 0.0 | **5.5** | 14.9 | 0.0 | 1005 | 12.0 | 0.0 |
| G40 | | 0.0 | **6.8** | 8.5 | 0.0 | 1011 | 14.0 | 0.0 |
| G23 | | 0.0 | 0.0 | 17.1 | 0.0 | 1006 | 11.5 | 0.0 |
| Leachate Sump | | 0.0 | 0.3 | 20.6 | 0.0 | 1004 | 12.5 | 0.0 |
| Sewer | | 0.0 | 0.5 | 20.6 | 0.0 | 1007 | 13.0 | 0.0 |
| IPS INLET* | | **42.5** | **34.5** | 1.6 | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 11/02/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | RF/SD | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Warm Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G35 | | 0.0 | 0.0 | 21.0 | 0.0 | 997 | 8.3 | 0.0 |
| G36 | | 0.0 | 0.6 | 20.3 | 0.0 | 997 | 8.3 | 0.0 |
| G37 | | 0.0 | **1.5** | 14.1 | 0.0 | 996 | 8.7 | 0.0 |
| G38 | | 0.0 | **3.3** | 11.9 | 0.0 | 996 | 8.6 | 0.0 |
| G39 | | 0.0 | **3.4** | 11.0 | 0.0 | 995 | 8.2 | 0.0 |
| G40 | | 0.0 | **5.1** | 8.7 | 0.0 | 995 | 8.0 | 0.0 |
| G23 | | 0.0 | 0.0 | 20.2 | 0.0 | 994 | 7.9 | 0.0 |
| Leachate Sump | | 0.2 | 0.7 | 20.6 | 0.0 | 994 | 8.5 | 3.0 |
| Sewer | | 0.0 | **1.5** | 20.5 | 0.0 | 997 | 8.8 | 0.7 |
| IPS INLET* | | | | | | | | |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 16/02/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | RF/SD | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Warm Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G35** | | 0.0 | 0.0 | 19.9 | 0.0 | 979 | 5.7 | 0.0 |
| **G36** | | 0.0 | 0.0 | 21.0 | 0.0 | 981 | 8.0 | 0.0 |
| **G37** | | 0.0 | 1.2 | 19.9 | 0.0 | 980 | 8.2 | 0.0 |
| **G38** | | 0.0 | 0.0 | 21.0 | 0.0 | 981 | 8.2 | 0.0 |
| **G39** | | 0.0 | **2.6** | 14.3 | 0.0 | 981 | 8.0 | 0.0 |
| **G40** | | 0.0 | **3.3** | 9.6 | 0.0 | 980 | 8.7 | 0.0 |
| **G23** | | 0.0 | **4.7** | 8.1 | 0.0 | 981 | 6.7 | 0.0 |
| **Leachate Sump** | | **1.6** | **4.4** | 19.0 | 0.0 | 982 | 5.9 | 31.5 |
| **Sewer** | | 0.1 | **2.0** | 20.4 | 0.0 | 982 | 10.4 | 1.8 |
| **IPS INLET*** | | **57.5** | **30.5** | 1.6 | | | | |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | |
|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | |
| Operator : | Fingal County Council | National Grid Reference : | | |
| Site Status : | Operational | Date : | 25/02/11 | Time: |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSx Multigas Landfill Analyser | 0-100% $CH_4$, $CO_2$. | Sep-11 |

| Monitoring Personnel : | RF/FK | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy / Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | 0.0 | 20.7 | 0.0 | 945 | 12.5 | 0.0 |
| G6 | | 0.0 | **2.1** | 17.9 | 0.0 | 940 | 12.5 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.9 | 0.0 | 950 | 12.0 | 0.0 |
| G8 | | 0.0 | 0.0 | 20.8 | 0.0 | 943 | 12.5 | 0.0 |
| G9 | | 0.0 | 1.3 | 18.3 | 0.0 | 942 | 13.0 | 0.0 |
| G10 | | 0.0 | 1.0 | 19.1 | 0.0 | 944 | 13.5 | 0.0 |
| G12 | | 0.0 | 0.0 | 20.7 | 0.0 | 943 | 15.0 | 0.0 |
| G13 | | 0.0 | 0.7 | 19.8 | 0.0 | 930 | 14.0 | 0.0 |
| G18 | | 0.0 | 0.2 | 20.5 | 0.0 | 944 | 12.0 | 0.0 |
| G21 | | 0.0 | 0.6 | 20.5 | 0.0 | 946 | 11.5 | 0.0 |
| G23 | | 0.0 | 0.0 | 18.4 | 0.0 | 939 | 12.5 | 0.0 |
| G35 | | 0.0 | 0.0 | 20.7 | 0.0 | 946 | 12.0 | 0.0 |
| G36 | | 0.0 | **2.1** | 19.5 | 0.0 | 946 | 13.5 | 0.0 |
| G37 | | 0.0 | 0.0 | 20.6 | 0.0 | 948 | 13.0 | 0.0 |
| G38 | | 0.0 | **2.9** | 16.3 | 0.0 | 945 | 12.0 | 0.0 |
| G39 | | 0.0 | **3.9** | 9.6 | 0.0 | 946 | 13.0 | 0.0 |
| G40 | | 0.0 | **6.6** | 8.5 | 0.0 | 945 | 11.5 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.7 | 0.0 | 945 | 12.5 | 0.0 |
| G42 | | 0.0 | 0.0 | 20.7 | 0.0 | 945 | 11.0 | 0.0 |
| G43 | | 0.0 | 1.5 | 19.5 | 0.0 | 949 | 12.0 | 0.0 |
| G44 | | 0.0 | **5.3** | 11.2 | 0.0 | 949 | 12.5 | 0.0 |
| Leachate Sump | | 0.0 | 0.5 | 20.5 | 0.0 | 946 | 11.5 | 0.0 |
| Sewer | | 0.0 | 1.1 | 20.4 | 0.0 | 947 | 16.0 | 0.0 |
| IPS INLET* | | **41.5** | **29.4** | 1.7 | - | - | - | - |

* Note monitoring completed manually with a portable gas analyser while the continuous gas analyser is being repaired

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 03/03/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | FK/SD | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cold Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G35 | | 0.0 | 0.0 | 17.7 | 0.0 | 957 | 7.0 | 0.0 |
| G36 | | 0.0 | 0.8 | 20.0 | 0.0 | 950 | 10.5 | 0.0 |
| G37 | | 0.0 | **2.1** | 19.5 | 0.0 | 950 | 7.5 | 0.0 |
| G38 | | 0.0 | **4.3** | 11.7 | 0.0 | 949 | 8.0 | 0.0 |
| G39 | | 0.0 | **5.0** | 13.4 | 0.0 | 949 | 7.5 | 0.0 |
| G40 | | 0.0 | **6.4** | 13.0 | 0.0 | 949 | 8.0 | 0.0 |
| G23 | | 0.0 | **6.5** | 7.6 | 0.0 | 960 | 11.0 | 0.0 |
| Leachate Sump | | 0.0 | **1.7** | 20.2 | 0.0 | 950 | 12.5 | 0.5 |
| Sewer | | 0.0 | 1.1 | 20.4 | 0.0 | 1036 | 17.5 | 0.0 |
| IPS INLET* | | **45.5** | **32.4** | 1.6 | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 10/03/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | FK/SD | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cold Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G35 | | 0.0 | 0.0 | 14.7 | 0.0 | 1002 | 9.0 | 0.0 |
| G36 | | 0.0 | 0.4 | 20.3 | 0.0 | 1003 | 12.0 | 0.0 |
| G37 | | 0.0 | **4.2** | 14.2 | 0.0 | 1003 | 11.5 | 0.0 |
| G38 | | 0.0 | **3.5** | 8.6 | 0.0 | 1003 | 11.0 | 0.0 |
| G39 | | 0.0 | **1.6** | 17.9 | 0.0 | 1003 | 11.0 | 0.0 |
| G40 | | 0.0 | **5.2** | 13.3 | 0.0 | 1002 | 12.0 | 0.0 |
| G23 | | 0.0 | **6.6** | 7.3 | 0.0 | 1002 | 10.0 | 0.0 |
| Leachate Sump | | 0.0 | 0.3 | 20.5 | 0.0 | 1003 | 10.5 | 0.0 |
| Sewer | | 0.0 | 0.5 | 20.5 | 0.0 | 1004 | 11.5 | 0.0 |
| IPS INLET* | | **41.3** | **30.4** | 1.5 | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 15/03/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | FK/SD | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cold Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G23 | | 0.0 | 0.0 | 16.2 | 0.0 | 1012 | 6.0 | 0.0 |
| G35 | | 0.0 | 0.0 | 18.9 | 0.0 | 1013 | 7.0 | 0.0 |
| G36 | | 0.0 | **4.4** | 13.9 | 0.0 | 1012 | 7.0 | 0.0 |
| G37 | | 0.0 | **4.4** | 6.9 | 0.0 | 1012 | 7.0 | 0.0 |
| G38 | | 0.0 | **4.1** | 13.2 | 0.0 | 1012 | 6.5 | 0.0 |
| G39 | | 0.0 | **6.0** | 11.2 | 0.0 | 1012 | 7.0 | 0.0 |
| G40 | | 0.0 | **6.8** | 7.2 | 0.0 | 1011 | 6.5 | 0.0 |
| Leachate Sump | | 0.0 | **2.2** | 19.6 | 0.0 | 1012 | 6.0 | 0.0 |
| Sewer | | 0.0 | 0.7 | 20.2 | 0.0 | 1014 | 17.0 | 0.0 |
| IPS INLET* | | - | - | - | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 23/03/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSx Multigas Landfill Analyser | 0-100% $CH_4$, $CO_2$. | Sep-11 |

| Monitoring Personnel : | FK/SD | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Sunny/Clear | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | 0.0 | 21.0 | 0.0 | 1035 | 10.0 | 0.0 |
| G6 | | 0.0 | 2.2 | 18.1 | 0.0 | 1036 | 19.5 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.8 | 0.0 | 1036 | 19.0 | 0.0 |
| G8 | | 0.0 | 0.3 | 20.7 | 0.0 | 1038 | 19.0 | 0.0 |
| G9 | | 0.0 | 1.9 | 18.0 | 0.0 | 1037 | 18.5 | 0.0 |
| G10 | | 0.0 | 2.0 | 16.3 | 0.0 | 1038 | 21.5 | 0.0 |
| G12 | | 0.0 | 0.0 | 21.0 | 0.0 | 1034 | 20.5 | 0.0 |
| G13 | | 0.0 | 0.5 | 20.4 | 0.0 | 1033 | 16.0 | 0.0 |
| G18 | | 0.0 | 0.3 | 20.7 | 0.0 | 1034 | 19.0 | 0.0 |
| G21 | | 0.0 | 0.1 | 21.0 | 0.0 | 1036 | 18.0 | 0.0 |
| G23 | | 0.0 | 0.0 | 18.7 | 0.0 | 1036 | 15.0 | 0.0 |
| G35 | | 0.0 | 0.7 | 20.2 | 0.0 | 1034 | 16.5 | 0.0 |
| G36 | | 0.0 | 4.3 | 13.8 | 0.0 | 1034 | 15.0 | 0.0 |
| G37 | | 0.0 | **2.3** | 14.7 | 0.0 | 1035 | 15.0 | 0.0 |
| G38 | | 0.0 | **5.6** | 11.1 | 0.0 | 1034 | 13.5 | 0.0 |
| G39 | | 0.0 | 5.8 | 12.7 | 0.0 | 1033 | 14.5 | 0.0 |
| G40 | | 0.0 | **5.9** | 7.0 | 0.0 | 1036 | 18.0 | 0.0 |
| G41 | | 0.0 | 0.0 | 21.0 | 0.0 | 1036 | 17.5 | 0.0 |
| G42 | | 0.0 | 0.0 | 20.9 | 0.0 | 1036 | 16.5 | 0.0 |
| G43 | | 0.0 | **2.0** | 15.9 | 0.0 | 1036 | 15.5 | 0.0 |
| G44 | | 0.0 | 5.5 | 11.7 | 0.0 | 1036 | 16.5 | 0.0 |
| Leachate Sump | | 0.0 | 0.2 | 20.9 | 0.0 | 1036 | 19.0 | 0.0 |
| Sewer | | 0.0 | 0.2 | 20.9 | 0.0 | 1036 | 18.5 | 0.0 |
| IPS INLET* | | 41.8 | 23.0 | 1.3 | - | - | - | - |

* Note monitoring completed manually with a portable gas analyser while the continuous gas analyser is being repaired

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM (Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 30/03/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy/Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 13.7 | 0.0 | 998 | 10.5 | 0.0 |
| **G35** | | 0.0 | 0.8 | 19.1 | 0.0 | 1000 | 14.5 | 0.0 |
| **G36** | | 0.0 | **4.4** | 13.5 | 0.0 | 1000 | 14.0 | 0.0 |
| **G37** | | 0.0 | **4.1** | 7.8 | 0.0 | 1000 | 12.5 | 0.0 |
| **G38** | | 0.0 | 0.0 | 20.5 | 0.0 | 1000 | 12.0 | 0.0 |
| **G39** | | 0.0 | 0.0 | 20.5 | 0.0 | 1000 | 14.0 | 0.0 |
| **G40** | | 0.0 | **6.4** | 5.4 | 0.0 | 1000 | 13.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.4 | 0.0 | 1000 | 13.5 | 0.0 |
| **Sewer** | | 0.0 | 0.6 | 20.6 | 0.0 | 1000 | 16.5 | 0.0 |
| **IPS INLET*** | | - | - | - | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 05/04/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | FK/SD | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Dull & Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.6 | 14.3 | 0.0 | 1006 | 15.0 | 0.0 |
| **G35** | | 0.0 | 0.2 | 20.6 | 0.0 | 1006 | 16.0 | 0.0 |
| **G36** | | 0.0 | **4.4** | 13.9 | 0.0 | 1005 | 17.0 | 0.0 |
| **G37** | | 0.0 | **1.5** | 18.3 | 0.0 | 1006 | 15.5 | 0.0 |
| **G38** | | 0.0 | 0.0 | 20.7 | 0.0 | 1006 | 16.5 | 0.0 |
| **G39** | | 0.0 | **4.7** | 14.8 | 0.0 | 1005 | 19.5 | 0.0 |
| **G40** | | 0.0 | **7.2** | 8.6 | 0.0 | 1006 | 16.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.8 | 0.0 | 1007 | 15.0 | 0.0 |
| **Sewer** | | 0.0 | 0.7 | 20.6 | 0.0 | 1008 | 16.5 | 0.0 |
| **IPS INLET*** | | **41.3** | **24.4** | 2.0 | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 14/04/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| Monitoring Personnel : | FK/SD | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Warm & Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 14.6 | 0.0 | 1012 | 14.0 | 0.0 |
| **G35** | | 0.0 | 0.7 | 19.3 | 0.0 | 1014 | 15.0 | 0.0 |
| **G36** | | 0.0 | **4.7** | 13.3 | 0.0 | 1013 | 14.5 | 0.0 |
| **G37** | | 0.0 | **1.7** | 17.8 | 0.0 | 1014 | 15.0 | 0.0 |
| **G38** | | 0.0 | **6.4** | 10.8 | 0.0 | 1014 | 14.0 | 0.0 |
| **G39** | | 0.0 | **6.0** | 12.2 | 0.0 | 1012 | 14.0 | 0.0 |
| **G40** | | 0.0 | **7.3** | 7.5 | 0.0 | 1015 | 18.5 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.5 | 20.3 | 0.0 | 1015 | 15.0 | 0.0 |
| **Sewer** | | 0.0 | 0.5 | 20.6 | 0.0 | 1014 | 17.5 | 0.0 |
| **IPS INLET*** | | | | | - | - | | >>> |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | Site Address : | | |
|---|---|---|---|
| Dunsink Landfill | Dunsink Lane, Dunsink., Co. Dublin | | |
| Operator : Fingal County Council | National Grid Reference : | | |
| Site Status : Operational | Date : 20/04/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSx Multigas Landfill Analyser | 0-100% $CH_4$, $CO_2$. | Sep-11 |

| Monitoring Personnel : | Weather: | Barometric Pressure : |
|---|---|---|
| FK & SD | Fine and Warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | 0.0 | 21.0 | 0.0 | 1011 | 24.5 | 0.0 |
| G6 | | 0.0 | **1.9** | 19.4 | 0.0 | 1012 | 22.5 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.8 | 0.0 | 1012 | 22.0 | 0.0 |
| G8 | | 0.0 | 0.4 | 20.6 | 0.0 | 1012 | 20.0 | 0.0 |
| G9 | | 0.0 | **2.0** | 18.7 | 0.0 | 1012 | 19.0 | 0.0 |
| G10 | | 0.0 | **4.8** | 15.0 | 0.0 | 1012 | 26.5 | 0.0 |
| G12 | | 0.0 | 0.1 | 21.2 | 0.0 | 1008 | 22.0 | 0.0 |
| G13 | | 0.0 | 0.6 | 20.5 | 0.0 | 1007 | 21.0 | 0.0 |
| G18 | | 0.0 | 0.1 | 20.9 | 0.0 | 1010 | 22.0 | 0.0 |
| G21 | | 0.0 | 0.0 | 21.1 | 0.0 | 1011 | 26.0 | 0.0 |
| G23 | | 0.0 | 0.0 | 16.8 | 0.0 | 1010 | 18.5 | 0.0 |
| G35 | | 0.0 | 0.8 | 19.4 | 0.0 | 1011 | 23.0 | 0.0 |
| G36 | | 0.0 | **4.7** | 13.6 | 0.0 | 1011 | 20.5 | 0.0 |
| G37 | | 0.0 | **4.2** | 10.5 | 0.0 | 1012 | 20.0 | 0.0 |
| G38 | | 0.0 | **8.1** | 7.6 | 0.0 | 1010 | 20.0 | 0.0 |
| G39 | | 0.0 | **3.8** | 15.0 | 0.0 | 1010 | 26.0 | 0.0 |
| G40 | | 0.0 | **7.1** | 5.8 | 0.0 | 1012 | 27.5 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.9 | 0.0 | 1012 | 26.0 | 0.0 |
| G42 | | 0.0 | 0.0 | 21.0 | 0.0 | 1012 | 20.5 | 0.0 |
| G43 | | 0.0 | **5.9** | 6.5 | 0.0 | 1012 | 26.0 | 0.0 |
| G44 | | 0.0 | **7.5** | 5.8 | 0.0 | 1012 | 26.0 | 0.0 |
| Leachate Sump | | 0.0 | 0.0 | 21.3 | 0.0 | 1010 | 25.0 | 0.0 |
| Sewer | | 0.0 | 0.1 | 21.0 | 0.0 | 1012 | 30.0 | 0.0 |
| IPS INLET* | | **42.2** | **24.7** | 2.0 | 0.0 | 1010 | 20.0 | 0.0 |

* Note monitoring completed manually with a portable gas analyser while the continuous gas analyser is being repaired

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

**(Baseline [ ]** **Ambient [ x ] )**

| **Site Name :** | | **Site Address :** | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| **Operator :** | Fingal County Council<br>Comhairle Contae Fhine Gall | **National Grid Reference :** | | | |
| **Site Status :** | Operational | **Date :** | 27/04/11 | ***Time:*** | am |

| **Instrument Used :** | **Normal Analytical Range** | **Next Calibration due:** |
|---|---|---|
| GA2000 Plus Gas Analyser | 0-100% $CH_4$, $CO_2$. | - |

| **Monitoring Personnel :** | RF/SD | **Weather :** | **Barometric Pressure :** |
|---|---|---|---|
| | | Warm & Sunny | See individual readings |

## Results

| **Borehole Number** | **Survey Depth** | **$CH_4$ % v/v** | **$CO_2$ % v/v** | **$O_2$ % v/v** | **$H_2S$ (ppm)** | **Atmospheric Pressure (mbar)** | **Temperature °C** | **LEL % v/v** |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 15.6 | 0.0 | 1017 | 15.4 | 0.0 |
| **G35** | | 0.0 | 0.7 | 18.8 | 0.0 | 1019 | 20.2 | 0.0 |
| **G36** | | 0.4 | **2.8** | 14.3 | 0.0 | 1019 | 24.2 | 8.0 |
| **G37** | | 0.2 | **2.4** | 14.6 | 0.0 | 1019 | 22.3 | 0.0 |
| **G38** | | 0.2 | **6.0** | 6.4 | 0.0 | 1019 | 25.4 | 0.0 |
| **G39** | | 0.0 | 0.3 | 20.5 | 0.0 | 1019 | 23.7 | 0.0 |
| **G40** | | 0.0 | **6.0** | 5.5 | 0.0 | 1019 | 24.3 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 21.0 | 0.0 | 1019 | 15.2 | 0.0 |
| **Sewer** | | 0.0 | 0.0 | 20.3 | 0.0 | 1020 | 29.3 | 0.0 |
| **IPS INLET*** | | **40.2** | **23.8** | 1.5 | 0.0 | 1019 | 22.2 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 04/05/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Windy & Sunny | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.5 | 12.9 | 0.0 | 1012 | 14.5 | 0.0 |
| **G35** | | 0.0 | 1.1 | 19.0 | 0.0 | 1013 | 16.0 | 0.0 |
| **G36** | | 0.0 | **5.5** | 13.4 | 0.0 | 1012 | 15.5 | 0.0 |
| **G37** | | 0.1 | **3.3** | 11.3 | 0.0 | 1012 | 15.0 | 0.0 |
| **G38** | | 0.0 | **8.8** | 6.5 | 0.0 | 1012 | 14.0 | 0.0 |
| **G39** | | 0.0 | 0.0 | 20.7 | 0.0 | 1012 | 16.5 | 0.0 |
| **G40** | | 0.0 | **9.1** | 9.9 | 0.0 | 1013 | 15.5 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.8 | 0.0 | 1014 | 15.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.9 | 0.0 | 1015 | 22.0 | 0.0 |
| **IPS INLET*** | | **38.4** | **23.3** | 2.2 | 0.0 | 1013 | 16.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 11/05/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Windy Sunny Mild | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.8 | 19.0 | 0.0 | 1015 | 19.5 | 0.0 |
| **G35** | | 0.0 | 0.7 | 19.8 | 0.0 | 1015 | 16.5 | 0.0 |
| **G36** | | 0.0 | **5.8** | 13.2 | 0.0 | 1015 | 16.5 | 0.0 |
| **G37** | | 0.0 | **1.9** | 18.6 | 0.0 | 1015 | 16.5 | 0.0 |
| **G38** | | 0.0 | **8.3** | 10.9 | 0.0 | 1014 | 18.0 | 0.0 |
| **G39** | | 0.0 | **5.3** | 13.5 | 0.0 | 1014 | 16.0 | 0.0 |
| **G40** | | 0.0 | **8.4** | 10.6 | 0.0 | 1014 | 16.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 19.9 | 0.0 | 1015 | 17.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.7 | 0.0 | 1017 | 18.5 | 0.0 |
| **IPS INLET*** | | **51.7** | **28.4** | 0.3 | 0.0 | 1015 | 17.2 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 18/05/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy, Windy, Mild | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.9 | 19.9 | 0.0 | 1007 | 15.5 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.9 | 0.0 | 1007 | 14.0 | 0.0 |
| **G36** | | 0.0 | **5.8** | 13.1 | 0.0 | 1006 | 16.5 | 0.0 |
| **G37** | | 0.0 | **3.1** | 15.2 | 0.0 | 1008 | 15.5 | 0.0 |
| **G38** | | 0.0 | 0.5 | 11.0 | 0.0 | 1006 | 18.0 | 0.0 |
| **G39** | | 0.0 | **7.0** | 11.7 | 0.0 | 1006 | 16.5 | 0.0 |
| **G40** | | 0.0 | **8.1** | 10.2 | 0.0 | 1009 | 21.5 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.9 | 0.0 | 1009 | 20.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 21.0 | 0.0 | 1009 | 20.0 | 0.0 |
| **IPS INLET*** | | **40.7** | **24.4** | 2.0 | 0.0 | 1007 | 17.5 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | Site Address : | | |
|---|---|---|---|
| Dunsink Landfill | Dunsink Lane, Dunsink., Co. Dublin | | |
| Operator : Fingal County Council | National Grid Reference : | | |
| Site Status : Operational | Date : 25/05/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM 430 Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RF & FK | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy & Windy, Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | **1.8** | 18.3 | 0.0 | 1009 | 12.5 | 0.0 |
| G6 | | 0.0 | 0.6 | 20.3 | 0.0 | 1009 | 12.5 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.7 | 0.0 | 1009 | 13.0 | 0.0 |
| G8 | | 0.0 | 0.1 | 20.6 | 0.0 | 1009 | 13.0 | 0.0 |
| G9 | | 0.0 | **2.1** | 19.1 | 0.0 | 1009 | 12.5 | 0.0 |
| G10 | | 0.0 | 1.4 | 19.1 | 0.0 | 1010 | 12.5 | 0.0 |
| G12 | | 0.0 | 0.1 | 20.5 | 0.0 | 1007 | 15.0 | 0.0 |
| G13 | | 0.0 | 0.2 | 20.5 | 0.0 | 1006 | 13.0 | 0.0 |
| G18 | | 0.0 | 0.1 | 20.6 | 0.0 | 1007 | 12.0 | 0.0 |
| G21 | | 0.0 | 0.0 | 20.6 | 0.0 | 1010 | 13.0 | 0.0 |
| G23 | | 0.0 | **1.6** | 8.9 | 0.0 | 1009 | 14.0 | 0.0 |
| G35 | | 0.0 | 0.0 | 20.6 | 0.0 | 1009 | 12.5 | 0.0 |
| G36 | | 0.0 | **6.0** | 13.0 | 0.0 | 1008 | 12.5 | 0.0 |
| G37 | | 0.0 | 1.3 | 18.8 | 0.0 | 1009 | 13.5 | 0.0 |
| G38 | | 0.0 | **6.5** | 13.2 | 0.0 | 1008 | 12.5 | 0.0 |
| G39 | | 0.0 | **6.7** | 12.7 | 0.0 | 1007 | 13.0 | 0.0 |
| G40 | | 0.0 | **7.6** | 11.8 | 0.0 | 1009 | 12.5 | 0.0 |
| G41 | | 0.0 | 0.5 | 20.3 | 0.0 | 1009 | 13.0 | 0.0 |
| G42 | | 0.0 | 0.1 | 20.6 | 0.0 | 1010 | 14.0 | 0.0 |
| G43 | | 0.0 | 1.0 | 18.5 | 0.0 | 1009 | 12.0 | 0.0 |
| G44 | | 0.0 | **9.2** | 13.3 | 0.0 | 1009 | 12.5 | 0.0 |
| Leachate Sump | | 0.0 | 0.1 | 20.6 | 0.0 | 1010 | 13.0 | 0.0 |
| Sewer | | 0.0 | 0.1 | 20.6 | 0.0 | 1009 | 15.0 | 0.0 |
| IPS INLET* | | **52.7** | **28.5** | 0.7 | 0.0 | 1009 | 15.0 | 0.0 |

* Note monitoring completed manually with a portable gas analyser while the continuous gas analyser is being repaired

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 31/05/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy Dry | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | **1.3** | **2.3** | 8.1 | 0.0 | 1015 | 16.0 | 30.2 |
| **G35** | | 0.0 | 0.0 | 21.1 | 0.0 | 1016 | 17.0 | 0.0 |
| **G36** | | 0.0 | **6.1** | 13.4 | 0.0 | 1015 | 16.0 | 0.0 |
| **G37** | | 0.0 | 1.5 | 19.1 | 0.0 | 1017 | 21.5 | 0.0 |
| **G38** | | 0.0 | **8.2** | 12.2 | 0.0 | 1015 | 21.0 | 0.0 |
| **G39** | | 0.0 | **6.0** | 13.4 | 0.0 | 1015 | 21.5 | 0.0 |
| **G40** | | 0.0 | **7.2** | 11.4 | 0.0 | 1017 | 20.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 21.1 | 0.0 | 1018 | 20.5 | 0.0 |
| **Sewer** | | 0.0 | 0.0 | 21.0 | 0.0 | 1016 | 19.0 | 0.0 |
| **IPS INLET*** | | **46.4** | **25.5** | 1.4 | 0.0 | 1016 | 19.2 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 08/06/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cool Wet Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | **3.5** | **3.4** | 1.7 | 0.0 | 995 | 14.0 | 78.5 |
| **G35** | | 0.0 | 0.0 | 21.0 | 0.0 | 996 | 17.5 | 0.0 |
| **G36** | | 0.0 | **6.2** | 13.7 | 0.0 | 995 | 17.5 | 0.0 |
| **G37** | | 0.0 | **2.2** | 17.4 | 0.0 | 997 | 23.5 | 0.0 |
| **G38** | | 0.0 | **9.2** | 8.3 | 0.0 | 995 | 16.5 | 0.0 |
| **G39** | | 0.0 | **2.8** | 18.1 | 0.0 | 995 | 21.5 | 0.0 |
| **G40** | | 0.0 | **7.7** | 9.4 | 0.0 | 997 | 16.5 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.2 | 20.9 | 0.0 | 998 | 21.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.9 | 0.0 | 996 | 19.0 | 0.0 |
| **IPS INLET*** | | **49.7** | **26.8** | 1.0 | 0.0 | 996 | 18.6 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 15/06/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Sunny Mild | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.6 | **3.7** | 3.3 | 0.0 | 1004 | 19.0 | 14.2 |
| **G35** | | 0.0 | 0.0 | 20.9 | 0.0 | 1005 | 19.0 | 0.0 |
| **G36** | | 0.0 | **6.3** | 14.1 | 0.0 | 1004 | 20.0 | 0.0 |
| **G37** | | 0.0 | **2.1** | 18.2 | 0.0 | 1005 | 18.0 | 0.0 |
| **G38** | | 0.0 | **10.1** | 7.8 | 0.0 | 1004 | 18.5 | 0.0 |
| **G39** | | 0.0 | **2.0** | 18.7 | 0.0 | 1003 | 19.5 | 0.0 |
| **G40** | | 0.0 | **8.1** | 9.9 | 0.0 | 1004 | 25.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.9 | 0.0 | 1006 | 19.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.8 | 0.0 | 1005 | 20.0 | 0.0 |
| **IPS INLET*** | | | | | 0.0 | 1004 | 19.8 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | Site Address : | | |
|---|---|---|---|
| Dunsink Landfill | Dunsink Lane, Dunsink., Co. Dublin | | |
| Operator : Fingal County Council | National Grid Reference : | | |
| Site Status : Operational | Date : 21/06/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM 430 Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RF & FK | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Warm Wet Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | **3.1** | 16.9 | 0.0 | 997 | 20.0 | 0.0 |
| G6 | | 0.0 | 1.0 | 19.5 | 0.0 | 1000 | 20.0 | 0.0 |
| G7 | | 0.0 | 0.0 | 21.0 | 0.0 | 999 | 17.5 | 0.0 |
| G8 | | 0.0 | 0.3 | 20.8 | 0.0 | 998 | 18.0 | 0.0 |
| G9 | | 0.0 | **1.8** | 19.5 | 0.0 | 998 | 16.0 | 0.0 |
| G10 | | 0.0 | **4.1** | 14.4 | 0.0 | 997 | 16.5 | 0.0 |
| G12 | | 0.0 | 0.2 | 20.8 | 0.0 | 995 | 18.5 | 0.0 |
| G13 | | 0.0 | 0.5 | 20.6 | 0.0 | 995 | 17.5 | 0.0 |
| G18 | | 0.0 | 0.3 | 20.8 | 0.0 | 997 | 20.0 | 0.0 |
| G21 | | 0.0 | 0.1 | 20.9 | 0.0 | 998 | 22.5 | 0.0 |
| G23 | | 0.0 | **3.9** | 12.9 | 0.0 | 997 | 18.0 | 0.0 |
| G35 | | 0.0 | 0.2 | 20.7 | 0.0 | 997 | 20.0 | 0.0 |
| G36 | | 0.0 | **6.3** | 14.6 | 0.0 | 997 | 20.0 | 0.0 |
| G37 | | 0.0 | **3.6** | 15.6 | 0.0 | 997 | 20.0 | 0.0 |
| G38 | | 0.0 | **10.8** | 6.6 | 0.0 | 997 | 19.0 | 0.0 |
| G39 | | 0.0 | 1.3 | 19.4 | 0.0 | 997 | 20.0 | 0.0 |
| G40 | | 0.0 | **8.2** | 7.5 | 0.0 | 997 | 18.5 | 0.0 |
| G41 | | 0.0 | **9.2** | 10.2 | 0.0 | 997 | 18.5 | 0.0 |
| G42 | | 0.0 | 0.1 | 20.8 | 0.0 | 997 | 17.5 | 0.0 |
| G43 | | 0.0 | **6.2** | 10.0 | 0.0 | 997 | 16.5 | 0.0 |
| G44 | | 0.0 | 0.8 | 19.8 | 0.0 | 997 | 19.0 | 0.0 |
| Leachate Sump | | 0.0 | 0.6 | 20.4 | 0.0 | 998 | 20.5 | 0.0 |
| Sewer | | 0.0 | 0.2 | 20.8 | 0.0 | 997 | 20.5 | 0.0 |
| IPS INLET* | | **44.3** | **26.4** | 0.2 | 0.0 | 997 | 20.5 | 0.0 |

* Note monitoring completed manually with a portable gas analyser while the continuous gas analyser is being repaired

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 29/06/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy Warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.8 | 18.1 | 0.0 | 1017 | 20.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.9 | 0.0 | 1018 | 17.0 | 0.0 |
| **G36** | | 0.0 | **6.4** | 14.5 | 0.0 | 1018 | 19.0 | 0.0 |
| **G37** | | 0.0 | **2.8** | 18.0 | 0.0 | 1018 | 19.0 | 0.0 |
| **G38** | | 0.0 | **11.2** | 7.0 | 0.0 | 1018 | 20.5 | 0.0 |
| **G39** | | 0.0 | **2.1** | 18.6 | 0.0 | 1017 | 24.0 | 0.0 |
| **G40** | | 0.0 | **8.0** | 7.3 | 0.0 | 1018 | 29.5 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.7 | 0.0 | 1019 | 28.5 | 0.0 |
| **Sewer** | | 0.0 | 0.0 | 20.9 | 0.0 | 1019 | 28.5 | 0.0 |
| **IPS INLET*** | | **38.4** | **24.8** | 0.4 | 0 | 1018 | 22.9 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 05/07/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Sunny Windy Warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 1.0 | 18.1 | 0.0 | 999 | 18.5 | 0.0 |
| **G35** | | 0.0 | 0.2 | 21.1 | 0.0 | 999 | 22.0 | 0.0 |
| **G36** | | 0.0 | **6.3** | 14.9 | 0.0 | 999 | 23.0 | 0.0 |
| **G37** | | 0.0 | 0.1 | 20.7 | 0.0 | 1000 | 19.5 | 0.0 |
| **G38** | | 0.0 | **10.2** | 8.0 | 0.0 | 999 | 21.5 | 0.0 |
| **G39** | | 0.0 | 0.2 | 21.0 | 0.0 | 999 | 22.5 | 0.0 |
| **G40** | | 0.0 | **8.5** | 5.9 | 0.0 | 1000 | 20.5 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.7 | 0.0 | 1000 | 19.5 | 0.0 |
| **Sewer** | | 0.0 | 0.3 | 20.5 | 0.0 | 1000 | 21.5 | 0.0 |
| **IPS INLET*** | | **63.1** | **31.1** | 0.4 | 0 | 999 | 20.9 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 14/07/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM430 Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy Very Warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **1.7** | 19.7 | 0.0 | 1016 | 24.5 | 0.0 |
| **G35** | | 0.0 | 0.2 | 20.9 | 0.0 | 1016 | 22.5 | 0.0 |
| **G36** | | 0.0 | **5.3** | 16.5 | 0.0 | 1017 | 23.0 | 0.0 |
| **G37** | | 0.0 | **3.9** | 14.8 | 0.0 | 1017 | 21.5 | 0.0 |
| **G38** | | 0.0 | **6.0** | 11.7 | 0.0 | 1017 | 21.5 | 0.0 |
| **G39** | | 0.0 | 1.4 | 19.1 | 0.0 | 1016 | 23.0 | 0.0 |
| **G40** | | 0.0 | **7.8** | 6.5 | 0.0 | 1017 | 21.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 21.2 | 0.0 | 1017 | 21.5 | 0.0 |
| **Sewer** | | 0.0 | 0.3 | 20.5 | 0.0 | 1017 | 21.5 | 0.0 |
| **IPS INLET*** | | **43.1** | **26.6** | 0.4 | 0 | 1017 | 22.2 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 21/07/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK & RD | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Heavy Rain | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | **3.6** | 15.9 | 0.0 | 1008 | 11.1 | 0.0 |
| G6 | | 0.0 | 1.4 | 19.1 | 0.0 | 1008 | 13.1 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.7 | 0.0 | 1008 | 11.5 | 0.0 |
| G8 | | 0.0 | 0.0 | 20.5 | 0.0 | 1008 | 11.5 | 0.0 |
| G9 | | 0.0 | **1.6** | 19.1 | 0.0 | 1008 | 11.2 | 0.0 |
| G10 | | 0.0 | **7.4** | 12.3 | 0.0 | 1008 | 11.8 | 0.0 |
| G12 | | 0.0 | 0.0 | 20.9 | 0.0 | 1008 | 11.5 | 0.0 |
| G13 | | 0.0 | 0.4 | 20.5 | 0.0 | 1006 | 10.6 | 0.0 |
| G18 | | 0.0 | 0.0 | 20.7 | 0.0 | 1008 | 11.1 | 0.0 |
| G21 | | 0.0 | 0.0 | 20.7 | 0.0 | 1008 | 11.4 | 0.0 |
| G23 | | 0.1 | **7.5** | 7.5 | 0.0 | 1008 | 11.0 | 1.0 |
| G35 | | 0.0 | 0.0 | 20.9 | 0.0 | 1008 | 11.1 | 0.0 |
| G36 | | 0.0 | **5.2** | 16.8 | 0.0 | 1008 | 12.4 | 0.0 |
| G37 | | 0.0 | 1.5 | 19.2 | 0.0 | 1008 | 10.7 | 0.0 |
| G38 | | 0.0 | **4.6** | 13.7 | 0.0 | 1008 | 11.3 | 0.0 |
| G39 | | 0.0 | 1.3 | 19.4 | 0.0 | 1008 | 11.2 | 0.0 |
| G40 | | 0.0 | **8.6** | 7.9 | 0.0 | 1008 | 10.9 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.6 | 0.0 | 1008 | 10.7 | 0.0 |
| G42 | | 0.0 | 1.4 | 19.6 | 0.0 | 1008 | 10.4 | 0.0 |
| G43 | | 0.0 | **7.1** | 12.6 | 0.0 | 1008 | 10.8 | 0.0 |
| G44 | | 0.0 | 11.0 | 9.6 | 0.0 | 1008 | 10.4 | 0.0 |
| Leachate Sump | | 0.0 | 0.4 | 20.2 | 0.0 | 1008 | 11.2 | 0.0 |
| Sewer | | 0.0 | 0.4 | 20.8 | 0.0 | 1009 | 12.7 | 0.0 |
| IPS INLET* | | **38.4** | **25.8** | 0.4 | 0.0 | 1008 | 11.3 | 0.0 |

* Note monitoring completed manually with a portable gas analyser while the continuous gas analyser is being repaired

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 28/07/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy, Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **3.6** | 14.1 | 0.0 | 1015 | 15.2 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.8 | 0.0 | 1016 | 14.0 | 0.0 |
| **G36** | | 0.0 | **4.7** | 17.1 | 0.0 | 1016 | 14.3 | 0.0 |
| **G37** | | 0.0 | **1.7** | 18.9 | 0.0 | 1016 | 15.3 | 0.0 |
| **G38** | | 0.0 | **6.9** | 10.9 | 0.0 | 1016 | 15.1 | 0.0 |
| **G39** | | 0.0 | 1.4 | 18.6 | 0.0 | 1016 | 16.1 | 0.0 |
| **G40** | | 0.0 | **9.3** | 5.0 | 0.0 | 1016 | 14.6 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.7 | 0.0 | 1017 | 15.7 | 0.0 |
| **Sewer** | | 0.0 | 0.3 | 20.0 | 0.0 | 1017 | 16.5 | 0.0 |
| **IPS INLET*** | | **38.7** | **25.5** | 0.3 | 0 | 1016 | 15.2 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 03/08/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy, Warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **1.9** | 16.6 | 0.0 | 1003 | 22.1 | 0.0 |
| **G35** | | 0.0 | 0.2 | 20.4 | 0.0 | 1004 | 24.9 | 0.0 |
| **G36** | | 0.0 | **4.3** | 17.4 | 0.0 | 1004 | 25.0 | 0.0 |
| **G37** | | 0.0 | **3.6** | 14.3 | 0.0 | 1004 | 21.5 | 0.0 |
| **G38** | | 0.0 | **7.4** | 9.9 | 0.0 | 1004 | 26.7 | 0.0 |
| **G39** | | 0.0 | **2.1** | 17.5 | 0.0 | 1003 | 25.9 | 0.0 |
| **G40** | | 0.0 | **8.7** | 5.5 | 0.0 | 1004 | 27.4 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.7 | 0.0 | 1005 | 22.4 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.6 | 0.0 | 1005 | 24.6 | 0.0 |
| **IPS INLET*** | | **40.0** | **25.9** | 0.2 | 0 | 1004 | 24.5 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 10/08/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK & RD | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Windy, wet & warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | **7.4** | 12.1 | 0.0 | 1007 | 16.2 | 0.0 |
| G6 | | 0.0 | 1.0 | 19.7 | 0.0 | 1006 | 16.8 | 0.0 |
| G7 | | 0.0 | 1.0 | 19.5 | 0.0 | 1006 | 14.9 | 0.0 |
| G8 | | 0.0 | 0.0 | 20.4 | 0.0 | 1006 | 14.9 | 0.0 |
| G9 | | 0.0 | 0.0 | 20.5 | 0.0 | 1006 | 14.9 | 0.0 |
| G10 | | 0.0 | **4.8** | 14.5 | 0.0 | 1007 | 15.9 | 0.0 |
| G12 | | 0.0 | 0.0 | 20.9 | 0.0 | 1003 | 17.3 | 0.0 |
| G13 | | 0.0 | 0.4 | 20.6 | 0.0 | 1005 | 15.8 | 0.0 |
| G18 | | 0.0 | 0.0 | 20.5 | 0.0 | 1005 | 15.8 | 0.0 |
| G21 | | 0.0 | 0.0 | 20.2 | 0.0 | 1007 | 15.7 | 0.0 |
| G23 | | 0.0 | **4.6** | 10.6 | 0.0 | 1005 | 15.2 | 0.0 |
| G35 | | 0.0 | 0.0 | 20.3 | 0.0 | 1007 | 15.9 | 0.0 |
| G36 | | 0.0 | **3.6** | 17.4 | 0.0 | 1007 | 16.3 | 0.0 |
| G37 | | 0.0 | **4.5** | 12.4 | 0.0 | 1007 | 15.6 | 0.0 |
| G38 | | 0.0 | **9.5** | 7.1 | 0.0 | 1006 | 16.0 | 0.0 |
| G39 | | 0.0 | 1.4 | 18.1 | 0.0 | 1006 | 16.8 | 0.0 |
| G40 | | 0.0 | **8.5** | 5.4 | 0.0 | 1006 | 15.7 | 0.0 |
| G41 | Flooded (No Top) | | | | | | | |
| G42 | | 0.0 | 0.5 | 19.7 | 0.0 | 1007 | 16.1 | 0.0 |
| G43 | | 0.0 | **6.6** | 14.0 | 0.0 | 1007 | 16.0 | 0.0 |
| G44 | | 0.0 | **11.0** | 9.0 | 0.0 | 1007 | 16.0 | 0.0 |
| Leachate Sump | | 0.0 | 0.0 | 20.3 | 0.0 | 1007 | 16.0 | 0.0 |
| Sewer | | 0.0 | 0.2 | 20.0 | 0.0 | 1007 | 17.0 | 0.0 |
| IPS INLET | | **40.2** | **25.0** | 0.2 | 0.0 | 1006 | 15.9 | 0.0 |

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 17/08/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RD/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Sunny, warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **4.7** | 8.8 | 0.0 | 1010 | 17.0 | 0.0 |
| **G35** | | 0.0 | 0.3 | 20.0 | 0.0 | 1010 | 17.0 | 0.0 |
| **G36** | | 0.0 | **3.5** | 17.5 | 0.0 | 1011 | 17.0 | 0.0 |
| **G37** | | 0.0 | **2.9** | 16.7 | 0.0 | 1010 | 17.0 | 0.0 |
| **G38** | | 0.0 | **12.0** | 6.4 | 0.0 | 1010 | 17.0 | 0.0 |
| **G39** | | 0.0 | 1.5 | 17.3 | 0.0 | 1010 | 17.0 | 0.0 |
| **G40** | | 0.0 | **7.0** | 8.2 | 0.0 | 1010 | 17.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 21.0 | 0.0 | 1011 | 17.0 | 0.0 |
| **Sewer** | | 0.0 | 0.0 | 22.0 | 0.0 | 1010 | 17.0 | 0.0 |
| **IPS INLET*** | | **3.8** | **2.8** | 18.8 | 0 | 1010 | 17.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council<br>Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 24/08/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RD/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy, warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **5.7** | 7.7 | 0.0 | 999 | 16.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.3 | 0.0 | 1000 | 16.0 | 0.0 |
| **G36** | | 0.0 | **3.3** | 17.5 | 0.0 | 1000 | 16.0 | 0.0 |
| **G37** | | 0.0 | **3.1** | 14.6 | 0.0 | 1000 | 16.0 | 0.0 |
| **G38** | | 0.0 | **10.0** | 5.6 | 0.0 | 999 | 16.0 | 0.0 |
| **G39** | | 0.0 | 0.3 | 19.8 | 0.0 | 1000 | 16.0 | 0.0 |
| **G40** | | 0.0 | **7.6** | 6.7 | 0.0 | 999 | 16.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.3 | 0.0 | 1000 | 16.0 | 0.0 |
| **Sewer** | | 0.0 | 0.2 | 19.8 | 0.0 | 1000 | 16.0 | 0.0 |
| **IPS INLET*** | | **3.1** | **2.1** | 19.6 | 0 | 1000 | 16.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 31/08/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RD/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy, cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **3.2** | 14.4 | 0.0 | 1008 | 16.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.4 | 0.0 | 1007 | 16.0 | 0.0 |
| **G36** | | 0.0 | **3.4** | 17.7 | 0.0 | 1007 | 16.0 | 0.0 |
| **G37** | | 0.0 | **3.1** | 16.1 | 0.0 | 1007 | 16.0 | 0.0 |
| **G38** | | 0.0 | **12.0** | 5.6 | 0.0 | 1007 | 16.0 | 0.0 |
| **G39** | | 0.0 | 0.8 | 18.1 | 0.0 | 1008 | 16.0 | 0.0 |
| **G40** | | 0.0 | **7.2** | 7.6 | 0.0 | 1007 | 16.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.5 | 0.0 | 1007 | 16.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.0 | 0.0 | 1007 | 16.0 | 0.0 |
| **IPS INLET*** | | **56.5** | **31.4** | 0.0 | 0 | 1007 | 16.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council<br>Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 07/09/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy, wet, cold | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.1 | **12.0** | 1.8 | 0.0 | 999 | 11.0 | 1.0 |
| **G35** | | 0.0 | 0.0 | 20.9 | 0.0 | 1000 | 11.0 | 0.0 |
| **G36** | | 0.0 | **3.5** | 18.2 | 0.0 | 1000 | 11.0 | 0.0 |
| **G37** | | 0.0 | **4.5** | 13.3 | 0.0 | 1000 | 11.0 | 0.0 |
| **G38** | | 0.0 | **10.0** | 7.4 | 0.0 | 999 | 11.0 | 0.0 |
| **G39** | | 0.0 | 1.5 | 18.6 | 0.0 | 999 | 11.0 | 0.0 |
| **G40** | | 0.0 | **9.1** | 8.5 | 0.0 | 999 | 11.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.8 | 0.0 | 1000 | 11.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.7 | 0.0 | 1001 | 11.0 | 0.0 |
| **IPS INLET*** | | **42.1** | **26.4** | 0.2 | 0 | 1000 | 11.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 13/09/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy, windy, cold | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **9.1** | 13.3 | 0.0 | 997 | 15.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.9 | 0.0 | 999 | 15.0 | 0.0 |
| **G36** | | 0.0 | **3.3** | 18.5 | 0.0 | 999 | 15.0 | 0.0 |
| **G37** | | 0.0 | **2.8** | 16.7 | 0.0 | 999 | 15.0 | 0.0 |
| **G38** | | 0.0 | **10.0** | 9.3 | 0.0 | 999 | 15.0 | 0.0 |
| **G39** | | 0.0 | 0.0 | 20.8 | 0.0 | 998 | 15.0 | 0.0 |
| **G40** | | 0.0 | **8.0** | 9.8 | 0.0 | 999 | 15.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.9 | 0.0 | 999 | 15.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.7 | 0.0 | 999 | 15.0 | 0.0 |
| **IPS INLET*** | | **38.4** | **26.1** | 0.2 | 0 | 999 | 15.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 21/09/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Windy / Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **5.7** | 10.6 | 0.0 | 999 | 13.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.8 | 0.0 | 999 | 13.0 | 0.0 |
| **G36** | | 0.0 | **3.3** | 18.0 | 0.0 | 999 | 13.0 | 0.0 |
| **G37** | | 0.0 | **4.3** | 9.5 | 0.0 | 1000 | 13.0 | 0.0 |
| **G38** | | 0.0 | **11.0** | 6.8 | 0.0 | 999 | 13.0 | 0.0 |
| **G39** | | 0.0 | 1.2 | 19.2 | 0.0 | 999 | 13.0 | 0.0 |
| **G40** | | 0.0 | **7.7** | 7.9 | 0.0 | 999 | 13.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.2 | 20.7 | 0.0 | 1000 | 13.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 20.6 | 0.0 | 1001 | 13.0 | 0.0 |
| **IPS INLET*** | | **44.6** | **26.9** | 0.1 | 0.0 | 999 | 13.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink., Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 29/09/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK & RF | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Sunny & warm | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | **3.1** | 17.9 | 0.0 | 1010 | 20.0 | 0.0 |
| G6 | | 0.0 | 0.8 | 20.0 | 0.0 | 1010 | 20.0 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.5 | 0.0 | 1010 | 20.0 | 0.0 |
| G8 | | 0.0 | 0.1 | 20.4 | 0.0 | 1010 | 20.0 | 0.0 |
| G9 | | 0.0 | 1.1 | 19.3 | 0.0 | 1010 | 20.0 | 0.0 |
| G10 | | 0.0 | **3.3** | 16.2 | 0.0 | 1010 | 20.0 | 0.0 |
| G12 | | 0.0 | 0.0 | 20.5 | 0.0 | 1009 | 20.0 | 0.0 |
| G13 | | 0.0 | 0.4 | 20.3 | 0.0 | 1008 | 20.0 | 0.0 |
| G18 | | 0.0 | 0.2 | 20.4 | 0.0 | 1008 | 20.0 | 0.0 |
| G21 | | 0.0 | 0.0 | 20.3 | 0.0 | 1010 | 20.0 | 0.0 |
| G23 | | 0.0 | **5.1** | 14.3 | 0.0 | 1010 | 20.0 | 0.0 |
| G35 | | 0.0 | 0.0 | 20.3 | 0.0 | 1010 | 20.0 | 0.0 |
| G36 | | 0.0 | **3.7** | 17.4 | 0.0 | 1010 | 20.0 | 0.0 |
| G37 | | 0.0 | 1.3 | 18.9 | 0.0 | 1010 | 20.0 | 0.0 |
| G38 | | 0.0 | **6.9** | 10.5 | 0.0 | 1010 | 20.0 | 0.0 |
| G39 | | 0.0 | 0.0 | 20.4 | 0.0 | 1010 | 20.0 | 0.0 |
| G40 | | 0.0 | **7.1** | 8.6 | 0.0 | 1010 | 20.0 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.3 | 0.0 | 1010 | 20.0 | 0.0 |
| G42 | | 0.0 | 0.4 | 20.0 | 0.0 | 1010 | 20.0 | 0.0 |
| G43 | | 0.0 | **3.5** | 13.6 | 0.0 | 1010 | 20.0 | 0.0 |
| G44 | | 0.0 | **8.5** | 10.4 | 0.0 | 1010 | 20.0 | 0.0 |
| Leachate Sump | | 0.0 | 0.1 | 20.3 | 0.0 | 1010 | 20.0 | 0.0 |
| Sewer | | 0.0 | 0.0 | 20.5 | 0.0 | 1010 | 20.0 | 0.0 |
| IPS INLET | | **43.5** | **28.6** | 0.1 | 0.0 | 1010 | 20.0 | 0.0 |

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council<br>Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 04/10/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | | Weather : | Barometric Pressure : |
|---|---|---|---|
| | FK/RF | Cloudy / Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.4 | 19.9 | 0.0 | 1012 | 15.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 21.0 | 0.0 | 1013 | 17.0 | 0.0 |
| **G36** | | 0.0 | **4.4** | 17.0 | 0.0 | 1013 | 15.5 | 0.0 |
| **G37** | | 0.0 | **4.9** | 8.3 | 0.0 | 1013 | 15.5 | 0.0 |
| **G38** | | 0.0 | **4.6** | 13.3 | 0.0 | 1013 | 14.5 | 0.0 |
| **G39** | | 0.0 | **3.9** | 9.7 | 0.0 | 1012 | 15.0 | 0.0 |
| **G40** | | 0.0 | **7.9** | 6.9 | 0.0 | 1013 | 16.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 21.0 | 0.0 | 1015 | 15.0 | 0.0 |
| **Sewer** | | 0.0 | 0.2 | 20.9 | 0.0 | 1015 | 17.0 | 0.0 |
| **IPS INLET*** | | **43.8** | **26.9** | 0.1 | 0.0 | 1013 | 15.6 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 12/10/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy / Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 20.2 | 0.0 | 1014 | 19.0 | 0.0 |
| **G35** | | 0.0 | 0.3 | 20.8 | 0.0 | 1015 | 19.5 | 0.0 |
| **G36** | | 0.0 | **4.4** | 15.9 | 0.0 | 1015 | 18.5 | 0.0 |
| **G37** | | 0.0 | **4.1** | 13.5 | 0.0 | 1015 | 20.0 | 0.0 |
| **G38** | | 0.0 | **4.1** | 15.0 | 0.0 | 1014 | 20.0 | 0.0 |
| **G39** | | 0.0 | **4.9** | 12.3 | 0.0 | 1015 | 18.5 | 0.0 |
| **G40** | | 0.0 | **7.6** | 7.3 | 0.0 | 1015 | 20.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 21.1 | 0.0 | 1016 | 20.0 | 0.0 |
| **Sewer** | | 0.0 | 0.1 | 21.0 | 0.0 | 1015 | 21.0 | 0.0 |
| **IPS INLET*** | | **42.7** | **26.5** | 0.1 | 0.0 | 1015 | 19.6 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 18/10/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Clear skies / Cood | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | **3.1** | 13.2 | 0.0 | 1003 | 8.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.7 | 0.0 | 1003 | 15.5 | 0.0 |
| **G36** | | 0.0 | **4.5** | 14.5 | 0.0 | 1003 | 14.0 | 0.0 |
| **G37** | | 0.0 | **7.8** | 3.2 | 0.0 | 1003 | 14.5 | 0.0 |
| **G38** | | 0.0 | **2.3** | 15.8 | 0.0 | 1003 | 14.5 | 0.0 |
| **G39** | | 0.0 | **5.8** | 12.1 | 0.0 | 1003 | 21.0 | 0.0 |
| **G40** | | 0.0 | **8.7** | 4.5 | 0.0 | 1003 | 14.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.2 | 20.7 | 0.0 | 1004 | 8.5 | 0.0 |
| **Sewer** | | 0.0 | 0.0 | 20.7 | 0.0 | 1006 | 15.0 | 0.0 |
| **IPS INLET*** | | **41.8** | **26.4** | 0.1 | 0.0 | 1003 | 13.9 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | Site Address : | | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | Dunsink Lane, Dunsink., Co. Dublin | | | | |
| Operator : Fingal County Council | National Grid Reference : | | | | |
| Site Status : Operational | Date : | 26/10/11 | Time: | | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | Weather: | Barometric Pressure : |
|---|---|---|
| FK & RF | Sunny & cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | 0.0 | 20.7 | 0.0 | 991 | 13.0 | 0.0 |
| G6 | | 0.0 | 0.7 | 18.2 | 0.0 | 992 | 11.5 | 0.0 |
| G7 | | 0.0 | 0.0 | 20.8 | 0.0 | 991 | 11.5 | 0.0 |
| G8 | | 0.0 | 0.0 | 20.6 | 0.0 | 992 | 15.0 | 0.0 |
| G9 | | 0.0 | 1.2 | 18.6 | 0.0 | 992 | 12.5 | 0.0 |
| G10 | | 0.0 | 0.2 | 20.4 | 0.0 | 993 | 13.5 | 0.0 |
| G12 | | 0.0 | 0.0 | 20.9 | 0.0 | 993 | 14.0 | 0.0 |
| G13 | | 0.0 | 0.1 | 20.7 | 0.0 | 992 | 11.5 | 0.0 |
| G18 | | 0.0 | 0.0 | 20.6 | 0.0 | 991 | 11.0 | 0.0 |
| G21 | | 0.0 | 0.0 | 20.7 | 0.0 | 992 | 11.0 | 0.0 |
| G23 | | 0.0 | 0.6 | 16.9 | 0.0 | 991 | 12.5 | 0.0 |
| G35 | | 0.0 | 0.0 | 20.8 | 0.0 | 991 | 15.0 | 0.0 |
| G36 | | 0.0 | **5.6** | 14.5 | 0.0 | 991 | 12.0 | 0.0 |
| G37 | | 0.0 | **7.2** | 0.3 | 0.0 | 991 | 12.0 | 0.0 |
| G38 | | 0.0 | **2.8** | 12.9 | 0.0 | 992 | 11.0 | 0.0 |
| G39 | | No Access | | | | | | |
| G40 | | 0.0 | **6.5** | 6.0 | 0.0 | 992 | 14.0 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.8 | 0.0 | 992 | 9.5 | 0.0 |
| G42 | | 0.0 | 0.0 | 20.8 | 0.0 | 991 | 10.5 | 0.0 |
| G43 | | 0.0 | **3.0** | 14.6 | 0.0 | 992 | 11.0 | 0.0 |
| G44 | | 0.0 | **6.6** | 11.9 | 0.0 | 992 | 10.0 | 0.0 |
| Leachate Sump | | No Access. Open for works all day | | | | | | |
| Sewer | | 0.0 | 0.0 | 20.8 | 0.0 | 993 | 11.0 | 0.0 |
| IPS INLET | | **48.5** | **27.5** | 0.0 | 0.0 | 992 | 12.0 | 0.0 |

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 03/11/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy/wet | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 19.9 | 0.0 | 973 | 12.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.7 | 0.0 | 975 | 12.0 | 0.0 |
| **G36** | | 0.0 | **5.7** | 15.5 | 0.0 | 975 | 12.0 | 0.0 |
| **G37** | | 0.0 | 1.1 | 17.9 | 0.0 | 974 | 12.0 | 0.0 |
| **G38** | | 0.0 | **6.6** | 7.3 | 0.0 | 975 | 12.0 | 0.0 |
| **G39** | | 0.0 | **3.3** | 16.4 | 0.0 | 974 | 12.0 | 0.0 |
| **G40** | | 0.0 | **8.5** | 5.4 | 0.0 | 975 | 12.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.6 | 0.0 | 975 | 12.0 | 0.0 |
| **Sewer** | | 0.0 | 0.3 | 20.6 | 0.0 | 975 | 12.0 | 0.0 |
| **IPS INLET*** | | **48.2** | **27.8** | 0.0 | 0.0 | 975 | 12.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 09/11/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK/RF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Sunny spells | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 19.8 | 0.0 | 996 | 12.0 | 0.0 |
| **G35** | | 0.0 | 0.5 | 20.0 | 0.0 | 997 | 12.0 | 0.0 |
| **G36** | | 0.0 | **2.7** | 17.3 | 0.0 | 997 | 12.0 | 0.0 |
| **G37** | | 0.0 | 0.9 | 18.6 | 0.0 | 997 | 12.0 | 0.0 |
| **G38** | | 0.0 | 0.3 | 19.7 | 0.0 | 997 | 12.0 | 0.0 |
| **G39** | | 0.0 | **4.8** | 14.0 | 0.0 | 997 | 12.0 | 0.0 |
| **G40** | | 0.0 | **8.4** | 3.6 | 0.0 | 997 | 12.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.1 | 20.7 | 0.0 | 997 | 12.0 | 0.0 |
| **Sewer** | | 0.0 | 0.3 | 20.8 | 0.0 | 998 | 12.0 | 0.0 |
| **IPS INLET*** | | **45.1** | **27.0** | 0.1 | 0.0 | 997 | 12.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 16/11/11 | Time: | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | FK & RF | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Cloudy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | 0.0 | 21.0 | 0.0 | 921 | 12.0 | 0.0 |
| G6 | | 0.0 | 1.2 | 18.9 | 0.0 | 1009 | 12.0 | 0.0 |
| G7 | | 0.0 | 0.0 | 21.3 | 0.0 | 1009 | 11.0 | 0.0 |
| G8 | | 0.0 | 0.1 | 20.9 | 0.0 | 927 | 11.0 | 75.1 |
| G9 | | 0.0 | **1.6** | 17.6 | 0.0 | 1008 | 10.5 | 0.0 |
| G10 | | 0.0 | 0.0 | 21.1 | 0.0 | 1007 | 11.0 | 0.0 |
| G12 | | 0.0 | 0.0 | 21.0 | 0.0 | 1007 | 11.5 | 0.0 |
| G13 | | 0.0 | 0.4 | 20.3 | 0.0 | 1007 | 13.5 | 0.0 |
| G18 | | 0.0 | 0.0 | 21.0 | 0.0 | 1007 | 12.0 | 0.0 |
| G21 | | 0.0 | 0.3 | 20.8 | 0.0 | 1008 | 12.0 | 0.0 |
| G23 | | 0.0 | 0.0 | 20.7 | 0.0 | 927 | 11.0 | 77.8 |
| G35 | | 0.0 | 0.5 | 20.4 | 0.0 | 1007 | 12.0 | 0.0 |
| G36 | | 0.0 | **6.1** | 13.9 | 0.0 | 1007 | 12.0 | 0.0 |
| G37 | | 0.0 | **3.5** | 11.8 | 0.0 | 1007 | 11.0 | 0.0 |
| G38 | | 0.0 | 0.8 | 19.0 | 0.0 | 1008 | 12.0 | 0.0 |
| G39 | | 0.0 | **5.7** | 13.1 | 0.0 | 1007 | 11.5 | 0.0 |
| G40 | | 0.0 | **7.9** | 6.5 | 0.0 | 1007 | 11.0 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.7 | 0.0 | 1007 | 12.0 | 0.0 |
| G42 | | 0.0 | 0.0 | 21.0 | 0.0 | 1008 | 12.0 | 0.0 |
| G43 | | 0.0 | **9.0** | 6.5 | 0.0 | 1007 | 10.5 | 0.0 |
| G44 | | 0.0 | **8.7** | 4.1 | 0.0 | 1007 | 11.0 | 0.0 |
| Leachate Sump | | 0.0 | 0.6 | 20.8 | 0 | 1008 | 12 | 0 |
| Sewer | | 0.0 | 0.2 | 21.1 | 0.0 | 1009 | 15.5 | 0.0 |
| IPS INLET | | **42.0** | **26.2** | 0.2 | 0.0 | 997 | 11.7 | 0.0 |

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 24/11/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | | Weather : | Barometric Pressure : |
|---|---|---|---|
| | FK/RF | Cloudy and mild | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 20.0 | 0.0 | 1007 | 12.0 | 0.0 |
| **G35** | | 0.0 | 1.0 | 20.2 | 0.0 | 1008 | 12.0 | 0.0 |
| **G36** | | 0.0 | **7.4** | 13.3 | 0.0 | 1008 | 12.0 | 0.0 |
| **G37** | | 0.0 | **3.1** | 12.9 | 0.0 | 1008 | 12.0 | 0.0 |
| **G38** | | 0.0 | **3.3** | 13.7 | 0.0 | 1008 | 12.0 | 0.0 |
| **G39** | | 0.0 | **4.5** | 15.6 | 0.0 | 1008 | 12.0 | 0.0 |
| **G40** | | 0.0 | **8.1** | 6.0 | 0.0 | 1008 | 12.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.2 | 20.5 | 0.0 | 1009 | 12.0 | 0.0 |
| **Sewer** | | 0.0 | 0.3 | 20.8 | 0.0 | 1009 | 12.0 | 0.0 |
| **IPS INLET*** | | **39.5** | **25.8** | 0.3 | 0.0 | 1008 | 12.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 02/12/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM435 Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RF/JF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Wet, Cold, Windy | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 20.3 | 0.0 | 1001 | 7.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 21.0 | 0.0 | 1001 | 7.0 | 0.0 |
| **G36** | | 0.0 | **4.8** | 17.0 | 0.0 | 1001 | 7.0 | 0.0 |
| **G37** | | 0.0 | **6.4** | 5.4 | 0.0 | 1001 | 7.0 | 0.0 |
| **G38** | | 0.0 | **6.5** | 10.0 | 0.0 | 1001 | 7.0 | 0.0 |
| **G39** | | 0.0 | **7.9** | 10.6 | 0.0 | 1001 | 7.0 | 0.0 |
| **G40** | | 0.0 | **9.7** | 6.5 | 0.0 | 1001 | 7.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.4 | 20.6 | 0.0 | 1003 | 7.0 | 0.0 |
| **Sewer** | | 0.0 | | | 0.0 | 1003 | 7.0 | 0.0 |
| **IPS INLET*** | | **37.3** | **25.4** | 0.4 | 0.0 | 1003 | 7.0 | 0.0 |

* Note monitoring of inlet gases undertaken at new continuous sampling point off enclosed flare

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | Site Address : | | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | Dunsink Lane, Dunsink, Co. Dublin | | | | |
| Operator : Fingal County Council | National Grid Reference : | | | | |
| Site Status : Operational | Date : | 07/12/11 | Time: | | |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| LMSX Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | Weather: | Barometric Pressure : |
|---|---|---|
| FK & RF | Sunny & Cool | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| G3 | | 0.0 | 0.0 | 20.2 | 0.0 | 999 | 6.0 | 0.0 |
| G6 | | 0.0 | 1.3 | 18.9 | 0.0 | 998 | 6.0 | 0.0 |
| G7 | | 0.0 | 0.1 | 20.2 | 0.0 | 998 | 6.0 | 0.0 |
| G8 | | 0.0 | 0.2 | 20.2 | 0.0 | 998 | 6.0 | 0.0 |
| G9 | | 0.0 | **2.0** | 17.9 | 0.0 | 998 | 6.0 | 0.0 |
| G10 | | 0.0 | **2.0** | 17.8 | 0.0 | 999 | 6.0 | 0.0 |
| G12 | | 0.0 | 0.1 | 20.2 | 0.0 | 999 | 6.0 | 0.0 |
| G13 | | 0.0 | 0.5 | 19.7 | 0.0 | 998 | 6.0 | 0.0 |
| G18 | | 0.0 | 0.1 | 20.2 | 0.0 | 998 | 6.0 | 0.0 |
| G21 | | 0.0 | 0.1 | 20.2 | 0.0 | 999 | 6.0 | 0.0 |
| G23 | | 0.0 | 0.0 | 18.7 | 0.0 | 997 | 6.0 | 0.0 |
| G35 | | 0.0 | 0.2 | 20.3 | 0.0 | 999 | 6.0 | 0.0 |
| G36 | | 0.0 | **5.7** | 17.8 | 0.0 | 998 | 6.0 | 0.0 |
| G37 | | **1.0** | **4.4** | 9.2 | 0.0 | 999 | 6.0 | 27.0 |
| G38 | | 0.0 | **6.4** | 12.0 | 0.0 | 998 | 6.0 | 0.0 |
| G39 | | 0.0 | **7.8** | 10.3 | 0.0 | 998 | 6.0 | 0.0 |
| G40 | | 0.0 | **9.4** | 7.0 | 0.0 | 999 | 6.0 | 0.0 |
| G41 | | 0.0 | 0.0 | 20.3 | 0.0 | 999 | 6.0 | 0.0 |
| G42 | | 0.0 | 0.2 | 20.2 | 0.0 | 999 | 6.0 | 0.0 |
| G43 | | 0.0 | 0.9 | 19.6 | 0.0 | 999 | 6.0 | 0.0 |
| G44 | | 0.0 | **7.9** | 13.8 | 0.0 | 999 | 6.0 | 0.0 |
| Leachate Sump | | 0.0 | 1.1 | 20 | 0.0 | 999 | 6.0 | 0.0 |
| Sewer | | 0.0 | **2.2** | 19.7 | 0.0 | 1000 | 6.0 | 0.0 |
| IPS INLET | | **50.5** | **28.6** | 0.2 | 0.0 | 999 | 6.0 | 0.0 |

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council<br>Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 13/12/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM435 Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RF/JF | Weather : | Barometric Pressure : |
|---|---|---|---|
| | | Windy, snowy, cold | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 20.5 | 0.0 | 968 | 3.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.9 | 0.0 | 969 | 3.0 | 0.0 |
| **G36** | | 0.0 | **5.5** | 18.1 | 0.0 | 969 | 3.0 | 0.0 |
| **G37** | | **3.9** | **4.2** | 1.8 | 0.0 | 968 | 3.0 | 0.0 |
| **G38** | | 0.0 | **6.8** | 9.0 | 0.0 | 968 | 3.0 | 0.0 |
| **G39** | | 0.0 | **6.9** | 7.4 | 0.0 | 968 | 3.0 | 0.0 |
| **G40** | | 0.0 | 0.5 | 20.0 | 0.0 | 969 | 3.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.9 | 0.0 | 970 | 3.0 | 0.0 |
| **Sewer** | | 0.0 | 0.0 | 20.9 | 0.0 | 970 | 3.0 | 0.0 |
| **IPS INLET** | | **53.1** | **29.5** | 0.0 | 0.0 | 969 | 3.0 | 0.0 |

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

WYG Ireland part of the WYG group
creative minds safe hands

# LANDFILL GAS MONITORING FORM

(Baseline [ ] Ambient [ x ] )

| Site Name : | | Site Address : | | | |
|---|---|---|---|---|---|
| Dunsink Landfill | | Dunsink Lane, Dunsink, Co. Dublin | | | |
| Operator : | Fingal County Council<br>Comhairle Contae Fhine Gall | National Grid Reference : | | | |
| Site Status : | Operational | Date : | 21/12/11 | *Time:* | am |

| Instrument Used : | Normal Analytical Range | Next Calibration due: |
|---|---|---|
| GFM435 Landfill Gas Analyser | 0-100% $CH_4$, $CO_2$. | Dec-11 |

| Monitoring Personnel : | RF/PG | Weather: | Barometric Pressure : |
|---|---|---|---|
| | | Overcast, Mild | See individual readings |

## Results

| Borehole Number | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | $H_2S$ (ppm) | Atmospheric Pressure (mbar) | Temperature °C | LEL % v/v |
|---|---|---|---|---|---|---|---|---|
| **G23** | | 0.0 | 0.0 | 20.5 | 0.0 | 1009 | 7.0 | 0.0 |
| **G35** | | 0.0 | 0.0 | 20.8 | 0.0 | 1010 | 7.0 | 0.0 |
| **G36** | | 0.0 | **6.6** | 17.0 | 0.0 | 1010 | 7.0 | 0.0 |
| **G37** | | 0.0 | **3.1** | 10.0 | 0.0 | 1011 | 7.0 | 0.0 |
| **G38** | | 0.0 | **4.6** | 13.9 | 0.0 | 1010 | 7.0 | 0.0 |
| **G39** | | 0.0 | **6.8** | 10.2 | 0.0 | 1010 | 7.0 | 0.0 |
| **G40** | | 0.0 | **7.5** | 9.2 | 0.0 | 1010 | 7.0 | 0.0 |
| **Leachate Sump** | | 0.0 | 0.0 | 20.8 | 0.0 | 1010 | 7.0 | 0.0 |
| **Sewer** | | 0.0 | 0.2 | 20.7 | 0.0 | 1011 | 7.0 | 0.0 |
| **IPS INLET** | | **INACCESSIBLE** | | | | | | |

**Bold underlined text indicates methane values greater than 1%v/v and Co2 values greater than 1.5%v/v**

# APPENDIX IV

# SURFACE WATER, LAGOON & PUMPHOUSE WEEKLY INSPECTION RECORD.

**DUNSINK LANDFILL W-L 127-1 – Condition 8.2 (Schedule D.5)**

Date:
Inspected By:
Weather:

WHEELWASH REQUIRES SERVICE
**YES** ☐ **NO** ☐

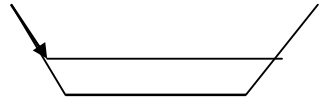
| **NUISANCES** | **SW18** | **SW7** | **SW10** | **SW2** | **SW11** | **SW9** | **SW17** | **SW19** | **WWSW 1 (Stream)** | **WWSW 2** |
|---|---|---|---|---|---|---|---|---|---|---|
| ***COLOUR*** *(clear/tinted/cloudy)* | | | | | | | | | | |
| ***ODOUR*** *(none/oily/leachate/organic)* | | | | | | | | | | |
| ***Herbaceous bank cm*** | | | | | | | | | | |
| ***Herbaceous stream cm*** | | | | | | | | | | |
| ***Algae %*** | | | | | | | | | | |
| ***Flow Rate (none/low/moderate/fast)*** | | | | | | | | | | |
| ***Depth (cm)*** | | | | | | | | | | |
| ***Vegetation cover %*** | | | | | | | | | | |
| ***Additional Parameters (OPTIONAL)*** | | | | | | | | | | |
| ***Conductivity µS*** | | | | | | | | | | |
| ***Temperature °C*** | | | | | | | | | | |
| ***pH*** | | | | | | | | | | |
| ***Dissolved oxygen (mg/l)*** | | | | | | | | | | |
| ***Dissolved oxygen (%)*** | | | | | | | | | | |

Base of lagoon Covered _____%

N

**W**
**E**

Freeboard____M

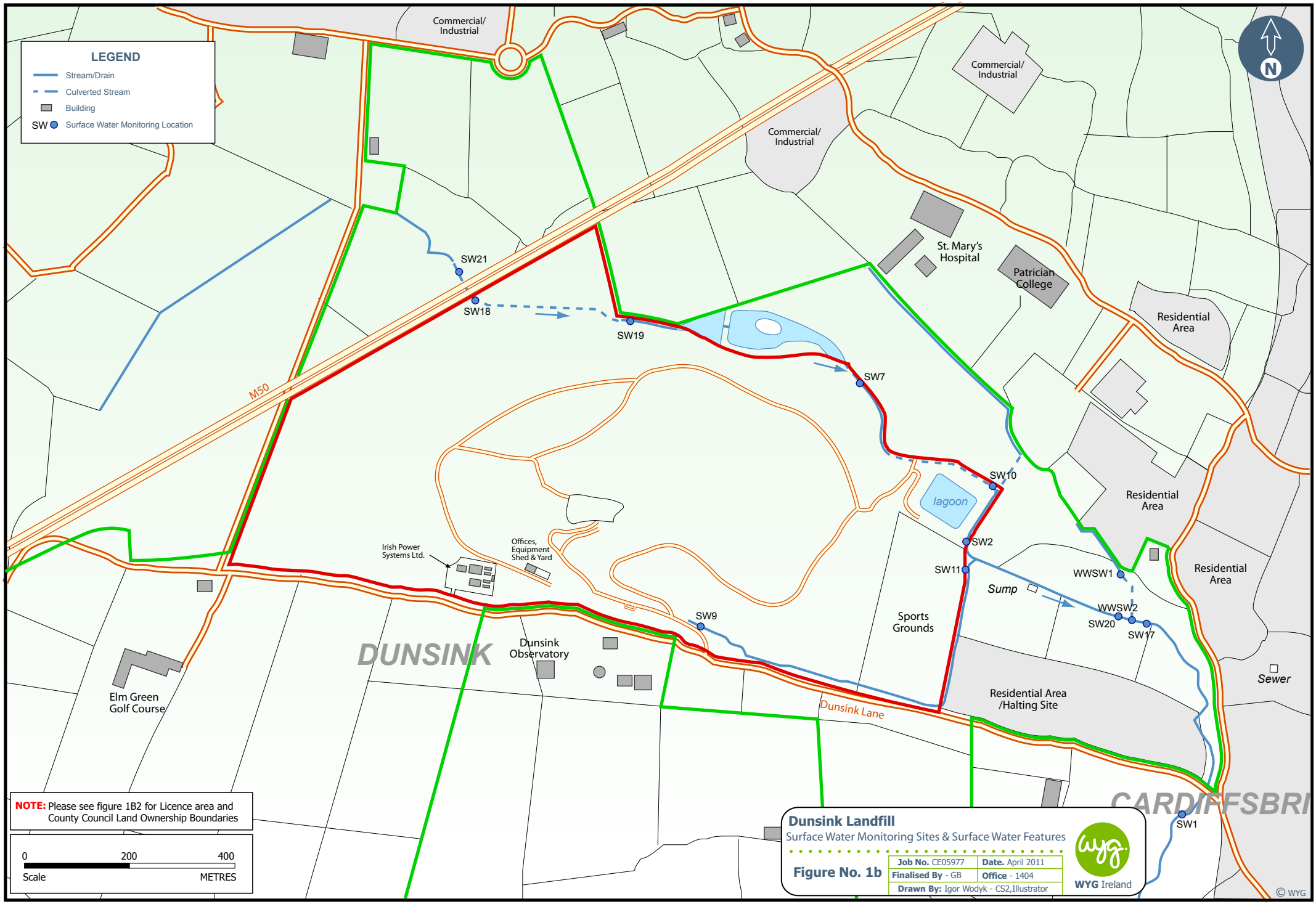


| Samples Taken: ~~Yes~~ / No<br>Photographs Taken: ~~Yes~~ / No | Inspector's Signature:<br>……. | Reviewed By:<br>…… | Site Inspector's Comments: |
|---|---|---|---|

Leachate Totaliser (litres)
_____
Time

OTHER OBSERVATIONS/ ANY IMMEDIATE ACTION REQUIRED * Cannot see base of stream for vegetation cover ** Cannot see base of stream for cloudiness of water

_____
_____
_____
_____


LEGEND
Stream/Drain
Culverted Stream
Building
SW Surface Water Monitoring Location
N
Commercial/ Industrial
Commercial/ Industrial
Commercial/ Industrial
St. Mary's Hospital
Patrician College
Residential Area
Residential Area
Residential Area
Residential Area
Residential Area /Halting Site
Sports Grounds
Dunsink Observatory
DUNSINK
Elm Green Golf Course
Irish Power Systems Ltd.
Offices, Equipment Shed & Yard
lagoon
Sump
Sewer
M50
Dunsink Lane
SW1
SW2
SW7
SW9
SW10
SW11
SW17
SW18
SW19
SW20
SW21
WWSW1
WWSW2
NOTE: Please see figure 1B2 for Licence area and County Council Land Ownership Boundaries
0
200
400
Scale
METRES
Dunsink Landfill
Surface Water Monitoring Sites & Surface Water Features
Figure No. 1b
Job No. CE05977
Date. April 2011
Finalised By - GB
Office - 1404
Drawn By: Igor Wodyk - CS2,Illustrator
WYG Ireland
© WYG

# APPENDIX V

Environmental Protection Agency

Guidance to completing the PRTR workbook

# AER Returns Workbook

Version 1.1.13

| | |
|---|---|
| **REFERENCE YEAR** | 2011 |

**1. FACILITY IDENTIFICATION**

| | |
|---|---|
| Parent Company Name | Fingal County Council |
| Facility Name | Dunsink Landfill aka Dunsink Civic Amenity |
| PRTR Identification Number | W0127 |
| Licence Number | W0127-01 |

Waste or IPPC Classes of Activity

| No. | class_name |
|---|---|
| 4.4 | Recycling or reclamation of other inorganic materials. |
| 3.4 | Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons. |
| 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. |
| 4.9 | Use of any waste principally as a fuel or other means to generate energy. |

| | |
|---|---|
| Address 1 | Dunsink Lane |
| Address 2 | Finglas |
| Address 3 | County Dublin |
| Address 4 | |
| | |
| | Dublin |
| Country | Ireland |
| Coordinates of Location | -6.33899 53.3903 |
| River Basin District | IEEA |
| NACE Code | 3832 |
| Main Economic Activity | Recovery of sorted materials |
| **AER Returns Contact Name** | Alain Kerveillant |
| **AER Returns Contact Email Address** | Alain.Kerveillant@fingalcoco.ie |
| **AER Returns Contact Position** | Assistant Scientist Waste Management Division Fingal County Council |
| **AER Returns Contact Telephone Number** | 01 8905000 |
| **AER Returns Contact Mobile Phone Number** | |
| **AER Returns Contact Fax Number** | |
| **Production Volume** | 0.0 |
| **Production Volume Units** | |
| **Number of Installations** | 0 |
| **Number of Operating Hours in Year** | 0 |
| **Number of Employees** | 0 |
| **User Feedback/Comments** | |
| **Web Address** | |

**2. PRTR CLASS ACTIVITIES**

| Activity Number | Activity Name |
|---|---|
| 50.1 | General |
| 50.1 | General |

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

| | |
|---|---|
| Is it applicable? | No |
| 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 |
| | | | | | 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 | | FLARE | ENGINE DN01 | | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | Emission Point 2 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| **01** | **Methane (CH4)** | C | OTH | Total estimated methane generated minus methane flared/utilised | 715.81 | 18610.95 | 1081710.86 | 0.0 | 1062384.1 |
| 03 | Carbon dioxide (CO2) | C | OTH | Gas Sim Data from RPS | 94870.86 | 1541750.54 | 8202635.41 | 0.0 | 6566014.01 |

* 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:** Dunsink Landfill aka Dunsink Civic Amenity

| **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) | 2028722.864 | C | Oth | Gas Sim Data from RPS | N/A | |
| Methane flared | 35075.0 | M | Oth | Data provided by Bioverda | 2500.0 | (Total Flaring Capacity) |
| Methane utilised in engine/s | 911937.0 | M | Oth | Data provided by Bioverda | 0.0 | (Total Utilising Capacity) |
| Net methane emission (as reported in Section A above) | 1081710.86 | C | C | Total generated- flared- utilise | N/A | |

## 4.2 RELEASES TO WATERS

Link to previous years emissions data



### SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

| RELEASES TO WATERS | | | | | Please enter all quantities in this section in KGs | | | |
|---|---|---|---|---|---|---|---|---|
| POLLUTANT | | | | | QUANTITY | | | |
| | | | Method Used | | | | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | 0.0 | 0.0 | 0.0 | 0.0 |

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

### SECTION B : REMAINING PRTR POLLUTANTS

| RELEASES TO WATERS | | | | | Please enter all quantities in this section in KGs | | | |
|---|---|---|---|---|---|---|---|---|
| POLLUTANT | | | | | QUANTITY | | | |
| | | | Method Used | | | | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | 0.0 | 0.0 | 0.0 | 0.0 |

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

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

| RELEASES TO WATERS | | | | | Please enter all quantities in this section in KGs | | | |
|---|---|---|---|---|---|---|---|---|
| POLLUTANT | | | | | QUANTITY | | | |
| | | | Method Used | | | | | |
| Pollutant No. | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | 0.0 | 0.0 | 0.0 | 0.0 |

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

## 4.3 RELEASES TO WASTEWATER OR SEWER

Link to previous years emissions data

### SECTION A : PRTR POLLUTANTS

| OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER | | | | | 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 B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

| OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER | | | | | 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

## 4.4 RELEASES TO LAND

Link to previous years emissions data



### SECTION A : PRTR POLLUTANTS

| RELEASES TO LAND | | | | | 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 |
| | | | | | 0.0 | 0.0 | 0.0 |

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

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

| RELEASES TO LAND | | | | | 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 |
| | | | | | 0.0 | 0.0 | 0.0 |

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

## 5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE



**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** | 147692.0 | landfill leachate other than those mentioned in 19 07 02 | D9 | M | Volume Calculation | Offsite in Ireland | Dublin City Council Waste Water Treatment Facility,D0034-01 | .,Ringsend,Dublin 4,.,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